Appendix B

Internal Barr Memorandum from Miguel Wong to John Borovsky and Keith Pilgrim, dated July 18, 2007, Regarding Wet and Dry Periods of Precipitation



# Internal Memorandum

| То:      | John Borovsky, Keith Pilgrim         |
|----------|--------------------------------------|
| From:    | Miguel Wong                          |
| Subject: | Wet and dry periods of precipitation |
| Date:    | May 18, 2007                         |
| Project: | 23/69-862-015-074                    |
| c:       | Greg Williams                        |

### Introduction

This memo presents the results of the statistical analysis of precipitation data representative of the long-term climatic conditions in the Partridge River and Embarrass River watersheds. These results will be used as a reference to determine whether the periods of water quality monitoring in the two referred watersheds corresponded to wet or dry flow conditions; flow data is available for the Partridge River and Embarrass River, but such data do not necessarily cover the same periods of water quality monitoring.

### Data Available

### Water Quality Monitoring

Water quality data in the Partridge River watershed and/or Embarrass River watershed are available for the following periods:

- 1955-1966.
- 1974-1979.
- 2001-2002.
- 2004.
- 2006.

Most of the water quality data is from two periods: 1970's and 2000's.

### **USGS Flow Gaging Stations**

Daily flow data in the Partridge River watershed and Embarrass River watershed are available for the following periods:

- USGS gaging station # 04015455, South Branch Partridge River near Babbitt from June 1, 1977 to November 5, 1980.
- USGS gaging station # 04015475, Partridge River above Colby Lake at Hoyt Lakes from September 19, 1978 to November 2, 1988.
- USGS gaging station # 04015500, Second Creek near Aurora from April 1, 1955 to September 30, 1980.
- USGS gaging station # 04016000, Partridge River near Aurora from August 1, 1942 to September 30, 1982.
- USGS gaging station # 04017000, Embarrass River at Embarrass from August 1, 1942 to December 31, 1964.
- USGS gaging station # 04018000, Embarrass River near McKinley from October 1, 1953 to September 30, 1962.

There is not flow gaging station that covers both the 1970's and the 2000's in either the Partridge River or the Embarrass River. Although the flow data available includes periods of wet and dry flows (see discussion in RS73B for the Partridge River, and in RS74 for the Embarrass River), a direct comparison of flows in the 1970's and 2000's is not possible from the flow data itself.

#### Precipitation

The Minnesota Department of Natural Resources (MnDNR) follows the definition given by the Climate Prediction Center of the National Weather Service (NWS), which considers a climate normal as that given by 30 years of recent data. The current definition corresponds to the period 1971-2001.

Monthly precipitation data is available from the NWS weather station (Coop ID) # 218311, Tower 3S – from January 1926 to March 2007. This precipitation record, limited to the period 1971-2001, has been used to obtain precipitation statistics that are considered representative for both the Partridge River and Embarrass River watersheds.

In addition, monthly precipitation data is available from the NWS weather station (Coop ID) # 210387, Babbitt (Partridge River watershed) – from June 1999 to March 2007, and from the NWS weather station (Coop ID) # 212576, Embarrass (Embarrass River watershed) – from January 1995 to

March 2007. Information for Water Years (October to September) 2005 and 2006 is incomplete in both the Babbitt and Embarrass precipitation records.

### **Statistical Analysis**

A frequency analysis was conducted on the annual precipitation record of the weather station at Tower 3S for the period 1971-2001. A normal probability distribution provided a good fit of the transformed (cubic root) series of annual precipitation values (Shahin et al., 1993). The annual precipitation varied between a maximum of 38.4 inches and a minimum of 22.2 inches, with a mean annual value of 29.3 inches and a standard deviation of 5.1 inches.

Using the Tower 3S precipitation record and the normal probability distribution obtained from the statistical fitting described above, the probability of non-exceedance of precipitation (used as a proxy for flows) during 1955-1966 and 1974-1979 resulted in:

| Water Year (October to September) | Probability of non-exceedance |
|-----------------------------------|-------------------------------|
| 1954                              | 4.8%                          |
| 1955                              | 4.1%                          |
| 1956                              | 40.3%                         |
| 1957                              | 9.9%                          |
| 1958                              | 51.3%                         |
| 1959                              | 8.9%                          |
| 1960                              | 32.3%                         |
| 1961                              | 56.9%                         |
| 1962                              | 17.2%                         |
| 1963                              | 75.7%                         |
| 1964                              | 71.0%                         |
| 1965                              | 63.6%                         |
| 1966                              | 21.5%                         |
|                                   |                               |
| 1973                              | 78.9%                         |
| 1974                              | 78.3%                         |
| 1975                              | 9.9%                          |
| 1976                              | 92.2%                         |
| 1977                              | 85.9%                         |
| 1978                              | 14.4%                         |
| 1979                              | 38.1%                         |

Using the Babbitt (Partridge River watershed) precipitation record and the normal probability distribution obtained from the statistical fitting described above, the probability of non-exceedance of precipitation (used as a proxy for flows) during the 2000's resulted in:

| Water Year (October to September) | Probability of non-exceedance |
|-----------------------------------|-------------------------------|
| 2000                              | 96.5%                         |
| 2001                              | 34.3%                         |
| 2002                              | 16.9%                         |
| 2003                              | 13.7%                         |
| 2004                              | 69.3%                         |

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Using the Embarrass (Embarrass River watershed) precipitation record and the normal probability distribution obtained from the statistical fitting described above, the probability of non-exceedance of precipitation (used as a proxy for flows) during the 2000's resulted in:

| Water Year (October to September) | Probability of non-exceedance |
|-----------------------------------|-------------------------------|
| 2000                              | 72.8%                         |
| 2001                              | 28.9%                         |
| 2002                              | 24.1%                         |
| 2003                              | 15.6%                         |
| 2004                              | 30.0%                         |

### References

Shahin, M., van Oorschot, H.J.L., and De Lange, S.J. (1993). Statistical Analysis in Water Resources Engineering – Balkema, Rotterdam, the Netherlands. 393 pp.

Appendix C

Internal Barr Memorandum From Miguel Wong To Project File Dated May 7, 2007 Regarding Embarrass River USGS Gage Flow Data



# Internal Memorandum

To:Project FileFrom:Miguel WongSubject:Embarrass River - USGS Gage Flow DataDate:May 7, 2007Project:23/69-862-015-074c:C:

### Introduction

This memo a) summarizes the information available on daily stream flows at USGS gaging stations located within the Embarrass River watershed, and b) provides flow estimates for average, wet and dry weather conditions at two surface water monitoring stations in the Embarrass River.

### **USGS Gage Flow Data**

Daily flows in the Embarrass River watershed are available at:

- USGS gaging station # 04017000 Embarrass River at Embarrass, Minnesota Drainage area = 88.3 square miles August 1, 1942 through December 31, 1964; and,
- USGS gaging station # 04018000 Embarrass River near McKinley, Minnesota Drainage area = 171.0 square miles October 1, 1953 through September 30, 1962.

Figure 1 shows that the time series of flow per unit catchment area at the two USGS gaging stations of the Embarrass River are very similar for the coincident period of record October 1, 1953 through September 30, 1962; the coefficient of correlation is 0.90. Flows recorded in the gaging station Embarrass River at Embarrass during 1953-1962, denoted by the green double-arrow in Figure 2, were on the average 36% smaller than those recorded at the same gaging station during 1942-1953. Precipitation records indicate the annual average snowfall during 1953-1962 was 25% smaller than that recorded during the previous decade, and most of the difference in the annual average flows observed at the Embarrass River at Embarrass before and during the coincident period of record referred to above can be explained by the difference in high flows occurring during spring snowmelt events. The decrease in flows during 1953-1962 was thus in response to natural climatic variability. Therefore, the entire period of record of the gaging station Embarrass River at Embarrass has been selected as representative of the hydrology at the two surface water monitoring stations in the Embarrass River.

### **Flow Estimates**

Three statistics have been computed for the time series of flow yields at the gaging station Embarrass River at Embarrass:

- Mean annual flow = 0.73 cubic feet per second per square mile of catchment area;
- Average of the 1-day maximum annual flows = 7.6 cubic feet per second per square mile of catchment area; and,
- Average of the 30-day minimum annual flows = 0.045 cubic feet per second per square mile of catchment area.

These flow yield statistics represent average, wet and dry weather conditions for the entire Embarrass River watershed, respectively. The corresponding flow values at the two surface water monitoring stations in the Embarrass River are:

Station PM-12 (18.9 square miles)

- Average flow = 13.8 cubic feet per second.
- Wet flow = 144.4 cubic feet per second.
- Dry flow = 0.9 cubic feet per second.

Station PM-13 (111.8 square miles)

- Average flow = 81.5 cubic feet per second.
- Wet flow = 853.1 cubic feet per second.
- Dry flow = 5.1 cubic feet per second.

To:Project FileFrom:Miguel WongSubject:Embarrass River - USGS Gage Flow DataDate:May 7, 2007Project:23/69-862-015-074Page:3

Figure 1: Time series of flow yields at the two gaging stations in the Embarrass River for the coincident period of record 1953-1962



To:Project FileFrom:Miguel WongSubject:Embarrass River - USGS Gage Flow DataDate:May 7, 2007Project:23/69-862-015-074Page:4

Figure 2: Time series of flow yields at the gaging station in the Embarrass River at Embarrass for the entire period of record 1942-1964



Appendix D

MPCA Baseline Water Quality Data: Quaternary Aquifer Wells within the Copper Nickel Study Area

#### MPCA Baseline Water Quality Data: Quaternary Aquifer Wells within the Copper Nickel Study Area

| ID Number                           |        | GWMAP00716      | GWMAP00906      | GWMAP01189      | GWMAP00759  | GWMAP00889  | GWMAP01038  |
|-------------------------------------|--------|-----------------|-----------------|-----------------|-------------|-------------|-------------|
| Universal Trans                     |        | 561261          | 556345          | 577600          | 577858      | 555021      | 553861      |
| Mercator - east                     |        | 501201          | 550545          | 511099          | 577858      | 555921      | 555801      |
| Universal Trans<br>Mercator - north |        | 5285293         | 5247911         | 5285468         | 5285406     | 5248401     | 5266949     |
| County                              |        | St Louis        | St Louis        | St Louis        | St Louis    | St Louis    | St Louis    |
| MPCA Region                         |        | 1               | 1               | 1               | 1           | 1           | 1           |
| Well Use                            |        | Domestic        | Domestic        | Domestic        | Domestic    | Domestic    | Domestic    |
| Well Diameter                       | inch   | 4               | 4               | 6               | 4           | 4           | 6           |
| CWI Aquifer Code                    | шен    | OBAA            | OBAA            | OBAA            | OWTA        | OWTA        | OWTA        |
|                                     |        | Buried artesian | Buried artesian | Buried artesian | Water table | Water table | Water table |
| Aquifer                             |        | aquifer         | aquifer         | aquifer         | aquifer     | aquifer     | aquifer     |
| 1.10.0                              |        | buried          | buried          | buried          | surficial   | surficial   | surficial   |
| Aquifer Group                       |        | Quaternary      | Quaternary      | Quaternary      | Quaternary  | Quaternary  | Quaternary  |
| Well Depth                          | ft     | 136             | 117             | 152             | 151         | 148         | 86          |
| Water Level                         | ft     | 10              | 25              | 12              | 0           | 14          | 35          |
| Sampling Date                       |        | 9/14/1995       | 8/22/1995       | 8/21/1996       | 9/14/1995   | 8/22/1995   | 6/5/1996    |
| VOC Detected                        | 14 - A | yes             | yes             | no              | no          | no          | no          |
| Alkalinity                          | ug/L   | 112000          | 282000          | 125000          | 164000      | 290000      | 95000       |
| Aluminum                            | ug/L   | 257.73          | 1.14            | 869.82          | 756.46      | 1.59        | 6.49        |
| Antimony                            | ug/L   | 0.007           | 0.050           | 0.007           | 0.030       | 0.020       | 0.015       |
| Arsenic                             | ug/L   | 12.800          | 2.950           | 1.670           | 6.140       | 2.510       | 0.090       |
| Barium                              | ug/L   | 133.7           | 41.5            | 61.2            | 144.7       | 35.4        | 75.0        |
| Beryllium                           | ug/L   | 0.0400          | 0.0050          | 0.0600          | 0.0600      | 0.0050      | 0.0050      |
| Bismuth                             | ug/L   | 0.0300          | 0.0300          | 0.0300          | 0.0300      | 0.0300      | 0.0300      |
| Boron                               | ug/L   | 14.8            | 93.0            | 14.3            | 27.6        | 65.4        | 12.0        |
| Bromide                             | ug/L   | 0.100           | 0.100           | 0.100           | 0.100       | 0.100       | 0.100       |
| Cadmium                             | ug/L   | 0.010           | 0.010           | 0.030           | 0.190       | 0.010       | 0.110       |
| Calcium                             | ug/L   | 35477           | 27306           | 37426           | 57016       | 47169       | 40874       |
| Cesium                              | ug/L   | 0.070           | 0.360           | 0.110           | 0.060       | 0.270       | 0.009       |
| Chloride                            | ug/L   | 520             | 16320           | 10340           | 16340       | 2020        | 6610        |
| Chromium                            | ug/L   | 2.49            | 0.04            | 3.76            | 5.03        | 0.04        | 0.08        |
| Cobalt                              | ug/L   | 0.780           | 0.170           | 2.403           | 1.870       | 0.300       | 0.779       |
| Copper                              | ug/L   | 530.4           | 9.6             | 7.4             | 140.0       | 11.8        | 8.3         |
| Dissolved oxygen                    | ug/L   | 290             | 290             | 290             | 290         | 290         | 290         |
| Eh                                  | mV     | 86              | 276             | -28             | 186         | 260         | 174         |
| Fluoride                            | ug/L   | 200             | 630             |                 | 220         | 550         |             |
| Iron                                | ug/L   | 4173.5          | 252.0           | 2281.2          | 13773.6     | 894.7       | 461.3       |
| Lead                                | ug/L   | 25.32           | 1.31            | 1.71            | 10.57       | 0.02        | 0.32        |
| Lithium                             | ug/L   | 4.4             | 15.8            | 4.4             | 4.4         | 16.5        | 4.4         |
| Magnesium                           | ug/L   | 6195            | 49755           | 10433           | 18118       | 37601       | 5356        |
| Manganese                           | ug/L   | 466.5           | 94.4            | 166.2           | 300.8       | 288.2       | 202.6       |
| Mercury                             |        |                 |                 |                 |             |             |             |
| Molybdenum                          | ug/L   | 4.10            | 9.40            | 4.10            | 4.10        | 10.00       | 4.10        |
| Nickel                              | ug/L   | 6.60            | 11.90           | 5.90            | 8.50        | 12.80       | 5.90        |
| Nitrate-N                           | ug/L   | 490             | 490             | 490             | 490         | 490         | 490         |
| Oxidation-reduction<br>potential    | mV     | -137            | 54              | -248            | -35         | 40          | -47         |
| pH                                  |        | 7.90            | 8.30            | 8.26            | 7.90        | 7.80        | 7.03        |
| Total Phosphorus                    | ug/L   | 212.4           | 164.7           | 84.0            | 440.5       | 72.0        | 14.8        |
| Potassium                           | ug/L   | 1637            | 2782            | 1691            | 2555        | 2705        | 1336        |
| Rubidium                            | ug/L   | 555             | 555             | 555             | 555         | 555         | 555         |
| Selenium                            | ug/L   | 3.4             | 2.5             | 0.9             | 9.0         | 3.7         | 0.9         |
| Silica                              | ug/L   | 12998           | 5616            | 7221            | 12200       | 9129        | 7959        |

| ID Number                 |          | GWMAP00716 | GWMAP00906 | GWMAP01189 | GWMAP00759 | GWMAP00889 | GWMAP01038 |
|---------------------------|----------|------------|------------|------------|------------|------------|------------|
| Silver                    | ug/L     | 0.008      | 0.020      | 0.008      | 0.030      | 0.008      | 0.008      |
| Sodium                    | ug/L     | 3451       | 19119      | 4670       | 5152       | 11455      | 2498       |
| Specific<br>Conductance   | mmhos/cm | 0.215      | 0.586      | 0.277      | 0.405      | 0.544      | 0.260      |
| Strontium                 | ug/L     | 136.5      | 282.5      | 133.4      | 156.6      | 212.2      | 91.8       |
| Sulfate-S                 | ug/L     | 120        | 1500       | 2650       | 4860       | 90         | 5690       |
| Sulfate                   | ug/L     | 360        | 4500       | 7950       | 14580      | 270        | 17070      |
| Total Sulfur              | ug/L     | 212        | 1678       | 2877       | 5059       | 160        | 5698       |
| Temperature               | °C       | 6.4        | 7.6        | 8.5        | 8.0        | 8.5        | 8.2        |
| Thallium                  | ug/L     | 0.004      | 0.004      | 0.032      | 0.004      | 0.004      | 0.009      |
| Tin                       | ug/L     | 0.650      | 0.050      | 0.030      | 0.110      | 0.030      | 0.310      |
| Titanium                  | ug/L     | 0.0117     | 0.0062     | 0.0141     | 0.0176     | 0.0069     | 0.0034     |
| Total dissolved solids    | ug/L     | 156000     | 332000     | 168000     | 250000     | 344000     | 186000     |
| Total organic carbon      | ug/L     | 5600       | 1800       | 1800       | 2300       | 2600       | 1300       |
| Total phosphate-P         | ug/L     | 200        | 140        | 50         | 1020       | 40         | 10         |
| Total suspended<br>solids | ug/L     | 18000      | 2000       | 112000     | 26000      | 2000       | 2000       |
| Tritium                   | ug/L     |            | 0.7        | 22.2       |            |            |            |
| Vanadium                  | ug/L     | 4.6        | 10.9       | 5.6        | 10.9       | 11.9       | 5.2        |
| Zinc                      | ug/L     | 169.1      | 12.2       | 8.5        | 76.2       | 11.0       | 2.6        |
| Zirconium                 | ug/L     | 0.280      | 0.040      | 0.650      | 0.230      | 0.090      | 0.020      |

#### MPCA Baseline Water Quality Data: Quaternary Aquifer Wells within the Copper Nickel Study Area

Data from Minnesota Pollution Control Agency's Ground Water Monitoring and Assessment Program (GWMAP) Baseline Data Sets http://www.pca.state.mn.us/water/groundwater/gwmap/gwbaseline.html

# Appendix E

Calibration of Mass Balance Models for Embarrass River Watershed

# Embarrass River Model - Calibration to Baseline Water Quality Data Parameter: Silver

|              | surface water flow into PM-12                                   | Q_s12 =             | 12.60        | (cfs)  |
|--------------|---|---------------------|--------------|--------|
| ata          | surface water flow into PM-13                                   | Q_s13 =             | 48.51        | (cfs)  |
| Ő            | Babbitt WWTP discharge  | Q_sBab =            | 0.33         | (cfs)  |
| N N          | Area 5 Pit NW discharge   | Q_spit =            | 1.99         | (cfs)  |
| 님            | LTVSMC Tailings Basin seepage                                   | $Q_{ts} =$          | 11.50        | (CIS)  |
| t            | around water flow into PM 12                                    | $Q_{1}$ = $Q_{1}$   | 0.00         | (CIS)  |
| du           | ground water flow into PM-12                                    | $Q_{g12} = 0.013 =$ | 0.00<br>4 21 | (CIS)  |
|              |   | &_g10 =             | 7.21         | (013)  |
|              | concentration of surface water into PM-12                       | C s12 =             | 0.11         | (µq/l) |
| Data         | concentration of surface water into PM-13                       | <br>C_s13 =         | 0.11         | (µa/l) |
| u L          | concentration of WWTP discharge                                 | <br>C_sBab =        | 0.11         | (µa/l) |
| atic         | concentration of Area 5 Pit NW discharge                        | C_spit =            | 0.16         | (ug/l) |
| entr         | concentration of LTVSMC Tailings Basin seepage                  | C fs =              | 0.1          | (µg/l) |
| DUC          | concentration of Hydrometallurgical Residue Cells Liner Leakage | C rrs =             | 0            |        |
| Ŭ            | concentration of ground water flow into PM-12                   | C g12 =             | 0.008        | (µg/l) |
| ndu          | concentration of ground water flow into PM-13                   | C q13 =             | 0.008        | (µg/l) |
|              | J   | 9.0                 |              | (1-3-7 |
| e            | flow in river at PM-12  | Q_r12 =             | 13.79        | (cfs)  |
| ater<br>Ian  | flow in river at PM-13  | Q_r13 =             | 80.00        | (cfs)  |
| Ba           | flow check  | Q_ck =              | 80.00        | (cfs)  |
|              |   |                     |              |        |
|              | mass flux of surface water into PM-12                           | M_s12 =             | 39           | (µg/s) |
|              | mass flux of surface water into PM-13                           | M_s13 =             | 151          | (µg/s) |
| of           | mass flux of Babbitt WWTP                                       | M_sBab =            | 1            | (µg/s) |
| u v          | concentration of Area 5 Pit NW discharge                        | M_spit =            | 9            | (µg/s) |
| El t         | concentration of LTVSMC Tailings Basin seepage                  | M_fs =              | 33           | (µg/s) |
| ss s         | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =             | 0            | (µg/s) |
| Calc<br>Mas  | mass flux of ground water into PM-12                            | M_g12 =             | 0            | (µg/s) |
| 02           | mass flux of ground water into PM-13                            | M_g13 =             | 1            | (µg/s) |
|              |   |                     |              |        |
| )ce          | mass flux in river at PM-12                                     | M_r12 =             | 40           | (µg/s) |
| lass<br>alar |   |                     |              |        |
| Σä           | mass flux in river at PM-13                                     | M_r13 =             | 234          | (µg/s) |
| C            |   |                     |              |        |
| L ioi        |   |                     |              |        |
| itec         | concentration in river at PM-12                                 | C_r12 =             | 0.10         | (µg/l) |
| cer          |   |                     |              |        |
| alc          |   |                     |              | 4 AT   |
| 00           | Iconcentration in river at PM-13                                | C_r13 =             | 0.10         | (µg/l) |
| C            |   |                     |              |        |
| atio         |   |                     |              |        |
| /ed<br>ntra  | Observed concentration in river at PM-12                        |                     | ND (0.2)     | (µg/l) |
| sen          |   |                     |              |        |
| D p          | Observed concentration in river at PM-13                        |                     | ND (0.2)     | (ua/l) |
|              |   | I                   | 110 (0.2)    | \M9''/ |

# Embarrass River Model - Calibration to Baseline Water Quality Data Parameter: Aluminum

|             | surface water flow into PM-12                                   | Q_s12 =     | 11.54    | (cfs)          |
|-------------|---|-------------|----------|----------------|
| ta          | surface water flow into PM-13                                   | Q_s13 =     | 43.27    | (cfs)          |
| Da          | Babbitt WWTP discharge  | Q_sBab =    | 0.33     | (cfs)          |
| ≥<br>≥      | Area 5 Pit NW discharge   | Q_spit =    | 1.99     | (cfs)          |
| O<br>L      | LTVSMC Tailings Basin seepage                                   | Q_fs =      | 11.50    | (cfs)          |
| rt I        | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =     | 0.00     | (CfS)          |
| đu          | ground water flow into PM-12                                    | $Q_{g12} =$ | 0.86     | (CfS)          |
|             | Iground water now into PM-13                                    | Q_g13 =     | 4.21     | (CIS)          |
|             | concentration of ourface water into DM 10                       | C a12       | 0.1      | (ma/l)         |
| Ita         |   | 0_\$12 =    | 0.1      | (mg/i)         |
| Da          | concentration of surface water into PM-13                       | C_s13 =     | 0.1      | (mg/l)         |
| u.          | concentration of WWTP discharge                                 | C_sBab =    | 0.1      | (mg/l)         |
| trat        | concentration of Area 5 Pit NW discharge                        | C_spit =    | 0.0125   | (mg/l)         |
| iu a        | concentration of LTVSMC Tailings Basin seepage                  | C_fs =      | 1.5788   | (mg/l)         |
| ouo         | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =     | 0        | (mg/l)         |
| U<br>T      | concentration of ground water flow into PM-12                   | C_g12 =     | 0.025    | (mg/l)         |
| Idu         | concentration of ground water flow into PM-13                   | C g13 =     | 0.025    | (mg/l)         |
|             |   | <u> </u>    | 0.020    | \ ··· ອ··/     |
| ø           | flow in river at PM-12  | Q_r12 =     | 12.73    | (cfs)          |
| tter<br>and | flow in river at PM-13  | <br>Q_r13 = | 73.70    | (cfs)          |
| Wa<br>Bal   | flow check  | Q ck =      | 73.70    | (cfs)          |
|             |   |             |          | (0.0)          |
|             | mass flux of surface water into PM-12                           | M s12 =     | 33       | (ma/l)         |
|             | mass flux of surface water into PM-13                           | M s13 =     | 122      | (mg/l)         |
| of          | mass flux of Babbitt WWTP                                       | M_sBab =    | 1        | (mg/l)         |
| Б×          | concentration of Area 5 Pit NW discharge                        | M_spit =    | 1        | (mg/l)         |
| -Iu atic    | concentration of LTVSMC Tailings Basin seepage                  | M_fs =      | 514      | (mg/l)         |
| s F s       | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =     | 0        | (mg/l)         |
| alc<br>as   | mass flux of ground water into PM-12                            | M_g12 =     | 1        | (mg/l)         |
| ΰΣ          | mass flux of ground water into PM-13                            | M_g13 =     | 3        | (mg/l)         |
|             |   |             |          |                |
| e           | mass flux in river at PM-12                                     | M r12 =     | 34       | (ma/s)         |
| ss<br>and   |   |             |          | ( <u>9</u> /0) |
| Ma<br>Bal   | mass flux in river at PM-13                                     | M r13 =     | 674      | (ma/s)         |
|             | 1   | <u> </u>    | <b>.</b> | ( ····;) ···/  |
| L<br>L      |   |             |          |                |
| d<br>atio   |   |             |          |                |
| ate<br>ntra | concentration in river at PM-12                                 | C_r12 =     | 0.09     | (mg/l)         |
| culs        |   |             |          |                |
| Calc        | concentration in river at DM 12                                 | C r12       | 0.00     | (ma/l)         |
| 00          | Concentration in river at FIVE 13                               | 0_113 =     | 0.32     | (119/1)        |
| 2           |   |             |          |                |
| atio        |   |             |          |                |
| /ed<br>ntra | Observed concentration in river at PM-12                        |             | 0.10     | (mg/l)         |
| sen         |   |             |          |                |
| SdC<br>Do   | Observed concentration in river at DM 12                        |             | 0.10     | (ma/l)         |
| 00          |   |             | 0.19     | (IIIg/I)       |

### Parameter: Arsenic

| surface water flow into PM-12 Q_s12 = 12.60 (cfs)<br>surface water flow into PM-13 Q_s13 = 48.51 (cfs)<br>Babbitt WWTP discharge Q_spit = 0.33 (cfs)<br>Area 5 Pit NW discharge Q_spit = 1.99 (cfs)<br>LTVSMC Tailings Basin seepage Q_fs = 11.50 (cfs)<br>Hydrometallurgical Residue Cells Liner Leakage Q_rrs = 0.00 (cfs)<br>ground water flow into PM-12 Q_g12 = 0.86 (cfs)<br>ground water flow into PM-13 Q_g13 = 4.21 (cfs)<br>concentration of surface water into PM-13 C_s13 = 0.75 (µg/l)<br>concentration of surface water into PM-13 C_s13 = 0.75 (µg/l)<br>concentration of Area 5 Pit NW discharge C_spit = 1 (µg/l)<br>concentration of LTVSMC Tailings Basin seepage C_fs = 2.905 (µg/l)<br>concentration of ground water flow into PM-12 C_g12 = 2.73 (µg/l)<br>concentration of ground water flow into PM-13 C_g13 = 2.73 (µg/l)<br>concentration of ground water flow into PM-13 C_g13 = 2.73 (µg/l)<br>concentration of ground water flow into PM-13 C_g13 = 2.73 (µg/l)<br>concentration of ground water flow into PM-13 C_g13 = 2.73 (µg/l)<br>concentration of ground water flow into PM-13 C_g13 = 2.73 (µg/l)<br>concentration of ground water flow into PM-13 C_g13 = 2.73 (µg/l)<br>flow in river at PM-12 Q_r12 = 13.79 (cfs)<br>flow in river at PM-13 Q_r13 = 80.00 (cfs)<br>flow check Q_0 ck = 80.00 (cfs)   |
|--|
| The second se  |
| Area 5 Pit NW dischargeQ_spit = $0.33$ (cfs)Area 5 Pit NW dischargeQ_spit = $1.99$ (cfs)LTVSMC Tailings Basin seepageQ_fs = $11.50$ (cfs)ground water flow into PM-12Q_g12 = $0.00$ (cfs)ground water flow into PM-13Q_g13 = $4.21$ (cfs)ground water flow into PM-13Q_g13 = $4.21$ (cfs)concentration of surface water into PM-13C_s13 = $0.75$ (µg/l)concentration of surface water into PM-13C_s13 = $0.75$ (µg/l)concentration of Area 5 Pit NW dischargeC_sbab = $0.75$ (µg/l)concentration of LTVSMC Tailings Basin seepageC_fs = $2.905$ (µg/l)concentration of ground water flow into PM-12C_g12 = $2.73$ (µg/l)concentration of ground water flow into PM-13C_g13 = $2.73$ (µg/l)concentration of ground water flow into PM-13C_g13 = $2.73$ (µg/l)tow in river at PM-12Q_r12 = $13.79$ (cfs)flow in river at PM-13Q_r13 = $80.00$ (cfs)flow in river at PM-13Q_r13 = $80.00$ (cfs)   |
| Area 5 Pit NW discharge $O_spit =$ $1.99$ (cfs)LTVSMC Tailings Basin seepageQ_fs = $11.50$ (cfs)Hydrometallurgical Residue Cells Liner LeakageQ_rrs = $0.00$ (cfs)ground water flow into PM-12Q_g12 = $0.86$ (cfs)ground water flow into PM-13Q_g13 = $4.21$ (cfs)concentration of surface water into PM-13C_s12 = $0.75$ (µg/l)concentration of surface water into PM-13C_s13 = $0.75$ (µg/l)concentration of Area 5 Pit NW dischargeC_sbab = $0.75$ (µg/l)concentration of LTVSMC Tailings Basin seepageC_fs = $2.905$ (µg/l)concentration of ground water flow into PM-12C_g12 = $2.73$ (µg/l)concentration of ground water flow into PM-13C_g12 = $2.73$ (µg/l)concentration of ground water flow into PM-13C_g13 = $2.73$ (µg/l)flow in river at PM-12Q_r12 = $13.79$ (cfs)flow in river at PM-13Q_r13 = $80.00$ (cfs)flow in river at PM-13Q_r13 = $80.00$ (cfs)   |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $  |
| Hydrothetatidigical Residue Cens Lifter Leakage $Q_ns =$ $0.00 (cts)$ ground water flow into PM-12 $Q_g12 =$ $0.86 (cfs)$ ground water flow into PM-13 $Q_g13 =$ $4.21 (cfs)$ concentration of surface water into PM-12 $C_s12 =$ $0.75 (\mu g/l)$ concentration of surface water into PM-13 $C_s13 =$ $0.75 (\mu g/l)$ concentration of WWTP discharge $C_sBab =$ $0.75 (\mu g/l)$ concentration of Area 5 Pit NW discharge $C_spit =$ $1 (\mu g/l)$ concentration of LTVSMC Tailings Basin seepage $C_fs =$ $2.905 (\mu g/l)$ concentration of ground water flow into PM-12 $C_g12 =$ $2.73 (\mu g/l)$ concentration of ground water flow into PM-13 $C_g13 =$ $2.73 (\mu g/l)$ flow in river at PM-12 $Q_r12 =$ $13.79 (cfs)$ flow in river at PM-13 $Q_r13 =$ $80.00 (cfs)$  |
| Operation  |
| Image: concentration of surface water into PM-12C_s12 =0.75 (µg/l)concentration of surface water into PM-13C_s13 =0.75 (µg/l)concentration of WWTP dischargeC_sBab =0.75 (µg/l)concentration of Area 5 Pit NW dischargeC_spit =1 (µg/l)concentration of LTVSMC Tailings Basin seepageC_fs =2.905 (µg/l)concentration of ground water flow into PM-12C_g12 =2.73 (µg/l)concentration of ground water flow into PM-13C_g13 =2.73 (µg/l)flow in river at PM-12Q_r12 =13.79 (cfs)flow in river at PM-13Q_r13 =80.00 (cfs)flow checkQ_cfs0.00 (cfs)   |
| the property concentration of surface water into PM-12C_s12 = $0.75$ (µg/l)concentration of surface water into PM-13C_s13 = $0.75$ (µg/l)concentration of WWTP dischargeC_sBab = $0.75$ (µg/l)concentration of Area 5 Pit NW dischargeC_spit =1 (µg/l)concentration of LTVSMC Tailings Basin seepageC_fs = $2.905$ (µg/l)concentration of Hydrometallurgical Residue Cells Liner LeakageC_rrs =0concentration of ground water flow into PM-12C_g12 = $2.73$ (µg/l)concentration of ground water flow into PM-13C_g13 = $2.73$ (µg/l)flow in river at PM-12Q_r12 = $13.79$ (cfs)flow in river at PM-13Q_r13 = $80.00$ (cfs)flow we heekO we heekO we heek0 we heek  |
| tempconcentration of surface water into PM-12 $C_s12 =$ $0.75 (\mu g/l)$ concentration of surface water into PM-13 $C_s13 =$ $0.75 (\mu g/l)$ concentration of WWTP discharge $C_sBab =$ $0.75 (\mu g/l)$ concentration of Area 5 Pit NW discharge $C_spit =$ 1 ( $\mu g/l)$ concentration of LTVSMC Tailings Basin seepage $C_fs =$ $2.905 (\mu g/l)$ concentration of Hydrometallurgical Residue Cells Liner Leakage $C_rrs =$ 0concentration of ground water flow into PM-12 $C_g12 =$ $2.73 (\mu g/l)$ concentration of ground water flow into PM-13 $C_g13 =$ $2.73 (\mu g/l)$ flow in river at PM-12 $Q_r12 =$ $13.79 (cfs)$ flow in river at PM-13 $Q_r13 =$ $80.00 (cfs)$ flow in river at PM-13 $Q_r6 =$ $80.00 (cfs)$  |
| Image: concentration of surface water into PM-13 $C_s13 =$ $0.75 (\mu g/l)$ concentration of WWTP discharge $C_sBab =$ $0.75 (\mu g/l)$ concentration of Area 5 Pit NW discharge $C_spit =$ $1 (\mu g/l)$ concentration of LTVSMC Tailings Basin seepage $C_fs =$ $2.905 (\mu g/l)$ concentration of Hydrometallurgical Residue Cells Liner Leakage $C_rrs =$ $0$ concentration of ground water flow into PM-12 $C_g12 =$ $2.73 (\mu g/l)$ concentration of ground water flow into PM-13 $C_g13 =$ $2.73 (\mu g/l)$ flow in river at PM-12 $Q_r12 =$ $13.79 (cfs)$ flow in river at PM-13 $Q_r13 =$ $80.00 (cfs)$ flow check $Q_ck =$ $80.00 (cfs)$  |
| concentration of WWTP discharge       C_sBab =       0.75 (µg/l)         concentration of Area 5 Pit NW discharge       C_spit =       1 (µg/l)         concentration of LTVSMC Tailings Basin seepage       C_fs =       2.905 (µg/l)         concentration of Hydrometallurgical Residue Cells Liner Leakage       C_rrs =       0         concentration of ground water flow into PM-12       C_g12 =       2.73 (µg/l)         concentration of ground water flow into PM-13       C_g13 =       2.73 (µg/l)         flow in river at PM-12       Q_r12 =       13.79 (cfs)         flow in river at PM-13       Q_r13 =       80.00 (cfs)         flow in river at PM-13       Q_r13 =       80.00 (cfs)  |
| traceconcentration of Area 5 Pit NW dischargeC_spit =1(µg/l)concentration of LTVSMC Tailings Basin seepageC_fs =2.905(µg/l)concentration of Hydrometallurgical Residue Cells Liner LeakageC_rrs =0concentration of ground water flow into PM-12C_g12 =2.73(µg/l)concentration of ground water flow into PM-13C_g13 =2.73(µg/l)flow in river at PM-12Q_r12 =13.79(cfs)flow in river at PM-13Q_r13 =80.00(cfs)flow in river at PM-13Q_r13 =80.00(cfs)  |
| concentration of LTVSMC Tailings Basin seepage       C_fs =       2.905 (µg/l)         concentration of Hydrometallurgical Residue Cells Liner Leakage       C_rrs =       0         concentration of ground water flow into PM-12       C_g12 =       2.73 (µg/l)         concentration of ground water flow into PM-13       C_g13 =       2.73 (µg/l)         flow in river at PM-12       Q_r12 =       13.79 (cfs)         flow in river at PM-13       Q_r13 =       80.00 (cfs)         flow in river at PM-13       Q_r13 =       80.00 (cfs)  |
| concentration of Hydrometallurgical Residue Cells Liner Leakage       C_rrs =       0         concentration of ground water flow into PM-12       C_g12 =       2.73 (µg/l)         concentration of ground water flow into PM-13       C_g13 =       2.73 (µg/l)         flow in river at PM-12       Q_r12 =       13.79 (cfs)         flow in river at PM-13       Q_r13 =       80.00 (cfs)         flow check       Q_ck =       80.00 (cfs)  |
| O to Cconcentration of ground water flow into PM-12C_g12 =2.73 (µg/l)concentration of ground water flow into PM-13C_g13 =2.73 (µg/l)o to concentration of ground water flow into PM-13O c_g12 =2.73 (µg/l)o to concentration of ground water flow into PM-13O c_g12 =2.73 (µg/l)o to concentration of ground water flow into PM-13O c_g13 =O c_g12 =13.79 (cfs)flow in river at PM-12O c_r12 =13.79 (cfs)flow in river at PM-13O c k =80.00 (cfs)O c k =   |
| C_g13 =2.73 ( $\mu g/l$ )The problem of ground water flow into PM-13C_g13 =2.73 ( $\mu g/l$ )The problem of ground water flow into PM-13Q_r12 =13.79 (cfs)The problem of ground water flow in river at PM-12Q_r13 =80.00 (cfs)The problem of ground water flow in river at PM-13Q_r13 =80.00 (cfs)The problem of ground water flow checkQ_ck =80.00 (cfs)  |
| $\begin{array}{c c} & & & & \\ \hline & & & \\ \hline & & & \\ \hline \\ \hline$   |
| Image: second  |
| Flow in river at PM-13 $Q_r13 = 80.00$ (cfs)   |
| $\sim$ m flow check $\sim$ 80.00 (cfs)   |
|  |
|  |
| mass flux of surface water into PM-12 M s12 = 268 (µg/s  |
| mass flux of surface water into PM-13 $M_s13 = 1030 (\mu g/s)$   |
| δ mass flux of Babbitt WWTP M_sBab = 7 (μg/s   |
| $5 \times \text{concentration of Area 5 Pit NW discharge}$ M_spit = 56 (µg/s   |
| Example Concentration of LTVSMC Tailings Basin seepage M_fs = 945 (µg/s  |
| concentration of Hydrometallurgical Residue Cells Liner Leakage M_rrs = 0 (μg/s  |
| $\frac{1}{100} \frac{1}{100} \frac{1}$ |
| $O \ge mass flux of ground water into PM-13$ $M_g13 = 325 (\mu g/s)$   |
|  |
| Φ  |
| $M_r12 = 341 (\mu g/s)$  |
| lan  |
| Σ 🛱 mass flux in river at PM-13 M_r13 = 2698 (μg/s   |
|  |
|  |
| ttion and the second  |
| concentration in river at PM-12 C r12 = 0.87 (uo/l)  |
|  |
|  |
| $O$ $O$ concentration in river at PM-13 C_r13 = 1.19 (µg/l)  |
|  |
|  |
| Ę  |
| ation  |
| Dbserved concentration in river at PM-12 ND (2) (µg/l)   |
| Dbserved concentration in river at PM-12 ND (2) (µg/l)   |
| Deserved concentration in river at PM-12 (µg/l)  |

#### Parameter: Boron

| surface water flow into PM-12         Q. s12 =         12.60 (cfs)           Yardace water flow into PM-13         Q. s13 =         44.51 (cfs)           Babbit WWTP discharge         Q. s9Bab =         0.33 (cfs)           Yardace water flow into PM-12         Q. s12 =         1.99 (cfs)           Hydrometallurgical Residue Cells Liner Leakage         Q. rs =         1.150 (cfs)           Yardace water flow into PM-12         Q. g12 =         0.88 (cfs)           Yardace water flow into PM-13         Q. g13 =         4.21 (cfs)           Yardace water flow into PM-13         Q. g13 =         4.21 (cfs)           Concentration of surface water into PM-13         C. s13 =         11 (µq/I)           Concentration of Surface water into PM-13         C. s13 =         12 (µg/I)           Concentration of Area 5 PI NW discharge         C. s8Bab =         12 (µg/I)           Concentration of Area 5 PI NW discharge         C. s91 =         133 (µg/I)           Concentration of ground water flow into PM-12         C. g12 =         21.2 (µg/I)           Concentration of ground water flow into PM-13         C. g13 =         21.2 (µg/I)           Concentration of ground water flow into PM-13         C. g13 =         11.2 (µg/I)           Concentration of Hydrometallurgical Residue Cells Liner Leakage         C. rrs =         0  | -            |   | -                        |         | _                |
|--|--------------|---|--------------------------|---------|------------------|
| Bistritace water flow into PM-13         Q s13 =         4.851 (cfs)<br>(cfs)           Area S Pit NW discharge         Q sBab         0.33 (cfs)           Area S Pit NW discharge         Q spit =         1.99 (cfs)           ground water flow into PM-12         Q g13 =         4.21 (cfs)           ground water flow into PM-13         Q g13 =         4.21 (cfs)           ground water flow into PM-13         Q g13 =         4.21 (cfs)           concentration of surface water into PM-13         C s12 =         12 (µg/l)           concentration of surface water into PM-13         C s13 =         112 (µg/l)           concentration of surface water into PM-13         C s13 =         12 (µg/l)           concentration of surface water into PM-12         C s12 =         2 (µg/l)           concentration of LTVSMC Tailings Basin seepage         C spit =         163 (µg/l)           concentration of ground water flow into PM-12         C g12 =         21.2 (µg/l)           concentration of ground water flow into PM-13         C g13 =         21.2 (µg/l)           concentration of ground water flow into PM-13         C g13 =         21.2 (µg/l)           concentration of ground water flow PM-13         C g13 =         21.2 (µg/l)           concentration of pround water flow PM-13         M s13 =         1180 (µg/s)   |              | surface water flow into PM-12                                   | Q_s12 =                  | 12.60   | (cfs)            |
| Operation         Operating and set of the se   | ata          | surface water flow into PM-13                                   | Q_s13 =                  | 48.51   | (cfs)            |
| Affed b Pfit NW discharge         O. splt =         11.50 (cfs)           Pit CMSMC Tailings Basin seepage         Q. rs =         0.00 (cfs)           Pydrometallurgical Residue Cells Liner Leakage         Q. rrs =         0.00 (cfs)           ground water flow into PM-13         Q.g13 =         4.21 (cfs)           concentration of surface water into PM-13         C. s12 =         11.50 (cfs)           concentration of surface water into PM-13         C. s13 =         112 (µg/l)           concentration of surface water into PM-13         C. s13 =         112 (µg/l)           concentration of surface water into PM-13         C. s13 =         12 (µg/l)           concentration of LTVSMC Tailings Basin seepage         C. fs =         330 (µg/l)           concentration of Hydrometallurgical Residue Cells Liner Leakage         C. rrs =         0           concentration of ground water flow into PM-12         C. g12 =         21.2 (µg/l)           concentration of ground water flow into PM-13         C. g13 =         21.2 (µg/l)           concentration of ground water flow into PM-13         Q. g13 =         21.2 (µg/l)           concentration of ground water flow into PM-13         Q.g13 =         21.2 (µg/l)           concentration of ground water flow into PM-13         Q.g13 =         21.2 (µg/l)           mass flux of surface water into PM-1  | Ö            | Babbitt WWTP discharge  | Q_sBab =                 | 0.33    | (cfs)            |
| Link         Use of a second constraints         Use of a second const   | Ň            | Area 5 Pit NW discharge   | Q_spit =                 | 1.99    | (CIS)            |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$  | Ĕ            | LTVSMC Tallings Basin seepage                                   | $Q_{IS} =$               | 0.00    | (CIS)            |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$  | nt           | around water flow into PM-12                                    | $Q_{15} = 0.012 = 0.012$ | 0.00    | (CIS)            |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$  | du           | around water flow into PM-13                                    | $Q_{g12} = 0$            | 4.21    | (cfs)            |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $  |              |   | <u>a_910</u> =           |         | (0.0)            |
| $\begin{tabular}{ c c c c c } \hline tilde{tabular} text and the text and the text and t$  | m            | concentration of surface water into PM-12                       | C_s12 =                  | 12      | (µg/l)           |
| $\begin{tabular}{ c c c c c } \hline \end{tabular} tabula$   | Data         | concentration of surface water into PM-13                       | C_s13 =                  | 12      | (µg/l)           |
| $\begin{tabular}{ c c c c c } \hline tilty discharge & C_spit = 163 (µg/l) \\ \hline concentration of LTVSMC Tailings Basin seepage & C_fs = 330 (µg/l) \\ \hline concentration of Hydrometallurgical Residue Cells Liner Leakage & C_rrs = 0 \\ \hline concentration of ground water flow into PM-12 & C_g12 = 21.2 (µg/l) \\ \hline concentration of ground water flow into PM-13 & C_g13 = 21.2 (µg/l) \\ \hline concentration of ground water flow into PM-13 & C_g13 = 21.2 (µg/l) \\ \hline flow in river at PM-12 & Q_rr12 = 13.79 (cfs) \\ flow in river at PM-13 & Q_rr13 = 80.00 (cfs) \\ \hline flow in river at PM-13 & Q_rr13 = 80.00 (cfs) \\ \hline to wcheck & Q_cck = 80.00 (cfs) \\ \hline to mass flux of surface water into PM-12 & M_s13 = 16473 (µg/s) \\ \hline mass flux of surface water into PM-13 & M_s13 = 16473 (µg/s) \\ \hline mass flux of surface water into PM-13 & M_s13 = 10473 (µg/s) \\ \hline mass flux of ground water into PM-13 & M_s13 = 10473 (µg/s) \\ \hline mass flux of ground water into PM-13 & M_s13 = 10473 (µg/s) \\ \hline mass flux of ground water into PM-13 & M_s13 = 10473 (µg/s) \\ \hline mass flux of ground water into PM-13 & M_g12 = 2516 (µg/s) \\ \hline mass flux of ground water into PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux of ground water into PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux of ground water into PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 & M_g13 = 2526 (µg/s) \\ \hline mass flux in river at PM-13 & M_g13 & M_g13 & M_g13 & M_g13 & M_g13 $   | ion          | concentration of WWTP discharge                                 | C_sBab =                 | 12      | (µg/l)           |
| SolutionConcentration of LTVSMC Tailings Basin seepageC_fs =330 (µg/l)concentration of Hydrometallurgical Residue Cells Liner LeakageC_rrs =0concentration of ground water flow into PM-12C_g12 =21.2 (µg/l)concentration of ground water flow into PM-13C_g13 =21.2 (µg/l)concentration of ground water flow into PM-13C_g13 =21.2 (µg/l)flow in river at PM-120_r12 =13.79 (cfs)flow in river at PM-130_r13 =80.00 (cfs)flow in river at PM-130_r13 =4280 (µg/s)mass flux of surface water into PM-12M_s12 =4280 (µg/s)mass flux of surface water into PM-13M_s13 =16473 (µg/s)mass flux of surface water into PM-13M_s12 =107399 (µg/s)concentration of Area 5 Pit NW dischargeM_s91 =9180 (µg/s)concentration of LTVSMC Tailings Basin seepageM_rs =0 (µg/s)mass flux of ground water into PM-13M_g12 =2526 (µg/s)mass flux of ground water into PM-13M_g13 =2526 (µg/s)mass flux of ground water into PM-13M_g13 =2526 (µg/s)mass flux in river at PM-13M_r13 =140485 (µg/s)mass flux in river at PM-13M_g13 =2526 (µg/s)mass flux in river at PM-13C_r13 =62.05 (µg/l)concentration in river at PM-13M_g13 =2526 (µg/l)mass flux in river at PM-13G_ground water into PM-12M_ground water into PM-13mass flux in river at PM-13G_ground water into PM-13G_ground water into PM-13 </td <td>trati</td> <td>concentration of Area 5 Pit NW discharge</td> <td>C_spit =</td> <td>163</td> <td>(µg/l)</td>   | trati        | concentration of Area 5 Pit NW discharge                        | C_spit =                 | 163     | (µg/l)           |
| $\begin{tabular}{ c c c c } \hline \end{tabular} \end{tabular}$  | sen<br>Len   | concentration of LTVSMC Tailings Basin seepage                  | C_fs =                   | 330     | (µg/l)           |
| $\begin{array}{ c c c c } \hline \begin{array}{ c c c } \hline c & c & c & g12 & $   | Sono         | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =                  | 0       |                  |
| E         concentration of ground water flow into PM-13         C_g13 =         21.2 (µg/l)           Intervention of ground water flow into PM-13         0,r12 =         13.79 (cfs)           Intervention of ground water flow into PM-13         0,r13 =         80.00 (cfs)           Intervention of ground water flow into PM-13         0,r13 =         40.00 (cfs)           Intervention of Area SPI NX of Surface water into PM-12         M_s12 =         4280 (µg/s)           Intervention of Area SPI NX discharge         M_s13 =         16473 (µg/s)           Intervention of Area SPI NX discharge         M_s13 =         107399 (µg/s)           Intervention of Area SPI NX discharge         M_s12 =         516 (µg/s)           Intervention of Area SPI NX discharge         M_s12 =         516 (µg/s)           Intervention of Area SPI NX discharge         M_s13 =         107399 (µg/s)           Intervention of Area SPI NX discharge         M_s13 =         107399 (µg/s)           Intervention of Hydrometallurgical Residue Cells Liner Leakage         M_rrs =         0 (µg/s)           Intervention of Hydrometallurgical Residue Cells Liner Leakage         M_rrs =         0 (µg/s)           Intervention of Area SPI NX disconter into PM-12         M_g13 =         2526 (µg/s)           Intervention of Area SPI NX disconter into PM-13         M_g13 =         140485 (µg/s)<   | nt O         | concentration of ground water flow into PM-12                   | C_g12 =                  | 21.2    | (µg/l)           |
| Approximate         Approximate <thapproximate< th=""> <thapproximate< th=""></thapproximate<></thapproximate<>  | dul          | concentration of ground water flow into PM-13                   | C_g13 =                  | 21.2    | (µg/l)           |
| Note         Inversion         In  |              |   |                          |         |                  |
| The formThe fo   | e            | flow in river at PM-12  | Q_r12 =                  | 13.79   | (cfs)            |
| Image: Normal StructureImage: Normal   | ater<br>Ilan | flow in river at PM-13  | Q_r13 =                  | 80.00   | (cfs)            |
| $\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$   | W;<br>Ba     | flow check  | Q_ck =                   | 80.00   | (cfs)            |
| $\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$   |              |   |                          |         |                  |
| $\begin{tabular}{ c c c c } \hline \end{tabular} & \begin{tabular}{ c c c c c c c } \hline \end{tabular} & \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$   |              | mass flux of surface water into PM-12                           | M_s12 =                  | 4280    | (µg/s)           |
| $\begin{tabular}{ c c c c c } \hline \end{tabular} & \begin{tabular}{ c c c c c c c c } \hline \end{tabular} & \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$   |              | mass flux of surface water into PM-13                           | M_s13 =                  | 16473   | (µg/s)           |
| $ \begin{array}{ c c c c c } \hline \begin{tabular}{ c c c c } \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$  | of           | mass flux of Babbitt WWTP                                       | M_sBab =                 | 112     | (µg/s)           |
| Image: concentration of LTVSMC Tailings Basin seepageM_fs =107399 (µg/s)concentration of Hydrometallurgical Residue Cells Liner LeakageM_rrs =0 (µg/s)mass flux of ground water into PM-12M_g12 =516 (µg/s)mass flux of ground water into PM-13M_g13 =2526 (µg/s)mass flux in river at PM-12mass flux in river at PM-13M_r12 =4908 (µg/s)mass flux in river at PM-13C_r12 =12.57 (µg/l)concentration in river at PM-13C_r12 =12.57 (µg/l)observed concentration in river at PM-12C_r13 =62.05 (µg/l)Observed concentration in river at PM-13Observed concentration in river at PM-13   | uo X         | concentration of Area 5 Pit NW discharge                        | M_spit =                 | 9180    | (µg/s)           |
| Image: concentration of Hydrometallurgical Residue Cells Liner Leakage       M_rrs =       0 (µg/s)         mass flux of ground water into PM-12       M_g12 =       516 (µg/s)         mass flux of ground water into PM-13       M_g13 =       2526 (µg/s)         mass flux in river at PM-12       M_r12 =       4908 (µg/s)         mass flux in river at PM-12       M_r13 =       140485 (µg/s)         mass flux in river at PM-13       M_r13 =       140485 (µg/s)         concentration in river at PM-13       C_r12 =       12.57 (µg/l)         order of the optimization of river at PM-13       C_r13 =       62.05 (µg/l)         other optimization of river at PM-13       C_r13 =       62.05 (µg/l)         other optimization of river at PM-13       0       0       0         optimization of river at PM-13       0       0       0       0         optimization of river at PM-13       0       0       0       0       0         optimization of river at PM-13       0       0       0       0       0       0         optimization of river at PM-13       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0  | lati<br>FIL  | concentration of LTVSMC Tailings Basin seepage                  | M_fs =                   | 107399  | (µg/s)           |
| The set of ground water into PM-12       M_g12 =       516 (µg/s)         mass flux of ground water into PM-13       M_g13 =       2526 (µg/s)         mass flux in river at PM-12       M_r12 =       4908 (µg/s)         mass flux in river at PM-13       M_r13 =       140485 (µg/s)         mass flux in river at PM-13       M_r13 =       140485 (µg/s)         participation       concentration in river at PM-13       C_r12 =       12.57 (µg/l)         participation       concentration in river at PM-13       C_r13 =       62.05 (µg/l)         participation       observed concentration in river at PM-12       ND (35) (µg/l)         participation       observed concentration in river at PM-13       68.9 (µg/l)  | cul<br>ss    | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =                  | 0       | (µg/s)           |
| SolutionImage flux or ground water into PM-13Image flux or ground water into PM-13Image flux in river at PM-12Image flux in river at PM-12Image flux in river at PM-12Image flux in river at PM-13Image flux in river at PM-13   | Cal<br>Aa:   | mass flux of ground water into PM-12                            | M_g12 =                  | 516     | (µg/s)           |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $   | 02           | mass nux of ground water into PM-13                             | M_g13 =                  | 2020    | (µg/s)           |
| $\frac{90}{1000} \frac{\text{mass flux in river at PM-12}}{\text{mass flux in river at PM-13}} \qquad M_r12 = 4908 (\mu g/s) \\ M_r13 = 140485 (\mu g/s) \\ M_r13 = 140485 (\mu g/s) \\ \hline M_r13 = 140485 (\mu g/s) \\ \hline M_r13 = 140485 (\mu g/s) \\ \hline M_r13 = 12.57 (\mu g/l) \\ \hline M_r13 = 12.57 ($                |              |   |                          |         |                  |
| $\frac{1}{1000} = \frac{1}{1000} = 1$ | e            | mass flux in river at PM-12                                     | M r12 –                  | 4908    | (ua/s)           |
| $\frac{140485}{(\mu g/s)}$ $\frac{12.57}{(\mu g/l)}$  | ss<br>and    |   | <u> </u>                 | +300    | (µg/3)           |
| Pattern       Image: mass nux in river at PM-13 $M_{-1}$ is a mass nux in river at PM-13 $L_{-1}$ is a mass nux in river at PM-12         Pattern       concentration in river at PM-12       C_r12 =       12.57 (µg/l)         concentration in river at PM-13       C_r13 =       62.05 (µg/l)         Observed concentration in river at PM-12       ND (35) (µg/l)         Observed concentration in river at PM-13       68.9 (µg/l)   | Ma:<br>Sal   | mass flux in river at PM 13                                     | M r12 -                  | 140485  | (ua/c)           |
| concentration in river at PM-12C_r12 =12.57(µg/l)concentration in river at PM-13C_r13 =62.05(µg/l)Observed concentration in river at PM-12ND (35)(µg/l)Observed concentration in river at PM-1368.9(µg/l)  | 2 Ш          | 111233 1104 11 11961 at 1 191-13                                | w_ri3 =                  | 140400  | (µy/s)           |
| concentration in river at PM-12       C_r12 =       12.57 (µg/l)         concentration in river at PM-13       C_r13 =       62.05 (µg/l)         concentration in river at PM-12       ND (35) (µg/l)         observed concentration in river at PM-13       ND (35) (µg/l)   | _            |   |                          |         |                  |
| $\frac{12.57}{(\mu g/l)}$  | ion<br>Ion   |   |                          |         |                  |
| $\frac{12.37 (\mu g/l)}{C_r r 13 =} = \frac{12.37 (\mu g/l)}{62.05 (\mu g/l)}$   | ed<br>rat    | concentration in river at PM-12                                 | C r12 -                  | 10.57   | (ua/l)           |
| $\frac{1}{10000} \frac{1}{100000} \frac{1}{10000000000000000000000000000000000$  | lat(         |   | 0_112 =                  | 12.07   | (µg/I)           |
| Solution       C_r13 =       62.05       (µg/l)         Participation       Observed concentration in river at PM-12       ND (35)       (µg/l)         Observed concentration in river at PM-13       68.9       (µg/l)   | lcu          |   |                          |         |                  |
| Observed concentration in river at PM-12     ND (35)     (µg/l)       Observed concentration in river at PM-13     68.9     (µg/l)   | Cal          | concentration in river at PM-13                                 | C r13 =                  | 62 05   | (ua/l)           |
| Observed concentration in river at PM-12       ND (35)       (µg/l)         Observed concentration in river at PM-13       68.9       (µg/l)   |              |   | 10                       | 02.00   | \ <b>m</b> 9'''/ |
| Observed concentration in river at PM-12       ND (35)       (µg/l)         Observed concentration in river at PM-13       68.9       (µg/l)   |              |   |                          |         |                  |
| Observed concentration in river at PM-12       ND (35)       (µg/l)         Observed concentration in river at PM-13       68.9       (µg/l)   | tior         |   |                          |         |                  |
| O O Observed concentration in river at PM-13 68.9 (µg/l)   | ed<br>tra    | Observed concentration in river at PM-12                        |                          | ND (35) | (µg/l)           |
| O O Observed concentration in river at PM-13 68.9 (µg/l)   | e S          |   |                          |         |                  |
| Ö Ŭ Observed concentration in river at PM-13 68.9 (μg/l)   | )<br>SSE     |   |                          |         |                  |
|  | ŏŭ           | Observed concentration in river at PM-13                        |                          | 68.9    | (µg/l)           |

#### Parameter: Barium

|                  | surface water flow into PM-12                                   | Q_s12 =     | 11.54 | (cfs)   |
|------------------|---|-------------|-------|---------|
| Ita              | surface water flow into PM-13                                   | Q_s13 =     | 43.27 | (cfs)   |
| Da               | Babbitt WWTP discharge  | Q_sBab =    | 0.33  | (cfs)   |
| ≥                | Area 5 Pit NW discharge   | Q_spit =    | 1.99  | (cfs)   |
| <u>e</u>         | LTVSMC Tailings Basin seepage                                   | Q_fs =      | 11.50 | (cfs)   |
| 보                | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =     | 0.00  | (cfs)   |
| nd               | ground water flow into PM-12                                    | Q_g12 =     | 0.86  | (cfs)   |
| <u>_</u>         | ground water flow into PM-13                                    | Q_g13 =     | 4.21  | (cfs)   |
|                  |   |             |       |         |
| а                | concentration of surface water into PM-12                       | C_s12 =     | 11    | (µg/l)  |
| Dat              | concentration of surface water into PM-13                       | C_s13 =     | 11    | (µg/l)  |
| u                | concentration of WWTP discharge                                 | C_sBab =    | 11    | (µg/l)  |
| trati            | concentration of Area 5 Pit NW discharge                        | C_spit =    | 5     | (µg/l)  |
| en:              | concentration of LTVSMC Tailings Basin seepage                  | C_fs =      | 92.98 | (µg/l)  |
| ouo              | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =     | 0     |         |
| nt O             | concentration of ground water flow into PM-12                   | C_g12 =     | 68.1  | (µg/l)  |
| du               | concentration of ground water flow into PM-13                   | C_g13 =     | 68.1  | (µg/l)  |
|                  | ·   | -           |       |         |
| Q                | flow in river at PM-12  | Q r12 =     | 12.73 | (cfs)   |
| ter<br>anc       | flow in river at PM-13  | Q r13 =     | 73.70 | (cfs)   |
| Wat<br>Bala      | flow check  | Q ck =      | 73.70 | (cfs)   |
|                  |   | _           |       | . ,     |
|                  | mass flux of surface water into PM-12                           | M s12 –     | 3592  | (un/s)  |
|                  | mass flux of surface water into PM-13                           | M_s13 -     | 13470 | (µg/s)  |
| oť               | mass flux of Babbitt WWTP                                       | M_sBab =    | 103   | (µg/s)  |
| ц<br>Ц           | concentration of Area 5 Pit NW discharge                        | M_spit =    | 282   | (µg/s)  |
| lu, tio          | concentration of LTVSMC Tailings Basin seepage                  | M_fs =      | 30260 | (µg/s)  |
| ы<br>П<br>П<br>П | concentration of Hydrometallurgical Residue Cells Liner Leakage | M rrs =     | 0     | (µg/s)  |
| alci             | mass flux of ground water into PM-12                            | M a12 =     | 1657  | (µg/s)  |
| ΰຶຶ              | mass flux of ground water into PM-13                            | M_g13 =     | 8114  | (µg/s)  |
|                  |   | 0           |       | ,       |
|                  |   |             |       |         |
| e<br>C           | mass flux in river at PM-12                                     | M r12 =     | 5352  | (ua/s)  |
| ss<br>ano        |   |             | 0002  | (rs, c) |
| vla<br>3al       | mass flux in river at PM-13                                     | M r13 -     | 57/70 | (110/6) |
|                  | וויזאסט וועא או איפו מגד איריס                                  | IVI_I I 3 = | 5/4/0 | (µy/5)  |
|                  |   | 1           |       |         |
| uo               |   |             |       |         |
| atio             |   |             |       |         |
| ate              | concentration in river at PM-12                                 | C_r12 =     | 14.86 | (µg/l)  |
| ula              |   |             |       |         |
| alc              |   |             |       |         |
| ΰŎ               | concentration in river at PM-13                                 | C_r13 =     | 27.56 | (µg/l)  |
|                  |   |             |       |         |
| Ę                |   |             |       |         |
| ttio             |   |             |       |         |
| ed<br>Itra       | Observed concentration in river at PM-12                        |             | 15.50 | (µg/l)  |
| en K             |   |             |       |         |
| se               |   |             |       |         |
| ဝိပိ             | Observed concentration in river at PM-13                        |             | 27.80 | (µg/l)  |
|                  | ·   | •           |       |         |

### Parameter: Beryllium

|              |   | 1         |                           |
|--------------|---|-----------|---------------------------|
|              | surface water flow into PM-12                                   | Q_s12 =   | 12.60 (cfs)               |
| ıta          | surface water flow into PM-13                                   | Q_s13 =   | 48.51 (cfs)               |
| Da           | Babbitt WWTP discharge  | Q_sBab =  | 0.33 (cfs)                |
| 3            | Area 5 Pit NW discharge   | Q_spit =  | 1.99 (cfs)                |
| 음            | LTVSMC Tailings Basin seepage                                   | Q_fs =    | 11.50 (cfs)               |
| rt I         | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =   | 0.00 (cfs)                |
| nd I         | ground water flow into PM-12                                    | Q_g12 =   | 0.86 (cfs)                |
|              | ground water flow into PM-13                                    | Q_g13 =   | 4.21 (Cfs)                |
|              |   | •         |                           |
| ם.<br>ש      | concentration of surface water into PM-12                       | C_s12 =   | 0.1 (µg/l)                |
| Dat          | concentration of surface water into PM-13                       | C_s13 =   | 0.1 (µg/l)                |
| ion          | concentration of WWTP discharge                                 | C_sBab =  | 0.1 (µg/l)                |
| itrat        | concentration of Area 5 Pit NW discharge                        | C_spit =  | 0.1 (µg/l)                |
| cen          | concentration of LTVSMC Tailings Basin seepage                  | C_fs =    | 0.75 (µg/l)               |
| Sone         | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =   | 0                         |
| nt C         | concentration of ground water flow into PM-12                   | C_g12 =   | 0.023 (µg/l)              |
| dul          | concentration of ground water flow into PM-13                   | C_g13 =   | 0.023 (µg/l)              |
|              |   |           |                           |
| e            | flow in river at PM-12  | Q_r12 =   | 13.79 (cfs)               |
| ater<br>land | flow in river at PM-13  | Q_r13 =   | 80.00 (cfs)               |
| Ba<br>Ba     | flow check  | Q_ck =    | 80.00 (cfs)               |
|              |   |           |                           |
|              | mass flux of surface water into PM-12                           | M s12 =   | 36 (µa/s)                 |
|              | mass flux of surface water into PM-13                           | M s13 =   | 137 (µg/s)                |
| of           | mass flux of Babbitt WWTP                                       | M sBab =  | 1 (µg/s)                  |
| E ×          | concentration of Area 5 Pit NW discharge                        | M spit =  | 6 (µg/s)                  |
| llu; Itic    | concentration of LTVSMC Tailings Basin seepage                  | M fs =    | 244 (µg/s)                |
| ula<br>s F   | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =   | 0 (µg/s)                  |
| asa          | mass flux of ground water into PM-12                            | M_g12 =   | 1 (µg/s)                  |
| ΰΞ           | mass flux of ground water into PM-13                            | M_g13 =   | 3 (µg/s)                  |
|              | •   |           |                           |
|              |   |           |                           |
| ce           | mass flux in river at PM-12                                     | M_r12 =   | 37 (µg/s)                 |
| ss<br>an     |   |           | Ar <b>3</b> <sup>-7</sup> |
| Vla<br>3al   | mass flux in river at PM-13                                     | M r13 –   | 427 (ug/s)                |
|              | ווייסט וועא וו וועכו מנד ועריוס                                 | INT_110 = | τ <i>ει</i> (μ9/5)        |
|              |   |           |                           |
| uo           |   |           |                           |
| ati          |   |           |                           |
| ate          | concentration in river at PM-12                                 | C_r12 =   | 0.10 (µg/l)               |
| sula         |   |           |                           |
| alc          |   |           |                           |
| ΟŪ           | concentration in river at PM-13                                 | C_r13 =   | 0.19 (µg/l)               |
|              |   |           |                           |
| L<br>L       |   |           |                           |
| atic         |   |           |                           |
| ed           | Observed concentration in river at PM-12                        |           | ND (0.2) (µg/l)           |
| Ser Je       |   |           |                           |
| )<br>SSE     |   |           |                           |
| δŭ           | Observed concentration in river at PM-13                        |           | ND (0.2) (µg/l)           |

#### Parameter: Calcium

|                  | surface water flow into PM 12                                   | 0 c12                 | 10 60          | (ofc)    |
|------------------|---|-----------------------|----------------|----------|
| D                | surface water flow into PM-13                                   | 0 = 13 =              | 12.0U<br>12.51 | (cfs)    |
| ati              | Babbitt WWTP discharge  | $\Omega_{\rm sBab} =$ | -+0.01<br>0 33 | (cfs)    |
|                  | Area 5 Pit NW discharge   | $Q_{spit} =$          | 1.99           | (cfs)    |
| Ň                | LTVSMC Tailings Basin seepage                                   | Q fs =                | 11.50          | (cfs)    |
| Ē                | Hydrometallurgical Residue Cells Liner Leakage                  | Q rrs =               | 0.00           | (cfs)    |
| ont              | ground water flow into PM-12                                    | Q g12 =               | 0.86           | (cfs)    |
| <u> </u>         | ground water flow into PM-13                                    | Q_g13 =               | 4.21           | (cfs)    |
|                  |   |                       |                | <u> </u> |
| D                | concentration of surface water into PM-12                       | C_s12 =               | 13             | (mg/l)   |
| Dat              | concentration of surface water into PM-13                       | C_s13 =               | 13             | (mg/l)   |
| <u>io</u>        | concentration of WWTP discharge                                 | C_sBab =              | 13             | (mg/l)   |
| trat             | concentration of Area 5 Pit NW discharge                        | C_spit =              | 98.7           | (mg/l)   |
| sen (            | concentration of LTVSMC Tailings Basin seepage                  | C_fs =                | 59.78          | (mg/l)   |
| Sonc             | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =               | 0              |          |
| nt O             | concentration of ground water flow into PM-12                   | C_g12 =               | 19             | (mg/l)   |
| lnp              | concentration of ground water flow into PM-13                   | C_g13 =               | 19             | (mg/l)   |
|                  |   |                       |                |          |
| . 8              | flow in river at PM-12  | Q_r12 =               | 13.79          | (cfs)    |
| ater<br>Ilan     | flow in river at PM-13  | Q_r13 =               | 80.00          | (cfs)    |
| ₿ Š              | flow check  | Q_ck =                | 80.00          | (cfs)    |
|                  |   |                       |                |          |
|                  | mass flux of surface water into PM-12                           | M_s12 =               | 4637           | (µg/s)   |
|                  | mass flux of surface water into PM-13                           | M_s13 =               | 17845          | (mg/s)   |
| o                | mass flux of Babbitt WWTP                                       | M_sBab =              | 121            | (mg/s)   |
| Lo X             | concentration of Area 5 Pit NW discharge                        | M_spit =              | 5558           | (mg/s)   |
| ati<br>FIL       | concentration of LTVSMC Tailings Basin seepage                  | M_fs =                | 19455          | (mg/s)   |
| cul<br>ss        | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =               | 0              | (mg/s)   |
| alı<br>1a:       | mass flux of ground water into PM-12                            | M_g12 =               | 462            | (mg/s)   |
| 02               | mass flux of ground water into PM-13                            | M_g13 =               | 2264           | (mg/s)   |
|                  |   |                       |                |          |
| e                | mass flux in river at PM-12                                     | M r12 =               | 5221           | (ma/s)   |
| ss<br>and        |   |                       | 0221           | (g, 3)   |
| ala:<br>3ala     | mass flux in river at PM-13                                     | M r13 –               | 50344          | (ma/e)   |
| 2 11             |   | <u>[M_10 –</u>        | 50044          | (119/3)  |
|                  |   |                       |                |          |
| io               |   |                       |                |          |
| ed<br>rat        | concentration in river at PM-12                                 | C r12 -               | 13 37          | (ma/l)   |
| lat <sup>.</sup> |   | 0_112 =               | 10.07          | (119/1)  |
| no<br>Loc        |   |                       |                |          |
| Cal              | concentration in river at PM-13                                 | C r13 =               | 22.24          | (mg/l)   |
|                  |   | <u> </u>              |                | 、 し /    |
| Ę                |   |                       |                |          |
| atio             |   |                       |                |          |
| /ed<br>ntra      | Observed concentration in river at PM-12                        |                       | 13.4           | (mg/l)   |
| en<br>cel        |   |                       |                |          |
| sd               |   |                       | 10.5           | / A\     |
| 00               | Observed concentration in river at PM-13                        |                       | 19.9           | (mg/l)   |

#### Parameter: Cadmium

|             |   | ā           |                 |
|-------------|---|-------------|-----------------|
|             | surface water flow into PM-12                                   | Q_s12 =     | 12.60 (cfs)     |
| ta          | surface water flow into PM-13                                   | Q_s13 =     | 48.51 (cfs)     |
| Da          | Babbitt WWTP discharge  | Q_sBab =    | 0.33 (cfs)      |
| 3           | Area 5 Pit NW discharge   | Q_spit =    | 1.99 (cfs)      |
| je<br>L     | LTVSMC Tailings Basin seepage                                   | Q_fs =      | 11.50 (cfs)     |
| ц<br>т<br>т | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =     | 0.00 (cfs)      |
| L d         | ground water flow into PM-12                                    | Q_g12 =     | 0.86 (cfs)      |
| L L         | ground water flow into PM-13                                    | Q_g13 =     | 4.21 (cfs)      |
|             |   |             |                 |
| a           | concentration of surface water into PM-12                       | C_s12 =     | 0.08 (µg/l)     |
| Dat         | concentration of surface water into PM-13                       | C_s13 =     | 0.08 (µg/l)     |
| u.          | concentration of WWTP discharge                                 | C_sBab =    | 0.08 (µg/l)     |
| trati       | concentration of Area 5 Pit NW discharge                        | C_spit =    | 0.1 (µg/l)      |
| en.         | concentration of LTVSMC Tailings Basin seepage                  | C_fs =      | 0.188 (µg/l)    |
| ouo         | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =     | 0               |
| nt O        | concentration of ground water flow into PM-12                   | C_g12 =     | 0.3 (µg/l)      |
| dul         | concentration of ground water flow into PM-13                   | C_g13 =     | 0.3 (µg/l)      |
|             | •   |             |                 |
| ġ           | flow in river at PM-12  | Q_r12 =     | 13.79 (cfs)     |
| tter<br>anc | flow in river at PM-13  | <br>Q_r13 = | 80.00 (cfs)     |
| Wa<br>Bal   | flow check  | <br>Q_ck =  | 80.00 (cfs)     |
|             |   |             |                 |
|             | mass flux of surface water into PM-12                           | M s12 =     | 29 (ug/s)       |
|             | mass flux of surface water into PM-13                           | M_s13 =     | 110 (ug/s)      |
| of          | mass flux of Babbitt WWTP                                       | M_sBab =    | 1 (µg/s)        |
| L L         | concentration of Area 5 Pit NW discharge                        | M_spit =    | 6 (ug/s)        |
| lux<br>Iux  | concentration of LTVSMC Tailings Basin seepage                  | M fs =      | 61 (ua/s)       |
| ла<br>Г     | concentration of Hydrometallurgical Residue Cells Liner Leakage | M rrs =     | 0 (µg/s)        |
| alcı<br>ass | mass flux of ground water into PM-12                            | M g12 =     | 7 (µg/s)        |
| Ma<br>Ma    | mass flux of ground water into PM-13                            | M_g13 =     | 36 (µa/s)       |
|             |   |             | (F.g, -)        |
|             |   |             |                 |
| e           | mass flux in river at PM-12                                     | M r12 =     | 37 (ua/s)       |
| ss<br>ano   |   |             | (µ9,0)          |
| Ma:<br>3ali | mass flux in river at PM-13                                     | M r13 -     | 249 (110/0)     |
|             | 1111255 11UX 111 11VEI al FIVI-15                               | IVI_I I 3 = | 249 (µy/s)      |
|             |   |             |                 |
| uc          |   |             |                 |
| atic        |   |             |                 |
| ate         | concentration in river at PM-12                                 | C_r12 =     | 0.09 (µg/l)     |
| suls        |   |             |                 |
| alc         |   |             |                 |
| 00          | concentration in river at PM-13                                 | C_r13 =     | 0.11 (µg/l)     |
|             |   |             |                 |
| L<br>L      |   |             |                 |
| atio        |   |             |                 |
| vec         | Observed concentration in river at PM-12                        | +           | ND (0.2) (µg/l) |
| ser         |   |             |                 |
| õ õ         | Observed concentration in river at PM-13                        |             | ND (0.2) (ug/l) |
|             |   | 1           |                 |

### Embarrass River Model - Calibration to Baseline Water Quality Data Parameter: Chloride

|             | surface water flow into PM-12                                   | Q_s12 =         | 0.30       | (cfs)         |
|-------------|---|-----------------|------------|---------------|
| lta         | surface water flow into PM-13                                   | Q_s13 =         | 0.30       | (cfs)         |
| Da          | Babbitt WWTP discharge  | Q_sBab =        | 0.33       | (cfs)         |
| ≥           | Area 5 Pit NW discharge   | Q_spit =        | 0.00       | (cfs)         |
| <u> </u>    | LTVSMC Tailings Basin seepage                                   | Q_fs =          | 1.20       | (cfs)         |
| , TF        | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =         | 0.00       | (cts)         |
| Idr         | ground water flow into PM-12                                    | Q_g12 =         | 0.86       | (CfS)         |
| <u> </u>    | ground water now into PNI-13                                    | <u>v_</u> gi3 = | 4.21       | (CIS)         |
|             | concentration of ourface water into DM 10                       | 0.010           | 10         | (mg/l)        |
| ta          | Concentration of surface water into PM-12                       | 0_512 =         | 10         | (mg/l)        |
| Da          | concentration of surface water into PM-13                       | C_s13 =         | 10         | (mg/l)        |
| ion<br>I    | concentration of WWTP discharge                                 | C_sBab =        | 10         | (mg/l)        |
| trat        | concentration of Area 5 Pit NW discharge                        | C_spit =        | 6.5        | (mg/l)        |
| Sen         | concentration of LTVSMC Tailings Basin seepage                  | C_fs =          | 21.54      | (mg/l)        |
| ouo         | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =         | 0          | (mg/l)        |
| nt O        | concentration of ground water flow into PM-12                   | C_g12 =         | 1.8        | (mg/l)        |
| lup         | concentration of ground water flow into PM-13                   | C_g13 =         | 1.8        | (mg/l)        |
| -           |   |                 |            |               |
| . 8         | flow in river at PM-12  | Q_r12 =         | 1.49       | (cfs)         |
| ater<br>Ian | flow in river at PM-13  | Q_r13 =         | 7.20       | (cfs)         |
| Ba          | flow check  | Q_ck =          | 7.20       | (cfs)         |
|             |   |                 |            |               |
|             | mass flux of surface water into PM-12                           | M_s12 =         | 85         | (mg/l)        |
|             | mass flux of surface water into PM-13                           | M_s13 =         | <u>8</u> 5 | (mg/l)        |
| of          | mass flux of Babbitt WWTP                                       | M_sBab =        | 93         | (mg/l)        |
| u no ×      | concentration of Area 5 Pit NW discharge                        | M_spit =        | 0          | (mg/l)        |
| ati         | concentration of LTVSMC Tailings Basin seepage                  | M_fs =          | 731        | (mg/l)        |
| l si        | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =         | 0          | (mg/l)        |
| alc<br>1as  | mass flux of ground water into PM-12                            | M_g12 =         | 44         | (mg/l)        |
| 2           | mass flux of ground water into PM-13                            | M_g13 =         | 214        | (mg/l)        |
|             |   |                 |            |               |
| e           | mass flux in river at PM-12                                     | M r12 =         | 222        | (mg/s)        |
| lss<br>lan  |   |                 |            | . <b>U</b> -/ |
| Ma<br>Bal   | mass flux in river at PM-13                                     | M r13 =         | 1253       | (mg/s)        |
|             |   |                 |            | 、 <b>∪</b> -/ |
| UC          |   |                 |            |               |
| d<br>atio   |   |                 |            |               |
| ate         | concentration in river at PM-12                                 | C_r12 =         | 5.27       | (mg/l)        |
| cer<br>cer  |   |                 |            |               |
| alc         |   |                 |            | ,             |
| 00          | concentration in river at PM-13                                 | C_r13 =         | 6.15       | (mg/l)        |
| -           |   |                 |            |               |
| ttior       |   |                 |            |               |
| ed<br>itra  | Observed concentration in river at PM-12                        |                 | 4.49       | (mg/l)        |
| er V        |   |                 |            |               |
| bsd         |   |                 |            |               |
| 00          | Observed concentration in river at PM-13                        |                 | 6.98       | (mg/l)        |

|             | surface water flow into PM-12                                   | Q_s12 =     | 12.60          | (cfs)                 |
|-------------|---|-------------|----------------|-----------------------|
| ıta         | surface water flow into PM-13                                   | Q_s13 =     | 48.51          | (cfs)                 |
| Da          | Babbitt WWTP discharge  | Q_sBab =    | 0.33           | (cfs)                 |
| 3           | Area 5 Pit NW discharge   | Q_spit =    | 1.99           | (cfs)                 |
| <u>e</u>    | LTVSMC Tailings Basin seepage                                   | Q_fs =      | 11.50          | (cfs)                 |
| т<br>т      | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =     | 0.00           | (cfs)                 |
| nd          | ground water flow into PM-12                                    | Q_g12 =     | 0.86           | (cfs)                 |
| <u> </u>    | ground water flow into PM-13                                    | Q_g13 =     | 4.21           | (cfs)                 |
|             |   |             |                |                       |
| b           | concentration of surface water into PM-12                       | C_s12 =     | 0.6            | (µg/l)                |
| Dat         | concentration of surface water into PM-13                       | C_s13 =     | 0.6            | (µg/l)                |
| ion         | concentration of WWTP discharge                                 | C_sBab =    | 0.6            | (µg/l)                |
| trat        | concentration of Area 5 Pit NW discharge                        | C_spit =    | 0.5            | (µg/l)                |
| e<br>L      | concentration of LTVSMC Tailings Basin seepage                  | C_fs =      | 1. <u>55</u> 6 | (µg/l)                |
| ouo         | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =     | 0              | (µg/l)                |
| nt C        | concentration of ground water flow into PM-12                   | C_g12 =     | 1.1            | (µg/l)                |
| dul         | concentration of ground water flow into PM-13                   | C_g13 =     | 1.1            | (µg/l)                |
| -           | ·   | -           |                |                       |
| ġ.          | flow in river at PM-12  | Q_r12 =     | 13.79          | (cfs)                 |
| tter<br>anc | flow in river at PM-13  | <br>Q_r13 = | 80.00          | (cfs)                 |
| Wa<br>Bal   | flow check  | <br>Q_ck =  | 80.00          | (cfs)                 |
|             |   | . –         |                | . /                   |
|             | mass flux of surface water into PM-12                           | M s12 =     | 214            | (ua/s)                |
|             | mass flux of surface water into PM-13                           | M_s13 =     | 824            | (µa/s)                |
| of          | mass flux of Babbitt WWTP                                       | M_sBab =    | 6              | (ua/s)                |
| u o         | concentration of Area 5 Pit NW discharge                        | M spit =    | 28             | (µg/s)                |
| Iuy<br>Tuy  | concentration of LTVSMC Tailings Basin seepage                  | M fs =      | 506            | (µg/s)                |
| ла<br>Г     | concentration of Hydrometallurgical Residue Cells Liner Leakage | M rrs =     | 000            | (µg/s)                |
| alcu        | mass flux of ground water into PM-12                            | M g12 =     | 27             | (µg/s)                |
| Ma<br>Ma    | mass flux of ground water into PM-13                            | M_g13 =     | 131            | (µg/s)                |
|             |   |             |                |                       |
|             |   |             |                |                       |
| ce          | mass flux in river at PM-12                                     | M r12 =     | 246            | (µg/s)                |
| ss<br>an    |   |             |                | (1 O <sup>2</sup> - / |
| Va<br>3al   | mass flux in river at PM-13                                     | M r13 –     | 1736           | (ua/e)                |
|             |   | <u></u>     | 1750           | (49/3)                |
|             |   |             |                |                       |
| ou          |   |             |                |                       |
| ed<br>ati   | DM 10   | 0           | 0.0            | (                     |
| ate<br>ntr  | concentration in river at PM-12                                 | C_r12 =     | 0.6            | (µg/l)                |
| ce          |   |             |                |                       |
| Calc        | concentration in river at PM-13                                 | C r13 -     | 0.0            | (ua/l)                |
|             | כטווכבוונומנוטון וון וועפו מג רועו-דס                           | 0_113 =     | 0.8            | (µg/I)                |
|             |   |             |                |                       |
| u<br>u      |   |             |                |                       |
| d<br>rati   | Observed concentration in river at DM 10                        |             | 0.59           | (ug/l)                |
| shti        |   | +           | 0.56           | (µg/I)                |
| ser         |   |             |                |                       |
| ja p        | Observed concentration in river at PM-13                        |             | ND (1)         | (ua/l)                |
| 00          |   | Į.          |                | (P9/1)                |

#### Parameter: Copper

|   |   |              | 10.00 | <i></i> |
|---|---|--------------|-------|---------|
|   | surface water flow into PM-12                                   | Q_s12 =      | 12.60 | (cts)   |
| ata   | surface water flow into PM-13                                   | Q_\$13 =     | 48.51 | (CfS)   |
| Õ   | Babbitt WW I P discharge  | Q_SBab =     | 0.33  | (CIS)   |
| Ň   | Alea 5 Fil NW discharge   | $Q_spit =$   | 11.99 | (CIS)   |
| Ē   | Hydrometallurgical Residue Cells Liner Leakage                  | $Q_{15} =$   | 0.00  | (cfs)   |
| prt   | ground water flow into PM-12                                    | $Q_{13} = 0$ | 0.00  | (cfs)   |
| du  | ground water flow into PM-13                                    | Q g13 =      | 4.21  | (cfs)   |
|   |   | 3            |       | ( /     |
| т   | concentration of surface water into PM-12                       | C_s12 =      | 1.5   | (µg/l)  |
| Data  | concentration of surface water into PM-13                       | C_s13 =      | 1.5   | (µg/l)  |
| u   | concentration of WWTP discharge                                 | C_sBab =     | 1.5   | (µg/l)  |
| trati   | concentration of Area 5 Pit NW discharge                        | C_spit =     | 2.5   | (µg/l)  |
| en<br>Sen                                     | concentration of LTVSMC Tailings Basin seepage                  | C_fs =       | 2.5   | (µg/l)  |
| ouo   | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =      | 0     | (µg/l)  |
| nt O  | concentration of ground water flow into PM-12                   | C_g12 =      | 4     | (µg/l)  |
| lnp   | concentration of ground water flow into PM-13                   | C_g13 =      | 4     | (µg/l)  |
|   |   |              |       |         |
| 9   | flow in river at PM-12  | Q_r12 =      | 13.79 | (cfs)   |
| ater<br>Ilan                                  | flow in river at PM-13  | Q_r13 =      | 80.00 | (cfs)   |
| Ba<br>Ba                                      | flow check  | Q_ck =       | 80.00 | (cfs)   |
|   |   |              |       |         |
|   | mass flux of surface water into PM-12                           | M_s12 =      | 535   | (µg/s)  |
|   | mass flux of surface water into PM-13                           | M_s13 =      | 2059  | (µg/s)  |
| of  | mass flux of Babbitt WWTP                                       | M_sBab =     | 14    | (µg/s)  |
| 5 ≚   | concentration of Area 5 Pit NW discharge                        | M_spit =     | 141   | (µg/s)  |
| ati   | concentration of LTVSMC Tailings Basin seepage                  | M_fs =       | 814   | (µg/s)  |
| ss cul  | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =      | 0     | (µg/s)  |
| al.<br>Jas                                    | mass flux of ground water into PM-12                            | M_g12 =      | 97    | (µg/s)  |
| 02  | mass flux of ground water into PM-13                            | M_g13 =      | 477   | (µg/s)  |
|   |   |              |       |         |
| e   | mass flux in river at PM-12                                     | M r12 -      | 616   | (ua/e)  |
| ss<br>and                                     | הותסט העג ווד דועכו מנד ועוד וב                                 |              | 040   | (µg/s)  |
| /la:<br>3ala                                  | mass flux in river at PM 13                                     | M r13        | 1100  | (uq/a)  |
| <u> — — —</u> — — — — — — — — — — — — — — — — | 111233 1111 1111 1111 dl F111-13                                | IVI_I I 3 =  | 4130  | (µy/s)  |
| _   |   |              |       |         |
| ion   |   |              |       |         |
| ed<br>rati                                    | concontration in river at PM 12                                 | C r12        | 1.60  | (ug/l)  |
| ate   |   | 0_112 =      | 1.00  | (µg/I)  |
| L Cu l  |   |              |       |         |
| C al  | concentration in river at PM-13                                 | C_r13 =      | 1.83  | (µg/l)  |
|   |   |              |       |         |
| Ľ   |   |              |       |         |
| atio  |   |              |       |         |
| /eo<br>ntra                                   | Observed concentration in river at PM-12                        |              | 1.53  | (µg/l)  |
| ice<br>ice                                    |   |              |       |         |
| a co<br>Co<br>Co                              | Observed concentration in river at PM-13                        |              | 2 00  | (ua/l)  |
|   |   |              | 2.00  | (P9')   |

### Embarrass River Model - Calibration to Baseline Water Quality Data Parameter: Flouride

|              | surface water flow into PM-12                                   | Q_s12 =             | 12.60 | (cfs)    |
|--------------|---|---------------------|-------|----------|
| lta          | surface water flow into PM-13                                   | Q_s13 =             | 48.51 | (cfs)    |
| Da           | Babbitt WWTP discharge  | Q_sBab =            | 0.33  | (cfs)    |
| ≥            | Area 5 Pit NW discharge   | Q_spit =            | 1.99  | (cfs)    |
| 인니           | LIVSMC Failings Basin seepage                                   | Q_ts =              | 11.50 | (cts)    |
| rt –         | Hydrometallurgical Residue Cells Liner Leakage                  | $Q_rrs =$           | 0.00  | (CIS)    |
| du           | ground water flow into PM-12                                    | $Q_{g12} = 0$ a13 - | 0.86  | (CIS)    |
| _            | Biogue water now into t M-19                                    | ע_שוט≓              | 4.21  |          |
|              | concentration of surface water into PM-12                       | C s12 =             | 0.1   | (ma/l)   |
| Data         | concentration of surface water into PM-13                       | C s13 =             | 0.1   | (ma/l)   |
| u D          | concentration of WWTP discharge                                 | C sBab =            | 0.1   | (mg/l)   |
| ratic        | concentration of Area 5 Pit NW discharge                        | C_spit =            | 0.2   | (mg/l)   |
| enti         | concentration of LTVSMC Tailings Basin seepage                  | C_fs =              | 1.55  | (mg/l)   |
| onc          | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =             | 0     | (mg/l)   |
| C<br>T       | concentration of ground water flow into PM-12                   | C_g12 =             | 0.385 | (mg/l)   |
| lnpu         | concentration of ground water flow into PM-13                   | C_g13 =             | 0.385 | (mg/l)   |
|              |   |                     |       |          |
| , e          | flow in river at PM-12  | Q_r12 =             | 13.79 | (cfs)    |
| ater<br>ilan | flow in river at PM-13  | Q_r13 =             | 80.00 | (cfs)    |
| Ba K         | flow check  | Q_ck =              | 80.00 | (cfs)    |
|              |   |                     |       |          |
|              | mass flux of surface water into PM-12                           | M_s12 =             | 36    | (mg/l)   |
|              | mass flux of surface water into PM-13                           | M_s13 =             | 137   | (mg/l)   |
| o            | mass flux of Babbitt WWTP                                       | M_sBab =            | 1     | (mg/l)   |
| uoi<br>vr    | concentration of Area 5 Pit NW discharge                        | M_spit =            | 11    | (mg/l)   |
| Flu          | concentration of LIVSMC Tailings Basin seepage                  | M_ts =              | 504   | (mg/l)   |
| cu           | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =             | 0     | (mg/l)   |
| Jal<br>Jas   | mass flux of ground water into PM-12                            | $M_{012} =$         | 9     | (mg/l)   |
| 02           | Intass nux of ground water into FIVI-15                         | w_y13 =             | 40    | (mg/I)   |
| -            |   |                     |       |          |
| s<br>nce     | mass flux in river at PM-12                                     | M_r12 =             | 46    | (mg/s)   |
| las:<br>ala  |   |                     |       |          |
| 2 10         | mass flux in river at PM-13                                     | M_r13 =             | 745   | (mg/s)   |
| C            |   |                     |       |          |
| ttion        |   |                     |       |          |
| atec         | concentration in river at PM-12                                 | C_r12 =             | 0.12  | (mg/l)   |
| Sula         |   |                     |       |          |
| Calc         | concentration in river at PM 12                                 | C r13 -             | 0.22  | (ma/l)   |
|              |   | 0_113 =             | 0.33  | (iiig/i) |
| Ľ            |   |                     |       |          |
| d<br>atic    | Observed concentration in viver at DM 10                        |                     | 0.10  | (m m //) |
| rve          | Observed concentration in river at PM-12                        |                     | 0.10  | (mg/I)   |
| )<br>Sel     |   |                     |       |          |
| ŏč           | Observed concentration in river at PM-13                        |                     | 0.37  | (mg/l)   |

Iron

# Embarrass River Model - Calibration to Baseline Water Quality Data

### Parameter: Iron

|              | surface water flow into PM-12   | Q_s12 =      | 0.77  | (cfs)            |
|--------------|---|--------------|-------|------------------|
| ıta          | surface water flow into PM-13   | Q_s13 =      | 2.63  | (cfs)            |
| D            | Babbitt WWTP discharge  | Q_sBab =     | 0.33  | (cts)            |
| Ň            | Area 5 Mit NW discharge   | $Q_spit =$   | 0.00  | (CIS)            |
| Ē            | LIVOIVIO Tallings basin seepage<br>Hydrometallurgical Residue Calls Liner Lookage | $Q_1S =$     | 1.20  | (CIS)            |
| ort .        | around water flow into PM-12  | $Q_{13} = 0$ | 0.00  | (cfs)            |
| dul          | ground water flow into PM-13  | Q_g13 =      | 4.21  | (cfs)            |
|              | I~  |              |       | 、 /              |
| ស            | concentration of surface water into PM-12   | C_s12 =      | 2.9   | (mg/l)           |
| Dat          | concentration of surface water into PM-13   | C_s13 =      | 2.9   | (mg/l)           |
| ion<br>Ion   | concentration of WWTP discharge   | C_sBab =     | 2.9   | (mg/l)           |
| trati        | concentration of Area 5 Pit NW discharge  | C_spit =     | 0.038 | (mg/l)           |
| sen (        | concentration of LTVSMC Tailings Basin seepage                                    | C_fs =       | 4.594 | (mg/l)           |
| ouo          | concentration of Hydrometallurgical Residue Cells Liner Leakage                   | C_rrs =      | 0     | (mg/l)           |
| nt C         | concentration of ground water flow into PM-12                                     | C_g12 =      | 0.035 | (mg/l)           |
| dul          | concentration of ground water flow into PM-13                                     | C_g13 =      | 0.035 | (mg/l)           |
|              |   |              |       |                  |
| r S          | flow in river at PM-12  | Q_r12 =      | 1.96  | (cfs)            |
| 'ate<br>alar | flow in river at PM-13  | Q_r13 =      | 10.00 | (cfs)            |
| ≥ ä          | flow check  | Q_ck =       | 10.00 | (cfs)            |
|              |   |              |       |                  |
|              | mass flux of surface water into PM-12   | M_s12 =      | 64    | (mg/l)           |
| ÷            | mass flux of surface water into PM-13   | M_s13 =      | 215   | (mg/l)           |
| 0            | concentration of Area 5 Dit NIM discharge   | IVI_SDdD =   | 27    | (mg/l)           |
| tion         | concentration of LTVSMC Tailings Basin seenage                                    | M fs =       | 156   | (mg/l)           |
| ла:<br>Ша    | concentration of Hydrometallurgical Residue Cells Liner Leakage                   | M_rrs =      | 0     | (mg/l)           |
| alcu<br>ass  | mass flux of ground water into PM-12  | M_g12 =      | 1     | (mg/l)           |
| Ma<br>Ma     | mass flux of ground water into PM-13  | M_g13 =      | 4     | (mg/l)           |
|              |   |              |       |                  |
| ð            | made flux in river of DM 12   | M r12        | 01    | (ma/a)           |
| ss<br>anc    |   | IVI_I I Z =  | 91    | (mg/s)           |
| Ma<br>Bal    | mass flux in river at PM-13   | M_r13 =      | 467   | (mg/s)           |
|              |   | 1            |       |                  |
| ion          |   |              |       |                  |
| ed<br>rat    | concentration in river at PM-12   | C r12 -      | 1.65  | (ma/l)           |
| ulat<br>ent  |   | <u></u>      | 1.00  | \'''9/''/        |
| alci         |   |              |       |                  |
| ÖÖ           | concentration in river at PM-13   | C_r13 =      | 1.65  | (mg/l)           |
|              |   |              |       |                  |
| tior         |   |              |       |                  |
| red<br>ntra  | Observed concentration in river at PM-12  |              | 1.75  | (mg/l)           |
| serv         |   |              |       |                  |
| Cor          | Observed concentration in river at PM-13  |              | 1.29  | (ma/l)           |
|              |   |              |       | \ <del>3</del> / |

### Embarrass River Model - Calibration to Baseline Water Quality Data Parameter: Hardness

|              | surface water flow into PM-12                                   | Q_s12 =  | 12.60   | (cfs)               |
|--------------|---|----------|---------|---------------------|
| ıta          | surface water flow into PM-13                                   | Q_s13 =  | 48.51   | (cfs)               |
| Da           | Babbitt WWTP discharge  | Q_sBab = | 0.33    | (cfs)               |
| 2            | Area 5 Pit NW discharge   | Q_spit = | 1.99    | (cfs)               |
| 음            | LTVSMC Tailings Basin seepage                                   | Q_fs =   | 11.50   | (cfs)               |
| H H          | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =  | 0.00    | (cfs)               |
| nd Id        | ground water flow into PM-12                                    | Q_g12 =  | 0.86    | (cfs)               |
| -            | Iground water flow into PM-13                                   | Q_g13 =  | 4.21    | (CIS)               |
|              |   |          |         | <i>( m</i> )        |
| ច            | concentration of surface water into PM-12                       | C_s12 =  | /0      | (mg/l)              |
| Dat          | concentration of surface water into PM-13                       | C_s13 =  | 70      | (mg/l)              |
| o            | concentration of WWTP discharge                                 | C_sBab = | 70      | (mg/l)              |
| trat         | concentration of Area 5 Pit NW discharge                        | C_spit = | 925     | (mg/l)              |
| cen          | concentration of LTVSMC Tailings Basin seepage                  | C_fs =   | 436.6   | (mg/l)              |
| Sone         | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =  | 0       | (mg/l)              |
| nt C         | concentration of ground water flow into PM-12                   | C_g12 =  | 87.5    | (mg/l)              |
| Inpi         | concentration of ground water flow into PM-13                   | C_g13 =  | 87.5    | (mg/l)              |
|              |   |          |         |                     |
| e            | flow in river at PM-12  | Q_r12 =  | 13.79   | (cfs)               |
| ater<br>land | flow in river at PM-13  | Q_r13 =  | 80.00   | (cfs)               |
| Ba Va        | flow check  | Q ck =   | 80.00   | (cfs)               |
|              |   | . –      |         | <b>、</b>            |
|              | Imass flux of surface water into PM-12                          | M s12 =  | 24969   | (ma/l)              |
|              | mass flux of surface water into PM-13                           | M_s13 =  | 96090   | (mg/l)              |
| oť           | mass flux of Babbitt WWTP                                       | M sBab = | 654     | (mg/l)              |
| Б×           | concentration of Area 5 Pit NW discharge                        | M spit = | 52093   | (mg/l)              |
| atic ati     | concentration of LTVSMC Tailings Basin seepage                  | M_fs =   | 142091  | (mg/l)              |
| s F<br>S F   | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =  | 0       | (mg/l)              |
| alc<br>as    | mass flux of ground water into PM-12                            | M_g12 =  | 2130    | (mg/l)              |
| UΣ           | mass flux of ground water into PM-13                            | M_g13 =  | 10425   | (mg/l)              |
|              |   |          |         |                     |
| e            | mass flux in river at PM-12                                     | M r12 =  | 27752   | (ma/s)              |
| ss<br>an     |   |          | _,,,,   | ( <del>9</del> , 0) |
| Aa:<br>3ala  | mass flux in river at PM-13                                     | M r13 –  | 328452  | (ma/s)              |
|              |   | <u></u>  | 020432  | (119/3)             |
| C C          |   |          |         |                     |
| tio _        |   |          |         |                     |
| tra          | concentration in river at PM-12                                 | C r12 =  | 71.09   | (mg/l)              |
| ulat         |   | <u> </u> |         |                     |
| LC LC        |   |          |         |                     |
| ပိပိ         | concentration in river at PM-13                                 | C_r13 =  | 145.08  | (mg/l)              |
|              |   | . —      |         | /                   |
| L<br>L       |   |          |         |                     |
| 4<br>atic    |   |          |         |                     |
| /ec<br>ntra  | Observed concentration in river at PM-12                        |          | 61.70   | (mg/l)              |
| ien<br>Cel   |   |          |         |                     |
| sd(          |   |          | 1.10 50 | ( / <b>)</b>        |
| 00           | Observed concentration in river at PM-13                        |          | 143.50  | (mg/l)              |

#### Parameter: Potassium

|               | curface water flow into PM 12                                   | 0 c12                     | 0 00 | (ofc)           |
|---------------|---|---------------------------|------|-----------------|
| D             | surface water flow into PM-13                                   | $\Box_{312} = \Box_{313}$ | 0.30 | (cfs)           |
| ati           | Babbitt WWTP discharge  | $\Omega_{\rm sBab} =$     | 0.30 | (cfs)           |
| Ū,            | Area 5 Pit NW discharge   | $Q_{spit} =$              | 0.00 | (cfs)           |
| Ň             | LTVSMC Tailings Basin seepage                                   | $Q_{fs} =$                | 1.20 | (cfs)           |
| Ē             | Hydrometallurgical Residue Cells Liner Leakage                  | Q rrs =                   | 0.00 | (cfs)           |
| out           | ground water flow into PM-12                                    | Q g12 =                   | 0.86 | (cfs)           |
| du du         | ground water flow into PM-13                                    | Q_g13 =                   | 4.21 | (cfs)           |
|               |   |                           |      |                 |
| a             | concentration of surface water into PM-12                       | C_s12 =                   | 3.7  | (mg/l)          |
| Dat           | concentration of surface water into PM-13                       | C_s13 =                   | 3.7  | (mg/l)          |
| <u>io</u>     | concentration of WWTP discharge                                 | C_sBab =                  | 3.7  | (mg/l)          |
| trati         | concentration of Area 5 Pit NW discharge                        | C_spit =                  | 48.6 | (mg/l)          |
| e<br>L        | concentration of LTVSMC Tailings Basin seepage                  | C_fs =                    | 7.77 | (mg/l)          |
| ouo           | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =                   | 0    |                 |
| nt C          | concentration of ground water flow into PM-12                   | C_g12 =                   | 1.6  | (mg/l)          |
| lnp           | concentration of ground water flow into PM-13                   | C_g13 =                   | 1.6  | (mg/l)          |
|               |   |                           |      |                 |
| e             | flow in river at PM-12  | Q_r12 =                   | 1.49 | (cfs)           |
| ater<br>Ilano | flow in river at PM-13  | Q_r13 =                   | 7.20 | (cfs)           |
| Ba<br>Ba      | flow check  | Q_ck =                    | 7.20 | (cfs)           |
|               |   |                           |      |                 |
|               | mass flux of surface water into PM-12                           | M_s12 =                   | 32   | (µg/s)          |
|               | mass flux of surface water into PM-13                           | M_s13 =                   | 31   | (mg/s)          |
| of            | mass flux of Babbitt WWTP                                       | M_sBab =                  | 35   | (mg/s)          |
| noi<br>XL     | concentration of Area 5 Pit NW discharge                        | M_spit =                  | 0    | (mg/s)          |
| Flu           | concentration of LTVSMC Tailings Basin seepage                  | M_fs =                    | 264  | (mg/s)          |
| cul           | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =                   | 0    | (mg/s)          |
| Cal<br>Aa:    | mass flux of ground water into PM-12                            | IVI_g12 =                 | 39   | (mg/s)          |
| 02            | Inass nux of ground water 1110 FIVE 13                          | w_yts =                   | 191  | (1119/5)        |
|               |   |                           |      |                 |
| ce            | mass flux in river at PM-12                                     | M r12 =                   | 105  | (mg/s)          |
| ss            |   |                           |      | . 3/            |
| Ma<br>Bal     | mass flux in river at PM-13                                     | M r13 =                   | 591  | (ma/s)          |
|               |   |                           | 001  | ( <u>9</u> , 0) |
| C             |   |                           |      |                 |
| tion          |   |                           |      |                 |
| tra           | concentration in river at PM-12                                 | C r12 =                   | 2.49 | (mg/l)          |
| ulat          |   |                           |      | ( ···· 3/··/    |
| alct          |   |                           |      |                 |
| ပိပိ          | concentration in river at PM-13                                 | C_r13 =                   | 2.90 | (mg/l)          |
|               |   |                           |      |                 |
| uc            |   |                           |      |                 |
| atio          |   |                           |      | <i>,</i>        |
| vec<br>ntr    | Observed concentration in river at PM-12                        |                           | 0.78 | (mg/l)          |
| ser<br>lce    |   |                           |      |                 |
| sdC<br>Doc    | Observed concentration is river at DM 19                        |                           | 0.01 | (mc/l)          |
| 00            | Observed concentration in river at PM-13                        |                           | 2.31 | (IIIg/I)        |

#### Parameter: Magnesium

|   |   | 1 -      |       |           |
|---|---|----------|-------|-----------|
|   | surface water flow into PM-12   | Q_s12 =  | 12.60 | (cfs)     |
| ıta                                       | surface water flow into PM-13   | Q_s13 =  | 48.51 | (cfs)     |
| D   | Babbitt WWTP discharge  | Q_sBab = | 0.33  | (cfs)     |
| N N                                       | Area 5 Pit NW discharge   | Q_spit = | 1.99  | (cfs)     |
| 음   | LTVSMC Tailings Basin seepage   | Q_fs =   | 11.50 | (cfs)     |
| nt F                                      | Hydrometallurgical Residue Cells Liner Leakage  | Q_rrs =  | 0.00  | (cfs)     |
| ਹੁ  | ground water flow into PM-12  | Q_g12 =  | 0.86  | (cfs)     |
| <u> </u>                                  | ground water flow into PM-13  | Q_g13 =  | 4.21  | (cfs)     |
|   |   |          |       |           |
| ъ   | concentration of surface water into PM-12   | C_s12 =  | 6     | (mg/l)    |
| Dat                                       | concentration of surface water into PM-13   | C_s13 =  | 6     | (mg/l)    |
| tion                                      | concentration of WWTP discharge   | C_sBab = | 6     | (mg/l)    |
| trat                                      | concentration of Area 5 Pit NW discharge  | C_spit = | 252   | (mg/l)    |
| en Cen                                    | concentration of LTVSMC Tailings Basin seepage  | C_fs =   | 69.97 | (mg/l)    |
| Sond                                      | concentration of Hydrometallurgical Residue Cells Liner Leakage   | C_rrs =  | 0     |           |
| nt C                                      | concentration of ground water flow into PM-12   | C_g12 =  | 10.65 | (mg/l)    |
| dul                                       | concentration of ground water flow into PM-13   | C_g13 =  | 10.65 | (mg/l)    |
|   |   |          |       |           |
| ee  | flow in river at PM-12  | Q_r12 =  | 13.79 | (cfs)     |
| ater<br>Ilano                             | flow in river at PM-13  | Q_r13 =  | 80.00 | (cfs)     |
| ₿ Š                                       | flow check  | Q_ck =   | 80.00 | (cfs)     |
|   |   |          |       |           |
|   | mass flux of surface water into PM-12   | M s12 =  | 2140  | (ua/s)    |
|   | mass flux of surface water into PM-13   | M s13 =  | 8236  | (ma/s)    |
| of  | mass flux of Babbitt WWTP   | M sBab = | 56    | (mg/s)    |
| E ×                                       | concentration of Area 5 Pit NW discharge  | M spit = | 14192 | (mg/s)    |
| lin, ti                                   | concentration of LTVSMC Tailings Basin seepage  | M fs =   | 22772 | (mg/s)    |
| с<br>П<br>п<br>п<br>с<br>П<br>с<br>п<br>с | concentration of Hydrometallurgical Residue Cells Liner Leakage   | M_rrs =  | 0     | (mg/s)    |
| ass                                       | mass flux of ground water into PM-12  | M_g12 =  | 259   | (mg/s)    |
| ΰΞ  | mass flux of ground water into PM-13  | M_g13 =  | 1269  | (mg/s)    |
|   |   |          |       |           |
|   |   |          |       |           |
| ce  | mass flux in river at PM-12   | M_r12 =  | 2455  | (mg/s)    |
| lss<br>lan                                |   |          |       |           |
| Ma<br>3al                                 | mass flux in river at PM-13   | M r13 =  | 48924 | (ma/s)    |
|   |   | <u> </u> | -0024 | (mg/3)    |
|   |   |          |       |           |
| Lo  |   |          |       |           |
| äti                                       | DATE: Note: | 0        | 0.00  | (         |
| ate<br>ntr                                | concentration in river at PM-12   | C_r12 =  | 6.29  | (mg/l)    |
| Sult                                      |   |          |       |           |
| Son                                       | concentration in vivor at DM 10   | 0        | 01.01 | (ma m /l) |
| 00  | concentration in river at PM-13   | 0_f13 =  | 21.61 | (mg/l)    |
|   |   | 1        |       | 1         |
| uo  |   |          |       |           |
| atio                                      |   |          |       |           |
| /ec<br>ntr:                               | Observed concentration in river at PM-12  |          | 6.2   | (mg/l)    |
| en  |   |          |       |           |
| sq  |   |          |       |           |
|   | Observed separation in viver at DM 10   | 1        | 15.0  | (ma/l)    |

#### Parameter: Manganese

|              |   | -           |       |          |
|--------------|---|-------------|-------|----------|
| _            | surface water flow into PM-12                                   | Q_s12 =     | 0.30  | (cfs)    |
| ata          | surface water flow into PM-13                                   | Q_s13 =     | 0.30  | (cfs)    |
| Ö            | Babbitt WWTP discharge  | Q_sBab =    | 0.33  | (cfs)    |
| Ň            | Area 5 Pit NW discharge   | Q_spit =    | 0.00  | (cts)    |
| 문            | LIVSMC Tailings Basin seepage                                   | Q_ts =      | 1.20  | (cts)    |
| , T          | Hydrometallurgical Residue Cells Liner Leakage                  | $Q_{rrs} =$ | 0.00  | (cfs)    |
| đ            | ground water flow into PM-12                                    | Q_g12 =     | 0.86  | (CfS)    |
|              | Iground water now into Pivi-13                                  | Q_g13 =     | 4.21  | (CIS)    |
|              |   |             |       |          |
| ອ            | concentration of surface water into PM-12                       | C_s12 =     | 0.3   | (mg/l)   |
| Dat          | concentration of surface water into PM-13                       | C_s13 =     | 0.3   | (mg/l)   |
| ion          | concentration of WWTP discharge                                 | C_sBab =    | 0.3   | (mg/l)   |
| itrat        | concentration of Area 5 Pit NW discharge                        | C_spit =    | 0.65  | (mg/l)   |
| cen          | concentration of LTVSMC Tailings Basin seepage                  | C_fs =      | 1.183 | (mg/l)   |
| Con          | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =     | 0     |          |
| ut C         | concentration of ground water flow into PM-12                   | C_g12 =     | 0.188 | (mg/l)   |
| lnp          | concentration of ground water flow into PM-13                   | C_g13 =     | 0.188 | (mg/l)   |
|              |   |             |       |          |
| ee           | flow in river at PM-12  | Q_r12 =     | 1.49  | (cfs)    |
| ater<br>Jane | flow in river at PM-13  | Q_r13 =     | 7.20  | (cfs)    |
| Wa<br>Ba     | flow check  | Q_ck =      | 7.20  | (cfs)    |
|              |   |             |       |          |
|              | mass flux of surface water into PM-12                           | M_s12 =     | 3     | (µg/s)   |
|              | mass flux of surface water into PM-13                           | M_s13 =     | 3     | (mg/s)   |
| of           | mass flux of Babbitt WWTP                                       | M_sBab =    | 3     | (mg/s)   |
| ы<br>Б       | concentration of Area 5 Pit NW discharge                        | M_spit =    | 0     | (mg/s)   |
| -In ati      | concentration of LTVSMC Tailings Basin seepage                  | M_fs =      | 40    | (mg/s)   |
| luc<br>s l s | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =     | 0     | (mg/s)   |
| alc<br>las   | mass flux of ground water into PM-12                            | M_g12 =     | 5     | (mg/s)   |
| S C          | mass flux of ground water into PM-13                            | M_g13 =     | 22    | (mg/s)   |
|              |   |             |       |          |
| Φ            |   |             |       | ,        |
| uč a         | mass flux in river at PM-12                                     | M_r12 =     | 10    | (mg/s)   |
| as:<br>ala   |   |             |       |          |
| Σű           | mass flux in river at PM-13                                     | M_r13 =     | 75    | (mg/s)   |
|              |   |             |       |          |
| 2            |   |             |       |          |
| tio          |   |             |       |          |
| tec<br>tra   | concentration in river at PM-12                                 | C r12 =     | 0.24  | (mg/l)   |
| ulat<br>en   |   |             |       | <u> </u> |
| lct<br>lct   |   |             |       |          |
| ပိပိ         | concentration in river at PM-13                                 | C r13 =     | 0.37  | (mg/l)   |
|              |   |             |       |          |
| C            |   |             |       |          |
| tio          |   |             |       |          |
| ed           | Observed concentration in river at PM-12                        |             | 0.34  | (mg/l)   |
| en           |   | 1           |       | /        |
| se           |   |             |       |          |
| ပိပိ         | Observed concentration in river at PM-13                        |             | 0.20  | (mg/l)   |
|              |   |             |       |          |

#### Parameter: Sodium

| surface water flow into PM-12         Q. s12 =         (12.60) (cfs)           Markae water flow into PM-13         Q. s13 =         (45.1) (cfs)           Babbit WWTP discharge         Q. sBab =         (0.33) (cfs)         (15.1) (cfs)           Markae water flow into PM-12         Q. g12 =         (0.6) (cfs)         (15.1) (cfs)           Markae water flow into PM-12         Q. g12 =         (0.6) (cfs)         (15.1) (cfs)           Ground water flow into PM-13         Q. g13 =         (4.2) (cfs)         (15.1) (cfs)           Ground water flow into PM-13         Q. g13 =         (4.2) (cfs)         (15.1) (cfs)           Goncentration of surface water into PM-13         Q. g13 =         (4.2) (cfs)           Goncentration of Avrace water into PM-13         Q. g13 =         (4.2) (cfs)           Goncentration of Avrace S Pit NW discharge         C. spit =         (11.9) (cfs)           Goncentration of Avrace S Pit NW discharge         C. spit =         (11.9) (cfs)           Goncentration of Ground water flow into PM-12         C. g12 =         (4.3) (cfs)           Goncentration of Ground water flow into PM-13         C. g13 =         (4.9) (cfs)           Goncentration of ground water flow into PM-13         Q. g13 =         (4.2) (cfs)           Goncentration of Avras Pit NW discharge         G. spit =         (1   |             |   |             |       |         |
|--|-------------|---|-------------|-------|---------|
| Bit face water flow into PM-13         Q s13 =         4.451 (cfs)           Q         Babbit WWTP discharge         Q s8b =         0.33 (cfs)           Area 5 PI NW discharge         Q spl =         1.99 (cfs)         1.99 (cfs)           Hydrometallurgical Residue Cells Liner Leakage         Q rrs =         0.00 (cfs)         0.00 (cfs)           ground water flow into PM-13         Q g13 =         4.21 (cfs)         0.65 =         0.35 (mgl)           concentration of surface water into PM-13         C s12 =         0.35 (mgl)         0.00 (cfs)         0.00 (cfs)           concentration of surface water into PM-13         C s13 =         3.5 (mgl)         0.00 (cfs)         0.00 (cfs)           concentration of Surface water into PM-12         C s12 =         0.5 (mgl)         0.00 (cfs)         0.00 (cfs)           concentration of LTVSMC Talings Basin seepage         C spl =         0.43 (mgl)         0.00 (cfs)         0.00 (cfs)           concentration of ground water flow into PM-12         C g12 =         4.9 (mgl)         0.00 (cfs)           concentration of ground water flow into PM-13         C g13 =         4.9 (mgl)         0.00 (cfs)           concentration of ground water flow PM-13         Q g13 =         4.9 (mgl)         0.00 (cfs)           mass flux of surface water into PM-12         M s12 =  |             | surface water flow into PM-12                                   | Q_s12 =     | 12.60 | (cfs)   |
| Application         Application         Application         Application           Application         Application         Application         <  | Data        | surface water flow into PM-13                                   | Q_s13 =     | 48.51 | (cfs)   |
| Area 5 Pit NW discharge         O. spit =         1.39 (cfs)           Hydrometallurgical Residue Cells Liner Leakage         O. rs =         0.00 (cfs)           ground water flow into PM-12         O. g12 =         0.86 (cfs)           ground water flow into PM-13         O. g12 =         0.86 (cfs)           concentration of surface water into PM-13         C. s12 =         3.5 (mg/l)           concentration of surface water into PM-13         C. s13 =         3.5 (mg/l)           concentration of surface water into PM-13         C. s13 =         3.5 (mg/l)           concentration of surface water into PM-12         C. s12 =         0.9 (cfs)           concentration of surface water into PM-13         C. s13 =         3.5 (mg/l)           concentration of Journd water flow into PM-12         C. g12 =         4.4 (mg/l)           concentration of ground water flow into PM-12         C. g13 =         4.9 (mg/l)           concentration of ground water flow into PM-13         C. g13 =         4.9 (mg/l)           concentration of ground water flow into PM-13         C. g13 =         4.9 (mg/l)           concentration of Area 5 Pit NW discharge         C. rs =         0           concentration of ground water flow into PM-12         C. g13 =         4.9 (mg/l)           concentration of Area 5 Pit NW discharge         O. rd =  |             | Babbitt WWTP discharge  | Q_sBab =    | 0.33  | (cfs)   |
| Open LTVSMC Tailings Basin seepage         O, fs =         (1.50 (cfs))           ground water flow into PM-12         O g12 =         0.86 (cfs)           ground water flow into PM-13         O, g13 =         4.21 (cfs)           concentration of surface water into PM-13         C, s12 =         3.5 (mg/l)           concentration of surface water into PM-13         C, s13 =         3.5 (mg/l)           concentration of Area 5 PRI NW discharge         C, s8ab =         3.5 (mg/l)           concentration of LTVSMC Tailings Basin seepage         C, fs =         44.31 (mg/l)           concentration of LTVSMC Tailings Basin seepage         C, g12 =         4.9 (mg/l)           concentration of LTVSMC Tailings Basin seepage         C, g13 =         4.9 (mg/l)           concentration of LTVSMC Tailings Basin seepage         C, g13 =         4.9 (mg/l)           concentration of LTVSMC Tailings Basin seepage         C, g13 =         4.9 (mg/l)           concentration of ground water flow into PM-12         C, g13 =         4.9 (mg/l)           concentration of ground water flow into PM-13         C, g13 =         4.9 (mg/l)           concentration of area 5 PRI NW discharge         O, ck =         80.00 (cfs)           mass flux of surface water into PM-13         M, s12 =         1248 (mg/s)           mass flux of surface water into PM-12   | 3           | Area 5 Pit NW discharge   | Q_spit =    | 1.99  | (cfs)   |
| Hydrometallurgical Residue Cells Liner Leakage         Q. rrs =         0.00 (cfs)           ground water flow into PM-13         Q.g13 =         4.21 (cfs)           concentration of surface water into PM-13         C. s12 =         3.5 (mg/l)           concentration of surface water into PM-13         C. s13 =         3.5 (mg/l)           concentration of surface water into PM-13         C. s13 =         3.5 (mg/l)           concentration of surface water into PM-13         C. s13 =         3.5 (mg/l)           concentration of Area 5 Pit NW discharge         C. s8ab =         3.5 (mg/l)           concentration of Hydrometallurgical Residue Cells Liner Leakage         C.rrs =         0           concentration of typdometallurgical Residue Cells Liner Leakage         C.rrs =         0           concentration of ground water flow into PM-12         C. g12 =         4.3 (mg/l)           concentration of typdometallurgical Residue Cells Liner Leakage         C.rrs =         0           concentration of typdometallurgical Residue Cells Liner Leakage         C.rrs =         0           concentration of typdometallurgical Residue Cells Liner Leakage         C.rrs =         0           concentration of ground water flow into PM-12         Q.g13 =         4.9 (mg/l)           mass flux of surface water into PM-13         Q.g14 =         13.79 (cfs)  | <u>e</u>    | LTVSMC Tailings Basin seepage                                   | Q_fs =      | 11.50 | (cfs)   |
| Magnetic flow         Model PM-12         Q.g12 =         Q.g13 =         4.21 (cfs)           Q.g13 =         4.21 (cfs)         Q.g13 =         4.21 (cfs)           Q.g13 =         4.21 (cfs)         Q.g13 =         4.21 (cfs)           Q.g13 =         4.21 (cfs)         Q.g13 =         4.21 (cfs)           Q.g13 =         0.212 =         0.25 (mgl)         Q.g13 =         4.21 (cfs)           Q.g14 =         0.35 (mgl)         Q.g13 =         4.21 (cfs)         Q.g13 =         4.21 (cfs)           Q.g14 =         0.35 (mgl)         Q.g14 =         0.35 (mgl)         Q.g14 =         0.05 (mgl)           Q.g14 =         0.91 (cfs)         1.11 (mgl)         Q.g14 =         0.01 (cfs)         Q.g14 =           Q.g14 =         0.43 (mgl)         Q.g14 =         0.01 (cfs)         Q.g14 =         Q.g14 (mgl)           Concentration of Pydrometallurgical Residue Calls Liner Leakage         C rs =         0         Q.g17 (mgl)         Q.g17 (mgl)           Move in river at PM-12         Q r12 =         13.79 (cfs)         Q.g13 (mgl)         Q.g12 (mgl)         Q.g12 (mgl)           Model         Invi niver at PM-13         Q r12 =         M.g12 =         1248 (mgl)         Q.g12 (mgl)           Model         Q.g12 =   | L<br>t      | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =     | 0.00  | (cfs)   |
| Image: space of the state into PM-13         O_g13 =         4.21 (cfs)           concentration of surface water into PM-12         C_s12 =         3.5 (mg/l)           concentration of surface water into PM-13         C_s13 =         3.5 (mg/l)           concentration of surface water into PM-13         C_s13 =         3.5 (mg/l)           concentration of WTPP discharge         C_s8ab =         3.5 (mg/l)           concentration of Area 5 Pit NW discharge         C_s9tl =         119 (mg/l)           concentration of LTVSMC Tailings Basin seepage         C_rrs =         0           concentration of LTVSMC Tailings Basin seepage         C_rrs =         0           concentration of ground water flow into PM-12         C_g12 =         4.9 (mg/l)           concentration of ground water flow into PM-13         C_g13 =         4.90 (mg/l)           concentration of ground water flow into PM-13         C_g13 =         80.00 (cfs)           flow in river at PM-12         Q_r12 =         13.79 (cfs)           flow in river at PM-13         Q_r13 =         80.00 (cfs)           mass flux of surface water into PM-12         M_s12 =         1248 (mg/s)           mass flux of surface water into PM-13         M_s12 =         1248 (mg/s)           mass flux of ground water flow PM-13         M_s12 =         100 (mg/s)   | nd          | ground water flow into PM-12                                    | Q_g12 =     | 0.86  | (cfs)   |
| Bits         C s12 =         3.5 (mg/l)           concentration of surface water into PM-13         C s13 =         3.5 (mg/l)           concentration of wWTP discharge         C s8ab =         3.5 (mg/l)           concentration of LTVSMC Tailings Basin seepage         C fs =         44.31 (mg/l)           concentration of regrund water flow into PM-12         C g12 =         4.9 (mg/l)           concentration of ground water flow into PM-13         C g12 =         4.9 (mg/l)           concentration of ground water flow into PM-13         C g13 =         4.9 (mg/l)           concentration of ground water flow into PM-13         C g13 =         4.9 (mg/l)           concentration of ground water flow into PM-13         C g13 =         4.9 (mg/l)           concentration of ground water flow into PM-13         C g13 =         4.9 (mg/l)           mass flux of surface water into PM-12         M r13 =         60.00 (cfs)           mass flux of surface water into PM-13         M s13 =         4804 (mg/s)           mass flux of surface water into PM-13         M s13 =         1248 (mg/s)           mass flux of surface water into PM-13         M s13 =         1482 (mg/s)           mass flux of surface water into PM-13         M s13 =         1482 (mg/s)           mass flux of ground water into PM-13         M s13 =         1428 (mg/  | L<br>L      | ground water flow into PM-13                                    | Q_g13 =     | 4.21  | (cfs)   |
| $\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$   |             |   |             |       |         |
| $\begin{tabular}{ c c c c c c c } \hline \end{tabular} \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$   | b           | concentration of surface water into PM-12                       | C_s12 =     | 3.5   | (mg/l)  |
| $\begin{tabular}{ c c c c c } \hline \end{tabular} \begin{tabular}{ c c c c c } \hline \end{tabular} \\ \hline \end{tabular} \end$   | Dat         | concentration of surface water into PM-13                       | C_s13 =     | 3.5   | (mg/l)  |
| $\begin{tabular}{ c c c c c c } \hline \end{tabular} tabu$   | <u>io</u>   | concentration of WWTP discharge                                 | C_sBab =    | 3.5   | (mg/l)  |
| $\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$   | trat        | concentration of Area 5 Pit NW discharge                        | C_spit =    | 119   | (mg/l)  |
| Open concentration of Hydrometallurgical Residue Cells Liner Leakage       C_rrs =       O         concentration of ground water flow into PM-12       C_g12 =       4.9 ((mg/l)         concentration of ground water flow into PM-13       C_g13 =       4.9 ((mg/l)         concentration of ground water flow into PM-13       Q_r12 =       13.79 (cfs)         flow in river at PM-12       Q_r13 =       80.00 (cfs)         flow check       Q_ck =       80.00 (cfs)         mass flux of surface water into PM-13       M_s13 =       4804 ((mg/s))         mass flux of surface water into PM-13       M_s13 =       4804 ((mg/s))         mass flux of surface water into PM-13       M_s13 =       4804 ((mg/s))         mass flux of ground water into PM-13       M_s13 =       4804 ((mg/s))         mass flux of ground water into PM-12       M_s91 =       6702 ((mg/s))         concentration of Hydrometallurgical Residue Cells Liner Leakage       M_rrs =       0 ((mg/s))         mass flux in river at PM-12       M_g13 =       584 ((mg/s))         mass flux in river at PM-13       M_g13 =       119 ((mg/s))         mass flux in river at PM-13       M_g13 =       12.30 ((mg/l))         mass flux in river at PM-13       C_r13 =       12.31 ((mg/l))         oconcentration in river at PM-13       C_r13 =  | en:         | concentration of LTVSMC Tailings Basin seepage                  | C_fs =      | 44.31 | (mg/l)  |
| $\begin{tabular}{ c c c c c c c } \hline C g12 & g12$  | ouc         | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =     | 0     |         |
| E         concentration of ground water flow into PM-13         C_g13 =         4.9 (mg/l)           group         flow in river at PM-12         0_r12 =         13.79 (cfs)           flow in river at PM-13         0_r13 =         80.00 (cfs)           flow in river at PM-13         0_r13 =         80.00 (cfs)           flow check         0_ck =         80.00 (cfs)           mass flux of surface water into PM-12         M_s13 =         4804 (mg/s)           mass flux of surface water into PM-13         M_s13 =         4804 (mg/s)           mass flux of surface water into PM-12         M_spit =         072 (mg/s)           concentration of Area 5 Pit NW discharge         M_spit =         070 (mg/s)           group         concentration of LTVSMC Tailings Basin seepage         M_fs =         14421 (mg/s)           mass flux of ground water into PM-12         M_g12 =         119 (mg/s)           mass flux of ground water into PM-13         M_g13 =         27911 (mg/s)           mass flux in river at PM-13         M_r12 =         1400 (mg/s)           mass flux in river at PM-13         C_r13 =         12.33 (mg/l)           mass flux in river at PM-13         C_r13 =         12.33 (mg/l)           mass flux in river at PM-13         3.0 (mg/l)         3.0 (mg/l)           mo   | nt O        | concentration of ground water flow into PM-12                   | C_g12 =     | 4.9   | (mg/l)  |
| NoteN  | lnp         | concentration of ground water flow into PM-13                   | C_g13 =     | 4.9   | (mg/l)  |
| But provide in river at PM-12         Q_r12 =         13.79 (cfs)           flow in river at PM-13         Q_r13 =         80.00 (cfs)           flow in river at PM-13         Q_rck =         80.00 (cfs)           flow check         Q_rck =         80.00 (cfs)           mass flux of surface water into PM-12         M_s12 =         1248 (µg/s).           mass flux of surface water into PM-13         M_s13 =         4804 (mg/s)           mass flux of surface water into PM-13         M_s13 =         4804 (mg/s)           mass flux of surface water into PM-13         M_s13 =         4804 (mg/s)           mass flux of surface water into PM-13         M_s13 =         6702 (mg/s)           concentration of Area 5 Pit NW discharge         M_spit =         6702 (mg/s)           concentration of Hydrometallurgical Residue Cells Liner Leakage         M rrs =         0 (mg/s)           mass flux of ground water into PM-12         M g12 =         119 (mg/s)           mass flux in river at PM-12         M_g13 =         584 (mg/s)           mass flux in river at PM-13         M_g13 =         27911 (mg/s)           mass flux in river at PM-13         C_r13 =         12.33 (mg/l)           concentration in river at PM-13         G_r13 =         12.33 (mg/l)           mass flux of ground water into PM-13  |             |   |             |       |         |
| Top top         Intervent at PM-13         Q_r13 =         80.00         (cfs)           Intow in river at PM-13         Q_ck =         80.00         (cfs)           Intow in river at PM-13         M_s12 =         1248 (µg/s)           mass flux of surface water into PM-12         M_s13 =         4404 (mg/s)           mass flux of surface water into PM-13         M_s13 =         4704 (mg/s)           mass flux of surface water into PM-13         M_s13 =         6702 (mg/s)           concentration of Area 5 Pit NW discharge         M_spit =         6702 (mg/s)           concentration of Hydrometallurgical Residue Cells Liner Leakage         M_rrs =         0 (mg/s)           mass flux of ground water into PM-13         M_g12 =         119 (mg/s)           mass flux of ground water into PM-13         M_g13 =         584 (mg/s)           mass flux in river at PM-12         M_g13 =         27911 (mg/s)           mass flux in river at PM-13         M_g13 =         27911 (mg/s)           concentration in river at PM-13         C_gr13 =         12.33 (mg/l)           mass flux in river at PM-13         C_gr13 =         12.33 (mg/l)           mass flux in river at PM-13         C_gr13 =         12.30 (mg/l)           mass flux in river at PM-13         12.7 (mg/l)         12.7 (mg/l) <td>ø</td> <td>flow in river at PM-12</td> <td>Q_r12 =</td> <td>13.79</td> <td>(cfs)</td>   | ø           | flow in river at PM-12  | Q_r12 =     | 13.79 | (cfs)   |
| Note:Q_ck =80.00 (cfs)Mass flux of surface water into PM-12M_s12 =1248 (µg/s)mass flux of surface water into PM-13M_s13 =4804 (mg/s)mass flux of Babbit WWTPM_splab =33 (mg/s)concentration of Area 5 Pit NW dischargeM_spit =6702 (mg/s)concentration of I_TVSMC Tailings Basin seepageM_fs =14421 (mg/s)concentration of Hydrometallurgical Residue Cells Liner LeakageM_rrs =0 (mg/s)mass flux of ground water into PM-13M_g12 =119 (mg/s)mass flux of ground water into PM-13M_g13 =584 (mg/s)mass flux in river at PM-12M_rr12 =1400 (mg/s)mass flux in river at PM-13M_r13 =27911 (mg/s)mass flux in river at PM-13C_r12 =3.59 (mg/l)mass flux in river at PM-13C_r13 =12.33 (mg/l)mass flux of concentration in river at PM-1300mass flux of concentration in river at PM-13012.7 (mg/l)  | tter<br>and | flow in river at PM-13  | Q_r13 =     | 80.00 | (cfs)   |
| mass flux of surface water into PM-12       M_s12 =       1248 (µg/s)         mass flux of surface water into PM-13       M_s13 =       4804 (mg/s)         mass flux of surface water into PM-13       M_s13 =       4804 (mg/s)         mass flux of surface water into PM-13       M_s12 =       1248 (µg/s)         mass flux of surface water into PM-13       M_s12 =       1248 (µg/s)         concentration of LTVSMC Tailings Basin seepage       M_fs =       14421 (mg/s)         concentration of Hydrometallurgical Residue Cells Liner Leakage       M_rrs =       0 (mg/s)         mass flux of ground water into PM-12       M_g12 =       119 (mg/s)         mass flux of ground water into PM-13       M_g13 =       584 (mg/s)         mass flux in river at PM-12       M_r13 =       27911 (mg/s)         mass flux in river at PM-13       M_r13 =       27911 (mg/s)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)         observed concentration in river at PM-12       3.0 (mg/l)       3.0 (mg/l)         observed concentration in river at PM-13       2.7 (mg/l)       3.0 (mg/l)   | Wa<br>Bai   | flow check  | Q_ck =      | 80.00 | (cfs)   |
| mass flux of surface water into PM-12       M_s12 =       1248 (µg/s)         mass flux of surface water into PM-13       M_s13 =       4804 (mg/s)         mass flux of surface water into PM-13       M_s13 =       4804 (mg/s)         mass flux of surface water into PM-13       M_s12 =       1248 (µg/s)         mass flux of surface water into PM-13       M_s12 =       33 (mg/s)         concentration of Area 5 Pit NW discharge       M_spit =       6702 (mg/s)         concentration of Hydrometallurgical Residue Cells Liner Leakage       M_rrs =       0 (mg/s)         mass flux of ground water into PM-12       M_g13 =       584 (mg/s)         mass flux of ground water into PM-13       M_g13 =       584 (mg/s)         mass flux in river at PM-12       M_r12 =       1400 (mg/s)         mass flux in river at PM-13       M_r13 =       27911 (mg/s)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)         participe O       Observed concentration in river at PM-12       3.0 (mg/l)         observed concentration in river at PM-13       12.7 (mg/l)  |             |   |             |       |         |
| $\frac{1000}{100} \text{ mass flux of surface water into PM-13} & M_s13 = 4804 (mg/s) \\ \frac{1000}{100} \text{ mass flux of Babbitt WWTP} & M_sBab = 33 (mg/s) \\ \frac{1000}{100} \text{ concentration of Area 5 Pit NW discharge} & M_spit = 6702 (mg/s) \\ \frac{1000}{100} \text{ concentration of LTVSMC Tailings Basin seepage} & M_fs = 14421 (mg/s) \\ \frac{1100}{100} \text{ concentration of LTVSMC Tailings Basin seepage} & M_fs = 14421 (mg/s) \\ \frac{1100}{100} \text{ mass flux of ground water into PM-12} & M_g12 = 119 (mg/s) \\ \frac{1100}{100} \text{ mass flux of ground water into PM-13} & M_g13 = 584 (mg/s) \\ \frac{1100}{100} \text{ mass flux in river at PM-12} & M_g13 = 584 (mg/s) \\ \frac{1100}{100} \text{ mass flux in river at PM-13} & M_g13 = 27911 (mg/s) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & C_gr13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 3.00 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100} \text{ concentration in river at PM-13} & M_g13 = 12.33 (mg/l) \\ \frac{1100}{100}  $  |             | mass flux of surface water into PM-12                           | M_s12 =     | 1248  | (µg/s)  |
| mass flux of Babbit WWTP       M_sBab =       33 (mg/s)         concentration of Area 5 Pit NW discharge       M_spit =       6702 (mg/s)         concentration of LTVSMC Tailings Basin seepage       M fs =       14421 (mg/s)         concentration of Hydrometallurgical Residue Cells Liner Leakage       M_rrs =       0 (mg/s)         mass flux of ground water into PM-12       M_g13 =       584 (mg/s)         mass flux of ground water into PM-13       M_g13 =       584 (mg/s)         mass flux in river at PM-12       M_rr13 =       27911 (mg/s)         mass flux in river at PM-13       M_r13 =       27911 (mg/s)         concentration in river at PM-13       C_r12 =       3.0 (mg/l)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)  |             | mass flux of surface water into PM-13                           | M_s13 =     | 4804  | (mg/s)  |
| StepConcentration of Area 5 Pit NW dischargeM_spit = $6702 \text{ (mg/s)}$ concentration of LTVSMC Tailings Basin seepageM_fs = $14421 \text{ (mg/s)}$ concentration of Hydrometallurgical Residue Cells Liner LeakageM_rrs =0 (mg/s)mass flux of ground water into PM-12M_g12 = $119 \text{ (mg/s)}$ mass flux of ground water into PM-13M_g13 = $5844 \text{ (mg/s)}$ mass flux in river at PM-12M_r12 = $1400 \text{ (mg/s)}$ mass flux in river at PM-13M_r13 = $27911 \text{ (mg/s)}$ mass flux in river at PM-13M_r13 = $27911 \text{ (mg/s)}$ concentration in river at PM-13C_r12 = $3.59 \text{ (mg/l)}$ concentration in river at PM-13C_r13 = $12.33 \text{ (mg/l)}$ concentration in river at PM-13C_r13 = $12.30 \text{ (mg/l)}$ concentration in river at PM-13C_r13 = $12.77 \text{ (mg/l)}$  | of          | mass flux of Babbitt WWTP                                       | M_sBab =    | 33    | (mg/s)  |
| $\frac{1}{2} \frac{1}{2} \frac{1}$ | Б×          | concentration of Area 5 Pit NW discharge                        | M_spit =    | 6702  | (mg/s)  |
| Image: Second structure       Concentration of Hydrometallurgical Residue Cells Liner Leakage       M_mrs =       O (mg/s)         mass flux of ground water into PM-12       M g12 =       119 (mg/s)         mass flux of ground water into PM-13       M_g13 =       584 (mg/s)         mass flux in river at PM-12       M_r12 =       1400 (mg/s)         mass flux in river at PM-13       M_r13 =       27911 (mg/s)         mass flux in river at PM-13       M_r13 =       27911 (mg/s)         concentration in river at PM-13       C_r12 =       3.59 (mg/l)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)         observed concentration in river at PM-13       0       3.0 (mg/l)         Observed concentration in river at PM-13       12.7 (mg/l)       12.7 (mg/l)   | atic        | concentration of LTVSMC Tailings Basin seepage                  | M_fs =      | 14421 | (mg/s)  |
| $M_g12 =$ 119 (mg/s)mass flux of ground water into PM-12M_g13 =584 (mg/s)mass flux of ground water into PM-13M_g13 =584 (mg/s)mass flux in river at PM-12M_r12 =1400 (mg/s)mass flux in river at PM-13M_r13 =27911 (mg/s)pattern of ground water into river at PM-13C_r12 =3.59 (mg/l)pattern of ground water into river at PM-13C_r13 =12.33 (mg/l)pattern of ground water into river at PM-13C_r13 =12.33 (mg/l)pattern of ground water into river at PM-13Deserved concentration in river at PM-1312.7 (mg/l)   | s F         | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =     | 0     | (mg/s)  |
| $O \ge$ mass flux of ground water into PM-13M_g13 =584 (mg/s)mass flux in river at PM-12M_r12 =1400 (mg/s)mass flux in river at PM-13M_r13 =27911 (mg/s)page of the page of the  | ass         | mass flux of ground water into PM-12                            | M_g12 =     | 119   | (mg/s)  |
| $\frac{M_r r 12 = 1400 \text{ (mg/s)}}{M_r r 13 = 27911 \text{ (mg/s)}}$ $\frac{M_r r 13 = 27911 \text{ (mg/s)}}{M_r r 13 = 27911 \text{ (mg/s)}}$ $\frac{M_r r 13 = 27911 \text{ (mg/s)}}{M_r r 13 = 27911 \text{ (mg/s)}}$ $\frac{M_r r 13 = 27911 \text{ (mg/s)}}{M_r r 13 = 27911 \text{ (mg/s)}}$ $\frac{M_r r 13 = 27911 \text{ (mg/s)}}{M_r r 13 = 27911 \text{ (mg/s)}}$ $\frac{M_r r 13 = 27911 \text{ (mg/s)}}{M_r r 13 = 27911 \text{ (mg/s)}}$ $\frac{M_r r 13 = 27911 \text{ (mg/s)}}{M_r r 13 = 27911 \text{ (mg/s)}}$ $\frac{M_r r 13 = 27911 \text{ (mg/s)}}{M_r r 13 = 27911 \text{ (mg/s)}}$ $\frac{M_r r 13 = 27911 \text{ (mg/s)}}{M_r r 13 = 27911 \text{ (mg/s)}}$   | ΰΣ          | mass flux of ground water into PM-13                            | M_g13 =     | 584   | (mg/s)  |
| mass flux in river at PM-12       M_r12 =       1400 (mg/s)         mass flux in river at PM-13       M_r13 =       27911 (mg/s)         mass flux in river at PM-13       C_r12 =       3.59 (mg/l)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)         concentration in river at PM-13       0bserved concentration in river at PM-12       3.0 (mg/l)         concentration in river at PM-13       12.7 (mg/l)       12.7 (mg/l)  |             |   |             |       |         |
| $\frac{mass flux in river at PM-12}{mass flux in river at PM-13}$ $M_r12 = 1400 (mg/s)$ $M_r13 = 27911 (mg/s)$ $M_r13 = 27911 (mg/s)$ $\frac{mass flux in river at PM-13}{mass flux in river at PM-12}$ $C_r12 = 3.59 (mg/l)$ $C_r13 = 12.33 (mg/l)$ $C_r13 = 3.0 (mg/l)$ $C_r13 = 3.0 (mg/l)$ $M_r13 = 3.0 (mg/l)$  |             |   |             |       |         |
| Wind and a set of the se  | ce          | mass flux in river at PM-12                                     | M_r12 =     | 1400  | (mg/s)  |
| $\frac{P_{R}}{P_{R}} = \frac{P_{R}}{P_{R}} + \frac{P_{R}}{P_{R}} = \frac{P_{R}}{P_{R}} + \frac{P_{R}}{P_{R}} = \frac{P_{R}}{P_{R}} + \frac{P_{R}}{P_{R}} + \frac{P_{R}}{P_{R}} = \frac{P_{R}}{P_{R}} + \frac{P_{R}}{P_{R}} + \frac{P_{R}}{P_{R}} = \frac{P_{R}}{P_{R}} + \frac{P_{R}}{P$   | ss<br>an    |   |             |       | /       |
| Image: Note of the infinite data in the data i   | Vla<br>3al  | mass flux in river at PM-13                                     | M r13 –     | 27011 | (ma/e)  |
| Visite       concentration in river at PM-12       C_r12 =       3.59 (mg/l)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)         visite       Observed concentration in river at PM-12       3.0 (mg/l)         Observed concentration in river at PM-13       12.7 (mg/l)  |             | ווינטט וועא ווי וועכו מנד ועריס                                 | IVI_I I 0 = | 21311 | (119/5) |
| Image: second  |             |   |             |       |         |
| Parage       concentration in river at PM-12       C_r12 =       3.59 (mg/l)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)         visual observed concentration in river at PM-12       3.0 (mg/l)         Observed concentration in river at PM-13       12.7 (mg/l)  | uo          |   |             |       |         |
| and the second concentration in river at PM-12       C_r12 =       3.59 (mg/l)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)         concentration in river at PM-13       C_r13 =       12.33 (mg/l)         observed concentration in river at PM-12       3.0 (mg/l)         Observed concentration in river at PM-13       12.7 (mg/l)  | ati         |   |             |       |         |
| Observed concentration in river at PM-13       C_r13 =       12.33 (mg/l)         Observed concentration in river at PM-12       3.0 (mg/l)         Observed concentration in river at PM-13       12.7 (mg/l)   | ate         | concentration in river at PM-12                                 | C_r12 =     | 3.59  | (mg/l)  |
| YE O       C_r13 =       12.33 (mg/l)         Observed concentration in river at PM-12         Observed concentration in river at PM-13       3.0 (mg/l)         12.7 (mg/l)   | suls        |   |             |       |         |
| O O concentration in river at PM-13       C_r13 =       12.33 (mg/l)         Observed concentration in river at PM-12       3.0 (mg/l)         Observed concentration in river at PM-13       12.7 (mg/l)  | alc         |   |             |       | ,       |
| Observed concentration in river at PM-12 3.0 (mg/l) Observed concentration in river at PM-13 12.7 (mg/l)   | 00          | concentration in river at PM-13                                 | C_r13 =     | 12.33 | (mg/l)  |
| Observed concentration in river at PM-12       3.0 (mg/l)         Observed concentration in river at PM-13       12.7 (mg/l)   |             |   | -           |       |         |
| Observed concentration in river at PM-12     3.0 (mg/l)       Observed concentration in river at PM-13     12.7 (mg/l)   | E           |   |             |       |         |
| Observed concentration in river at PM-12       3.0 (mg/l)         Observed concentration in river at PM-13       12.7 (mg/l)   | H<br>atio   |   |             |       |         |
| O O Observed concentration in river at PM-13 12.7 (mg/l)   | /ec<br>htra | Observed concentration in river at PM-12                        |             | 3.0   | (mg/l)  |
| ŠČOObserved concentration in river at PM-1312.7 (mg/l)   | arv<br>Ser  |   |             |       |         |
| O O Observed concentration in river at PM-13 12.7 (mg/l)   | )<br>bnc    |   |             |       |         |
|  | δŏ          | Observed concentration in river at PM-13                        |             | 12.7  | (mg/l)  |

Parameter: Nickel

|             | surface water flow into PM-12                                   | Q_s12 =     | 12.60 | (cfs)  |
|-------------|---|-------------|-------|--------|
| ata         | surface water flow into PM-13                                   | Q_s13 =     | 48.51 | (cfs)  |
| ow Da       | Babbitt WWTP discharge  | Q_sBab =    | 0.33  | (cfs)  |
|             | Area 5 Pit NW discharge   | Q_spit =    | 1.99  | (cfs)  |
| 문           | LIVSMC Tailings Basin seepage                                   | Q_ts =      | 11.50 | (CfS)  |
| t           | Aydrometallurgical Residue Cells Liner Leakage                  | $Q_{1}S =$  | 0.00  | (CIS)  |
| du          | ground water flow into PM-12                                    | $Q_{g12} =$ | 0.00  | (CIS)  |
| —           | giodina water new into t in to                                  | Q_910 =     | ۱ ۲.۲ | (013)  |
|             | concentration of ourface water into PM 12                       | C a12       | 1.0   | (ug/l) |
| ata         |   | 0_512 =     | 1.2   | (µg/i) |
| õ           | concentration of surface water into PM-13                       | C_s13 =     | 1.2   | (µg/l) |
| ion         | concentration of WWTP discharge                                 | C_sBab =    | 1.2   | (µg/l) |
| trat        | concentration of Area 5 Pit NW discharge                        | C_spit =    | 2.5   | (µg/l) |
| cen         | concentration of LTVSMC Tailings Basin seepage                  | C_fs =      | 6.88  | (µg/l) |
| ouo         | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =     | 0     | (µg/l) |
| nt O        | concentration of ground water flow into PM-12                   | C_g12 =     | 7     | (µg/l) |
| dul         | concentration of ground water flow into PM-13                   | C_g13 =     | 7     | (µg/l) |
|             |   |             |       |        |
| ø           | flow in river at PM-12  | Q_r12 =     | 13.79 | (cfs)  |
| anc         | flow in river at PM-13  | Q_r13 =     | 80.00 | (cfs)  |
| Bal<br>Bal  | flow check  | Q ck =      | 80.00 | (cfs)  |
|             |   |             |       | (/     |
|             | mass flux of surface water into PM-12                           | M s12 =     | 428   | (ua/s) |
|             | mass flux of surface water into PM-13                           | M s13 =     | 1647  | (µg/s) |
| of          | mass flux of Babbitt WWTP                                       | M_sBab =    | 11    | (µg/s) |
| 티스          | concentration of Area 5 Pit NW discharge                        | M_spit =    | 141   | (µg/s) |
| ati<br>Flu  | concentration of LTVSMC Tailings Basin seepage                  | M_fs =      | 2239  | (µg/s) |
| cul         | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =     | 0     | (µg/s) |
| Cal<br>Aas  | mass flux of ground water into PM-12                            | M_g12 =     | 170   | (µg/s) |
| 02          | mass flux of ground water into PM-13                            | $IVI_gI3 =$ | 834   | (µg/s) |
|             |   |             |       |        |
| e           | mass flux in river at PM-12                                     | M r12 -     | 610   | (nu/e) |
| ss<br>and   |   |             | 010   | (P9/9/ |
| Ma:<br>Bal  | mass flux in river at PM 13                                     | M r13 -     | 5471  | (ua/c) |
|             |   | 101_113 =   | J47 I | (µg/s) |
| c           |   |             |       |        |
| ior         |   |             |       |        |
| ed<br>rat   | concentration in river at PM-12                                 | C r12 -     | 1.6   | (ua/l) |
| lat         |   | 0_112 =     | 1.0   | (µg/i) |
| nce<br>Lice |   |             |       |        |
| ပ် ပိ       | concentration in river at PM-13                                 | C r13 =     | 2.4   | (µq/l) |
|             |   | . –         |       |        |
| Ę           |   |             |       |        |
| atio        |   |             |       |        |
| red<br>'tra | Observed concentration in river at PM-12                        | 1           | 1.9   | (µg/l) |
| erv         |   |             |       |        |
| sq          |   |             |       |        |
| 00          | Observed concentration in river at PM-13                        |             | 2.1   | (µg/l) |

Parameter: Lead

| -            |   | -           |           |          |
|--------------|---|-------------|-----------|----------|
|              | surface water flow into PM-12                                   | Q_s12 =     | 12.60     | (cfs)    |
| Data         | surface water flow into PM-13                                   | Q_s13 =     | 48.51     | (cfs)    |
|              | Babbitt WWTP discharge  | Q_sBab =    | 0.33      | (cfs)    |
| Ň            | Area 5 Pit NW discharge   | Q_spit =    | 1.99      | (cts)    |
| 음            | LTVSMC Tailings Basin seepage                                   | Q_ts =      | 11.50     | (cts)    |
| Ť            | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =     | 0.00      | (CfS)    |
| đ            | ground water flow into PM-12                                    | Q_g12 =     | 0.86      | (CfS)    |
| _            | Iground water now into PW-13                                    | Q_913 =     | 4.21      | (CIS)    |
|              |   |             |           | <i>(</i> |
| a            | concentration of surface water into PM-12                       | C_s12 =     | 0         | (µg/l)   |
| Dai          | concentration of surface water into PM-13                       | C_s13 =     | 0         | (µg/l)   |
| L L          | concentration of WWTP discharge                                 | C_sBab =    | 0         | (ua/l)   |
| atic         |   |             | 0.5       | (mg/)    |
| ntre         | concentration of Area 5 Pit NW discharge                        | C_spit =    | 0.5       | (µg/I)   |
| Gel          | concentration of LTVSMC Tailings Basin seepage                  | C_fs =      | 1.2       | (µg/l)   |
| u o          | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =     | 0         |          |
| out C        | concentration of ground water flow into PM-12                   | C_g12 =     | 1.2       | (µg/l)   |
| dul          | concentration of ground water flow into PM-13                   | C_g13 =     | 1.2       | (µg/l)   |
|              |   |             |           |          |
| <u></u>      | flow in river at PM-12  | Q_r12 =     | 13.79     | (cfs)    |
| tter<br>lanc | flow in river at PM-13  | <br>Q_r13 = | 80.00     | (cfs)    |
| Ba<br>Ba     | flow check  | Q ck =      | 80.00     | (cfs)    |
|              |   |             |           | . ,      |
|              | mass flux of surface water into PM-12                           | M s12 =     | 0         | (ua/s)   |
|              | mass flux of surface water into PM-13                           | M_s13 =     | 0         | (µg/s)   |
| oť           | mass flux of Babbitt WWTP                                       | M sBab =    | 0         | (µg/s)   |
| 5 ×          | concentration of Area 5 Pit NW discharge                        | M spit =    | 28        | (µg/s)   |
| atic ati     | concentration of LTVSMC Tailings Basin seepage                  | M fs =      | 391       | (µg/s)   |
| s F<br>B     | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =     | 0         | (µg/s)   |
| alc<br>as    | mass flux of ground water into PM-12                            | M_g12 =     | 29        | (µg/s)   |
| υΣ           | mass flux of ground water into PM-13                            | M_g13 =     | 143       | (µg/s)   |
|              |   | -           |           |          |
| Φ            |   |             | _         | , , .    |
| uc s         | mass flux in river at PM-12                                     | M_r12 =     | 29        | (µg/s)   |
| as<br>ala    |   |             |           |          |
| Σä           | mass flux in river at PM-13                                     | M_r13 =     | 591       | (µg/s)   |
|              |   | -           |           |          |
| Ľ            |   |             |           |          |
| atic         |   |             |           |          |
| ttee         | concentration in river at PM-12                                 | C_r12 =     | 0.07      | (µg/l)   |
| ula<br>Ser   |   |             |           |          |
| alc          |   |             |           |          |
| ΰŭ           | concentration in river at PM-13                                 | C_r13 =     | 0.26      | (µg/l)   |
|              |   |             |           |          |
| L            |   |             |           |          |
| J<br>atic    |   |             |           |          |
| vec          | Observed concentration in river at PM-12                        |             | ND (0.30) | (µg/l)   |
| en<br>Ce     |   |             |           |          |
| sd(          |   |             | 0.07      | (        |
| 00           | Observed concentration in river at PM-13                        |             | 0.27      | (µg/I)   |

### Parameter: Antimony

|   | aunfange unstan flags inte DM 40                                | 0 -10        | 10.00 (    | - (-)          |
|---|---|--------------|------------|----------------|
|   | Sunace water now into MM-12                                     | $Q_{12} = 0$ | 12.60 ((   | cis)           |
| Data                                      | surface water flow into PM-13                                   | Q_s13 =      | 48.51 (0   | cts)           |
|   | Babbitt WWTP discharge  | Q_sBab =     | 0.33 (0    | cfs)           |
| ≥   | Area 5 Pit NW discharge   | Q_spit =     | 1.99 (0    | cfs)           |
| 은   | LTVSMC Tailings Basin seepage                                   | Q_fs =       | 11.50 (0   | cfs)           |
| ц. | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =      | 0.00 (0    | cfs)           |
| nd  | ground water flow into PM-12                                    | Q_g12 =      | 0.86 (0    | cfs)           |
|   | ground water flow into PM-13                                    | Q g13 =      | 4.21 (     | cfs)           |
|   | 10  |              |            | ,              |
|   | and the standard water into DM 40                               | 0 -10        | 0.00 (     |                |
| a   | concentration of surface water into PIN-12                      | 6_\$12 =     | 0.02 (     | µg/I)          |
| Dai<br>D                                  | concentration of surface water into PM-13                       | C_s13 =      | 0.02 (     | µg/l)          |
| on l                                      | concentration of WWTP discharge                                 | C_sBab =     | 0.02 (     | µg/l)          |
| ati                                       | concentration of Area 5 Pit NW discharge                        | C spit =     | 150        | ua/l)          |
| intr                                      | concentration of LTVSMC Tailings Pagin scopage                  | C_fc         | 0.25 (     | ug/l)          |
| ЭС<br>ЭС                                  |   | 0_13 =       | 0.23       | µg/i)          |
| Cor                                       | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =      | 0          |                |
| out (                                     | concentration of ground water flow into PM-12                   | C_g12 =      | 1.5 (      | µg/l)          |
| dul                                       | concentration of ground water flow into PM-13                   | C_g13 =      | 1.5 (      | µg/l)          |
|   | •   | -            |            |                |
| D   | flow in river at PM-12  | Q r12 =      | 13 79 (    | cfs)           |
| ter<br>anc                                | flow in river at PM-13  | Q_r13 =      | 80.00 (    | cfs)           |
| Na:<br>Bala                               | flow check  | 0. ck -      | 80.00 (    | ofe)           |
|   |   | Q_0K =       | 00.00 (0   | 013)           |
|   | Image flux of outpage water into DM 10                          | M at0        | 7 (        |                |
|   | mass flux of surface water into PM-12                           | M_\$12 =     | / (        | µg/s)          |
| ÷   | mass flux of surface water into PM-13                           | M_\$13 =     | 27 (       | µg/s)          |
| 0   | mass flux of Babbitt WWTP                                       | M_sBab =     | 0 ()       | µg/s)          |
| א פ                                       | concentration of Area 5 Pit NW discharge                        | M_spit =     | 84 (       | µg/s)          |
| El ati                                    | concentration of LTVSMC Tailings Basin seepage                  | M_fs =       | 81 (       | µg/s)          |
| s   n                                     | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =      | 0 ()       | µg/s)          |
| alc<br>as                                 | mass flux of ground water into PM-12                            | M_g12 =      | 37 ()      | µg/s)          |
| UΣ  | mass flux of ground water into PM-13                            | M_g13 =      | 179 (      | µg/s)          |
|   |   |              |            |                |
|   |   |              |            |                |
| Ce  | mass flux in river at PM-12                                     | M_r12 =      | 44 (       | µg/s)          |
| lss<br>lan                                |   |              | ľ          |                |
| Ba  | mass flux in river at PM-13                                     | M r13 =      | 416 (      | ua/s)          |
|   |   | <u> </u>     |            | . 3, 3/        |
|   |   |              |            |                |
| ior                                       |   |              |            |                |
| ∋d<br>rat                                 | concentration in river at DM 12                                 | C r12        | 0.11       | ug/l)          |
| ate                                       |   | 0_112 =      | 0.11       | µg/I)          |
| cul                                       |   |              |            |                |
| o al                                      | concentration in river at PM-13                                 | C r13 -      | 0 19 /     | ua/l)          |
|   |   | 0_113 =      | 0.10       | μ <u>θ</u> /1) |
|   |   |              |            |                |
| ior                                       |   |              |            |                |
| bd<br>trat                                | Observed concentration in river at PM-12                        |              | ND (0.3) ( | ua/l)          |
| enie                                      |   |              | (0.0) (    | r: 3r '/       |
| se  |   |              |            |                |
| ပ်င်                                      | Observed concentration in river at PM-13                        |              | ND (0.3) ( | µg/l)          |
|   |   |              |            |                |

#### Parameter: Selenium

|             | surface water flow into PM-12                                   | Q_s12 =       | 12.60  | (cfs)                                   |
|-------------|---|---------------|--------|---|
| w Data      | surface water flow into PM-13                                   | Q_s13 =       | 48.51  | (cfs)                                   |
|             | Babbitt WWTP discharge  | Q_sBab =      | 0.33   | (cfs)                                   |
|             | Area 5 Pit NW discharge   | Q_spit =      | 1.99   | (cfs)                                   |
| <u>í</u>    | LTVSMC Tailings Basin seepage                                   | Q_fs =        | 11.50  | (cfs)                                   |
| L<br>t      | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =       | 0.00   | (cfs)                                   |
| Inc         | ground water flow into PM-12                                    | Q_g12 =       | 0.86   | (cfs)                                   |
| Ē           | ground water flow into PM-13                                    | Q_g13 =       | 4.21   | (cfs)                                   |
| -           |   |               |        |   |
|             | concentration of ourface water into PM 12                       | C a12         | 0.2    | (110/1)                                 |
| ta          |   | 0_512 =       | 0.3    | (µg/i)                                  |
| Da          | concentration of surface water into PM-13                       | C_s13 =       | 0.3    | (µg/l)                                  |
| ion         | concentration of WWTP discharge                                 | C_sBab =      | 0.3    | (µg/l)                                  |
| trat        | concentration of Area 5 Pit NW discharge                        | C_spit =      | 1      | (µg/l)                                  |
| ent         | concentration of LTVSMC Tailings Basin seepage                  | C fs =        | 1.09   | (ua/l)                                  |
| u c         | concentration of Hydrometallurgical Residue Cells Liner Leakage | _<br>C rrs =  | 0      |   |
| Ŭ           |   |               |        | / m                                     |
| out         | concentration of ground water flow into PM-12                   | C_g12 =       | 2.95   | (µg/l)                                  |
| lnp         | concentration of ground water flow into PM-13                   | C_g13 =       | 2.95   | (µg/l)                                  |
|             |   |               |        |   |
| Φ           | flow in river at PM-12  | Q r12 =       | 13.79  | (cfs)                                   |
| ter<br>anc  | flow in river at PM-13  | $0_{13} =$    | 80.00  | (cfs)                                   |
| Nat<br>Sali | flow check  | Q_rte =       | 80.00  | (cfs)                                   |
|             |   | <u>u_ur =</u> | 00.00  | (013)                                   |
|             |   | M - 10        | 10-1   | (                                       |
|             | mass flux of surface water into PM-12                           | IVI_S12 =     | 107    | (µg/s)                                  |
| ·           | mass flux of surface water into PM-13                           | M_s13 =       | 412    | (µg/s)                                  |
| ō           | mass flux of Babbitt WWTP                                       | M_sBab =      | 3      | (µg/s)                                  |
| u ×         | concentration of Area 5 Pit NW discharge                        | M_spit =      | 56     | (µg/s)                                  |
| ati<br>Fl∪  | concentration of LTVSMC Tailings Basin seepage                  | M_fs =        | 355    | (µg/s)                                  |
| lu s        | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =       | 0      | (µg/s)                                  |
| alcas       | mass flux of ground water into PM-12                            | M_g12 =       | 72     | (µg/s)                                  |
| UΣ          | mass flux of ground water into PM-13                            | M_g13 =       | 351    | (µg/s)                                  |
|             |   |               |        |   |
|             |   |               |        |   |
| Ce          | mass flux in river at PM-12                                     | M_r12 =       | 182    | (µg/s)                                  |
| ss<br>an    |   |               |        |   |
| Ma<br>3al   | mass flux in river at PM-13                                     | M r13 –       | 1356   | (uu/s)                                  |
|             |   | <u></u>       | 1000   | (M9/3)                                  |
|             |   |               |        |   |
| uo          |   |               |        |   |
| ati         |   |               |        |   |
| ate         | concentration in river at PM-12                                 | C_r12 =       | 0.47   | (µg/l)                                  |
| cer         |   |               |        |   |
| alc         |   |               |        |   |
| 00          | concentration in river at PM-13                                 | C_r13 =       | 0.60   | (µg/l)                                  |
|             |   |               |        |   |
| L<br>L      |   |               |        |   |
| atio        |   |               |        |   |
| /ed         | Observed concentration in river at PM-12                        |               | ND (1) | (µg/l)                                  |
| erv<br>cei  |   |               |        |   |
| sq          |   |               |        | , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |
| 00          | Observed concentration in river at PM-13                        |               | ND (1) | (µg/l)                                  |
# Embarrass River Model - Calibration to Baseline Water Quality Data

# Parameter: Sulfate

|              | surface water flow into PM-12                                   | Q_s12 =         | 12.60  | (cfs)     |
|--------------|---|-----------------|--------|-----------|
| ata          | surface water flow into PM-13                                   | Q_s13 =         | 48.51  | (cfs)     |
| ä            | Babbitt WWTP discharge  | Q_sBab =        | 0.33   | (CfS)     |
| Ň            | Area 5 Pit NW discharge   |                 | 11.99  | (CIS)     |
| Ĕ            | LTVSMU Tallings Basin seepage                                   |                 | 11.50  | (CIS)     |
| rt           | Aydrometallurgical Residue Cells Liner Leakage                  | $Q_{1}$ $S = 0$ | 0.00   | (CIS)     |
| du           | ground water flow into PM-12                                    | $Q_{g12} =$     | 0.00   | (CIS)     |
| _            | Giodina water now into T MPTO                                   | Q_910 =         | 4.21   | (013)     |
|              | and the standard water into DM 40                               | 0 -10           | 4      | (ma m /l) |
| ta           | concentration of surface water into PM-12                       | C_\$12 =        | 4      | (mg/I)    |
| Da           | concentration of surface water into PM-13                       | C_s13 =         | 4      | (mg/l)    |
| tion         | concentration of WWTP discharge                                 | C_sBab =        | 4      | (mg/l)    |
| itral        | concentration of Area 5 Pit NW discharge                        | C_spit =        | 1042   | (mg/l)    |
| cen          | concentration of LTVSMC Tailings Basin seepage                  | C_fs =          | 152.4  | (mg/l)    |
| Sone         | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =         | 0      |           |
| nt O         | concentration of ground water flow into PM-12                   | C_g12 =         | 8.5    | (mg/l)    |
| dul          | concentration of ground water flow into PM-13                   | C_g13 =         | 8.5    | (mg/l)    |
|              |   |                 |        |           |
| e            | flow in river at PM-12  | Q_r12 =         | 13.79  | (cfs)     |
| ater<br>land | flow in river at PM-13  | Q_r13 =         | 80.00  | (cfs)     |
| Ba Va        | flow check  | Q_ck =          | 80.00  | (cfs)     |
|              |   |                 |        |           |
|              | mass flux of surface water into PM-12                           | M_s12 =         | 1427   | (µg/s)    |
|              | mass flux of surface water into PM-13                           | M_s13 =         | 5491   | (mg/s)    |
| of           | mass flux of Babbitt WWTP                                       | M_sBab =        | 37     | (mg/s)    |
| ы            | concentration of Area 5 Pit NW discharge                        | M_spit =        | 58682  | (mg/s)    |
| -In ati      | concentration of LTVSMC Tailings Basin seepage                  | M_fs =          | 49599  | (mg/s)    |
| luc<br>si l  | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =         | 0      | (mg/s)    |
| alc<br>las   | mass flux of ground water into PM-12                            | M_g12 =         | 207    | (mg/s)    |
| S            | mass flux of ground water into PM-13                            | M_g13 =         | 1013   | (mg/s)    |
|              |   |                 |        |           |
| Ð            | mana flux in vivan et DM 10                                     | M =10           | 1071   | (ma m/=)  |
| s            | mass flux in river at PM-12                                     | IVI_r12 =       | 16/1   | (mg/s)    |
| as:<br>ala   |   | 1               |        |           |
| Σä           | mass flux in river at PM-13                                     | M_r13 =         | 116455 | (mg/s)    |
|              |   |                 |        |           |
| L            |   |                 |        |           |
| d            |   |                 |        |           |
| ntra         | concentration in river at PM-12                                 | C_r12 =         | 4.3    | (mg/l)    |
| ula          |   |                 |        |           |
| alc          |   |                 |        |           |
| ŰŐ           | concentration in river at PM-13                                 | C_r13 =         | 51.4   | (mg/l)    |
|              |   | -               |        |           |
| uo           |   |                 |        |           |
| d<br>rati    | Observed concentration in river at DM 10                        |                 | 4 7    | (ma/l)    |
| vec          | Observed concentration in river at PM-12                        |                 | 4./    | (mg/I)    |
| ser          |   |                 |        |           |
| So So        | Observed concentration in river at PM 12                        | 1               | 26.1   | (ma/l)    |
| 00           |   |                 | 30.1   | (119/1)   |

# Embarrass River Model - Calibration to Baseline Water Quality Data

# Parameter: Thallium

|              |   |                 | 40.00      | ( ( )          |
|--------------|---|-----------------|------------|----------------|
|              | surface water flow into PM-12                                   | $Q_{s12} =$     | 12.60      | (CfS)          |
| ata          | surface water flow into PM-13                                   | Q_\$13 =        | 48.51      | (CtS)          |
| ä            | Babbitt WWIP discharge  | Q_sBab =        | 0.33       | (CfS)          |
| Ň            | Area 5 PILINW discharge   |                 | 1.99       | (CIS)          |
| Ĕ            | Livolvio Tallings Basin seepage                                 |                 | 11.50      | (CIS)          |
| rt           | around water flow into DM 12                                    |                 | 0.00       | (CIS)          |
| du           | ground water flow into PM-12                                    | $Q_g   2 =$     | 0.86       | (CIS)<br>(cfc) |
| _            | Biodina water now into Finisho                                  | <u>v_</u> gio = | 4.21       | (013)          |
| đ            | concentration of surface water into PM-12                       | C_s12 =         | 0.2        | (mg/l)         |
| Data         | concentration of surface water into PM-13                       | C_s13 =         | 0.2        | (mg/l)         |
| – uo         | concentration of WWTP discharge                                 | C_sBab =        | 0.2        | (mg/l)         |
| trati        | concentration of Area 5 Pit NW discharge                        | C_spit =        | 1 (        | (mg/l)         |
| en j         | concentration of LTVSMC Tailings Basin seepage                  | C_fs =          | 0.2        | (mg/l)         |
| ouc          | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =         | 0          |                |
| ut C         | concentration of ground water flow into PM-12                   | C_g12 =         | 0.004      | (mg/l)         |
| lnp          | concentration of ground water flow into PM-13                   | C_g13 =         | 0.004      | (mg/l)         |
|              |   |                 |            |                |
| ို           | flow in river at PM-12  | Q_r12 =         | 13.79      | (cfs)          |
| ateı<br>alan | flow in river at PM-13  | Q_r13 =         | 80.00      | (cfs)          |
| ≥ ä          | flow check  | Q_ck =          | 80.00      | (cfs)          |
|              |   | -               |            |                |
|              | mass flux of surface water into PM-12                           | M_s12 =         | 71         | (µg/s)         |
| ·            | mass flux of surface water into PM-13                           | M_s13 =         | 275        | (mg/s)         |
| Ō            | mass flux of Babbitt WWTP                                       | M_sBab =        | 2          | (mg/s)         |
| joi xu       | concentration of Area 5 Pit NW discharge                        | M_spit =        | 56         | (mg/s)         |
| Flu          | concentration of LTVSMC Tailings Basin seepage                  | fs =            | 65         | (mg/s)         |
| cul          | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =         | 0          | (mg/s)         |
| Cal<br>Aas   | mass flux of ground water into PM-12                            | $M_{g12} =$     | 0          | (mg/s)         |
| 02           | mass nux of ground water into FIV-13                            | IVI_YI3 =       | 0          | (ing/s)        |
|              |   |                 |            |                |
| lce .        | mass flux in river at PM-12                                     | M_r12 =         | 73         | (mg/s)         |
| ass<br>ılar  |   |                 |            |                |
| Β̈́́         | mass flux in river at PM-13                                     | M_r13 =         | 470        | (mg/s)         |
|              |   |                 |            |                |
| uo           |   |                 |            |                |
| ed<br>rati   | concentration in river at PM-12                                 | C r12 -         | 0.10       | (ma/l)         |
| ulati<br>ent |   | 0_112 =         | 0.19       | (iiig/l)       |
| alct         |   |                 |            |                |
| ပိပိ         | concentration in river at PM-13                                 | C_r13 =         | 0.21       | (mg/l)         |
|              |   |                 |            |                |
| ion          |   |                 |            |                |
| ed<br>trat   | Observed concentration in river at PM-12                        |                 | ND (0.4)   | (µg/l)         |
| erve         |   |                 | , <i>(</i> |                |
| )bs(         |   |                 |            | ((I))          |
| 00           | Observed concentration in river at PM-13                        |                 | ND (0.4)   | (µg/I)         |

# Embarrass River Model - Calibration to Baseline Water Quality Data Parameter: Zinc

|              | surface water flow into PM-12                                   | Q_s12 =  | 12.60 | (cfs)   |
|--------------|---|----------|-------|---------|
| ıta          | surface water flow into PM-13                                   | Q_s13 =  | 48.51 | (cfs)   |
| D<br>D       | Babbitt WWTP discharge  | Q_sBab = | 0.33  | (cfs)   |
| 2            | Area 5 Pit NW discharge   | Q_spit = | 1.99  | (cfs)   |
| 음            | LTVSMC Tailings Basin seepage                                   | Q_fs =   | 11.50 | (cfs)   |
| т Н          | Hydrometallurgical Residue Cells Liner Leakage                  | Q_rrs =  | 0.00  | (cfs)   |
| d d          | ground water flow into PM-12                                    | Q_g12 =  | 0.86  | (cfs)   |
| <u> </u>     | ground water flow into PM-13                                    | Q_g13 =  | 4.21  | (cfs)   |
|              |   |          |       |         |
| ъ<br>D       | concentration of surface water into PM-12                       | C_s12 =  | 16    | (µg/l)  |
| Data         | concentration of surface water into PM-13                       | C_s13 =  | 16    | (µg/l)  |
| u<br>O       | concentration of WWTP discharge                                 | C_sBab = | 16    | (µg/l)  |
| trat         | concentration of Area 5 Pit NW discharge                        | C_spit = | 5     | (µg/l)  |
| en<br>Sen    | concentration of LTVSMC Tailings Basin seepage                  | C_fs =   | 14.35 | (µg/l)  |
| ono          | concentration of Hydrometallurgical Residue Cells Liner Leakage | C_rrs =  | 0     |         |
| nt O         | concentration of ground water flow into PM-12                   | C_g12 =  | 11.5  | (µg/l)  |
| lnp          | concentration of ground water flow into PM-13                   | C_g13 =  | 11.5  | (µg/l)  |
|              |   |          |       |         |
| e            | flow in river at PM-12  | Q_r12 =  | 13.79 | (cfs)   |
| ater<br>land | flow in river at PM-13  | Q_r13 =  | 80.00 | (cfs)   |
| У́;<br>Ва    | flow check  | Q_ck =   | 80.00 | (cfs)   |
|              |   |          |       |         |
|              | mass flux of surface water into PM-12                           | M_s12 =  | 5707  | (µg/s)  |
|              | mass flux of surface water into PM-13                           | M_s13 =  | 21963 | (µg/s)  |
| of           | mass flux of Babbitt WWTP                                       | M_sBab = | 149   | (µg/s)  |
| ы<br>Бх      | concentration of Area 5 Pit NW discharge                        | M_spit = | 282   | (µg/s)  |
| -In ati      | concentration of LTVSMC Tailings Basin seepage                  | M_fs =   | 4670  | (µg/s)  |
| s P<br>S F   | concentration of Hydrometallurgical Residue Cells Liner Leakage | M_rrs =  | 0     | (µg/s)  |
| alc<br>as    | mass flux of ground water into PM-12                            | M_g12 =  | 280   | (µg/s)  |
| UΣ           | mass flux of ground water into PM-13                            | M_g13 =  | 1370  | (µg/s)  |
|              |   |          |       |         |
|              |   |          |       |         |
|              | mass flux in river at PM-12                                     | M_r12 =  | 6137  | (µg/s)  |
| ass<br>lar   |   |          |       |         |
| Ba           | mass flux in river at PM-13                                     | M r13 =  | 34422 | (µg/s)  |
|              |   |          |       |         |
|              |   |          |       |         |
| ior          |   |          |       |         |
| ed<br>rat    | concontration in river at PM 12                                 | C r12    | 15 70 | (110/1) |
| ate          |   | 0_112 =  | 15.72 | (µg/I)  |
| cul          |   |          |       |         |
| Salc         | concentration in vivor at DM 10                                 | 0 110    | 15.00 | (       |
| 00           | concentration in river at PM-13                                 | U_113 =  | 15.20 | (µg/I)  |
|              |   |          |       |         |
| LO LO        |   |          |       |         |
| -<br>atio    |   |          |       |         |
| /ec          | Observed concentration in river at PM-12                        |          | 18.3  | (µg/l)  |
| en<br>cel    |   |          |       |         |
| sq           |   |          |       |         |
|              | Observed concentration in river at PM 12                        | 1        | 10.0  | (ua/l)  |

# Appendix F

# Predicted Concentrations Using Mass-Balance Models for Embarrass River Watershed

# Tailings Basin - Proposed Action

| F.1 | Embarrass River: | Year 1  |
|-----|------------------|---------|
| F.2 | Embarrass River: | Year 5  |
| F.3 | Embarrass River: | Year 8  |
| F.4 | Embarrass River: | Year 9  |
| F.5 | Embarrass River: | Year 15 |
| F.6 | Embarrass River: | Year 20 |
| E 7 | Emborross Divor  | Closura |

- F.7 Embarrass River: Closure
- F.8 Embarrass River: Post-Closure

# Tailings Basin - Geotechnical Mitigation

- F.9 Embarrass River: Year 1
- F.10 Embarrass River: Year 5
- F.11 Embarrass River: Year 10
- F.12 Embarrass River: Year 15
- F.13 Embarrass River: Year 20
- F.14 Embarrass River: Closure
- F.15 Embarrass River: Post-Closure

Appendix F.1 Embarrass River Proposed Action Year 1

Input Flows

#### Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

#### FLOWS

| Case                 | Year 1   |                        |      |                |                |
|----------------------|--|------------------------|------|----------------|----------------|
| Flows                | Low Flow Conditions (no surface runoff)          |                        |      |                | Node           |
| low in<br>rass River | flow in river at PM-12<br>flow in river at PM-13 | Q_r12_L =<br>Q_r13_L = | 0.86 | (cfs)<br>(cfs) | PM-12<br>PM-13 |
| Total f<br>Embar     | flow check                                       | Q_ck_L =               | 6.27 | (cfs)          |                |
|                      | surface water flow into PM-12                    | Q_s12_L =              | 0.00 | (cfs)          | PM-12          |
|                      | surface water flow into PM-13                    | Q_s13_L =              | 0.00 | (cfs)          | PM-13          |
|                      | Babbitt WWTP discharge                           | Q_sBab_L =             | 0.00 | (cfs)          | PM-12          |
|                      | Area 5 Pit NW discharge                          | Q_spit_L =             | 0.00 | (cfs)          | PM-13          |
| ta                   | seepage from Tailings Basin Cells 1E and 2E      | Q_fs_L =               | 0.34 | (cfs)          | PM-13          |
| / da                 | hydrometallurgical residue cells liner leakage   | Q_rrs_L =              | 0.00 | (cfs)          | PM-13          |
| lov                  | seepage from cell 2W                             | Q_s2w_L =              | 0.86 | (cfs)          | PM-13          |
| out 1                | ground water flow into PM-12                     | Q_g12_L =              | 0.86 | (cfs)          | PM-12          |
| lnp                  | ground water flow into PM-13                     | Q_g13_L =              | 4.21 | (cfs)          | PM-13          |

| Case                | Year 1   |            |       |       |       |
|---------------------|--|------------|-------|-------|-------|
| Flow                | Average Flow Conditions (mean annual)          |            |       |       |       |
| liver               | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| flow in<br>arrass F | flow in river at PM-13                         | Q_r13_M =  | 92.68 | (cfs) | PM-13 |
| Total<br>Embi       | flow check                                     | Q_ck_M =   | 92.68 | (cfs) |       |
|                     | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|                     | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                     | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                     | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ta<br>ta            | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 3.19  | (cfs) | PM-13 |
| / da                | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.00  | (cfs) | PM-13 |
| Nol.                | seepage from cell 2W                           | Q_s2w_M =  | 7.96  | (cfs) | PM-13 |
| nt 1                | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| aul                 | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case             | Year 1  |            |        |       |       |
|------------------|---|------------|--------|-------|-------|
| Flow             | High Flow Conditions (avg. annual 1-day max flow) |            |        |       | _     |
| n<br>River       | flow in river at PM-12                            | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>ırrass | flow in river at PM-13                            | Q_r13_H =  | 864.23 | (cfs) | PM-13 |
| Total<br>Emba    | flow check  | Q_ck_H =   | 864.23 | (cfs) |       |
|                  | surface water flow into PM-12                     | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                     | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                            | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                           | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta               | seepage from Tailings Basin Cells 1E and 2E       | Q_fs_H =   | 3.19   | (cfs) | PM-13 |
| / da             | hydrometallurgical residue cells liner leakage    | Q_rrs_H =  | 0.00   | (cfs) | PM-13 |
| lov              | seepage from cell 2W                              | Q_s2w_H =  | 7.96   | (cfs) | PM-13 |
| t<br>t           | ground water flow into PM-12                      | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| du               | ground water flow into PM-13                      | Q q13 H =  | 4.21   | (cfs) | PM-13 |

| Case      | Year 1  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Silver  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| tra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00096  | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| ut con    | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
|           | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| -                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tior                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.19    | (mg/s) | 2       | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| u xn                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>Ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| n ve<br>mas                 | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ បំ                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.45    | (mg/s) |
| Mass b<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 0.01    | (mg/s) | 0.35    | (mg/s) | 2.75    | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 1<br>Aluminum  |          |         |        |
|-------------------|---|----------|---------|--------|
|                   |   | 4        |         |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.1     | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.1     | (mg/L) |
| u da              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.01    | (mg/L) |
| cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.18    | (mg/L) |
| L S               | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788  | (mg/L) |
| Ĕ                 | concentration of ground water into PM-12                        | C_g12 =  | 0.025   | (mg/L) |
| lnp               | concentration of ground water into PM-13                        | C_g13 =  | 0.025   | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| tion                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) | 0.61    | (mg/s) | 0.61     | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) | 2.98    | (mg/s) | 2.98     | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.75    | (mg/s) | 0.75     | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.10    | (mg/s) | 0.90    | (mg/s) | 0.90     | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 38.29   | (mg/s) | 355.65  | (mg/s) | 355.65   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| alance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) | 37.23   | (mg/s) | 406.69   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 41.98   | (mg/s) | 571.64  | (mg/s) | 2,755.13 | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) | 0.095   | (mg/L) | 0.100    | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.237   | (mg/L) | 0.218   | (mg/L) | 0.113    | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Arsenic   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00075     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00075     | (mg/L) |
| , da      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00075     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.001325    | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.005946518 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00291     | (mg/L) |
| rt .      | concentration of ground water into PM-12                        | C_g12 =  | 0.00273     | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.00273     | (mg/L) |

|                            |   |          | Low Flo | w      | Average I | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|-----------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.27      | (mg/s) | 3       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07      | (mg/s) | 0.07    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01      | (mg/s) | 0.01    | (mg/s) |
| tra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.31      | (mg/s) | 15      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) | 0.33      | (mg/s) | 0.33    | (mg/s) |
| uo Xn                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.07      | (mg/s) | 0.07    | (mg/s) |
| ent o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.06    | (mg/s) | 0.54      | (mg/s) | 0.54    | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| ទ ប្                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.07    | (mg/s) | 0.65      | (mg/s) | 0.65    | (mg/s) |
|                            |   |          | Low Flo | W      | Average   | Flow   | High Fl | ow     |
| lance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.34      | (mg/s) | 3.11    | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.52    | (mg/s) | 3.24      | (mg/s) | 19.61   | (mg/s) |
|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.001     | (mg/L) | 0.001   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001     | (mg/L) | 0.001   | (mg/L) |

| Case       | Year 1  |          |             |        |
|------------|---|----------|-------------|--------|
| Parameter  | Boron   |          |             |        |
|            |   | -        | -           |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ıtra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.138981444 | (mg/L) |
| Cel        | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| co         | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| ort .      | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| du         | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                               |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 4.28    | (mg/s) | 49      | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) | 0.52    | (mg/s) | 0.52    | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
| Itrai                         | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 20.90   | (mg/s) | 239     | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) | 2.53    | (mg/s) | 2.53    | (mg/s) |
| uo:                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.41    | (mg/s) | 7.41    | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.35    | (mg/s) | 12.53   | (mg/s) | 12.53   | (mg/s) |
| mag                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប្                          | mass flux in seepage from cell 2W                           | M_s2w =  | 8.00    | (mg/s) | 74.34   | (mg/s) | 74.34   | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>ch node            | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) | 4.91    | (mg/s) | 49.25   | (mg/s) |
| Mass<br>at eac                | mass flux in river at PM-13                                 | M_r13 =  | 12.40   | (mg/s) | 122.61  | (mg/s) | 384.63  | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) | 0.013   | (mg/L) | 0.012   | (mg/L) |
| Con<br>flux<br>conc           | concentration in river at PM-13                             | C_r13 =  | 0.070   | (mg/L) | 0.047   | (mg/L) | 0.016   | (mg/L) |

| Case      | Year 1  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Barium  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.011    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| , di      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.29E-02 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| t         | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 3.93    | (mg/s) | 45      | (mg/s) |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 1.66    | (mg/s) | 1.66    | (mg/s) | 1.66    | (mg/s) |
| tion                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| Itra                         | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 19.15   | (mg/s) | 219     | (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 8.11    | (mg/s) | 8.11    | (mg/s) | 8.11    | (mg/s) |
| nos                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
| ert o<br>ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.51    | (mg/s) | 4.77    | (mg/s) | 4.77    | (mg/s) |
| mas                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ۹ ů                          | mass flux in seepage from cell 2W                           | M_s2w =  | 2.26    | (mg/s) | 20.95   | (mg/s) | 20.95   | (mg/s) |
|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| lance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 1.66    | (mg/s) | 5.69    | (mg/s) | 46.33   | (mg/s) |
| Mass ba<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 12.54   | (mg/s) | 58.92   | (mg/s) | 299.10  | (mg/s) |
|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| t mass<br>tration            | concentration in river at PM-12                             | C_r12 =  | 0.068   | (mg/L) | 0.015   | (mg/L) | 0.011   | (mg/L) |
| Conver<br>filux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.071   | (mg/L) | 0.022   | (mg/L) | 0.012   | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Beryllium   |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0001      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0001      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000271356 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0           | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.000023    | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.000023    | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Flo | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0        | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| Itra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.17    | (mg/s) | 2        | (mg/s) |
| concer<br>flux                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
|                                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| ert o<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00    | (mg/s) | 0.02    | (mg/s) | 0.02     | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -       | (mg/s) | -       | (mg/s) | -        | (mg/s) |
| <u>۽</u> ک                           | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.17    | (mg/s) | 0.17     | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Flo | ow     |
| ass balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | <br>0.41 | (mg/s) |
| at                                   | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.41    | (mg/s) | 2.60     | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Flo | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000    | (mg/L) |
| U ≓ S                                | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000    | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Calcium   |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 13          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 13          | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 13          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 95.35       | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 45.78662467 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 416         | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 59.78       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 19          | (mg/L) |
| d L       | concentration of ground water into PM-13                        | C_g13 =  | 19          | (mg/L) |

|                        |   |           | Low Flo  | w      | Average   | Flow   | High Fl               | ow     |
|------------------------|---|-----------|----------|--------|-----------|--------|-----------------------|--------|
|                        | mass flux of surface water into PM-12                       | M_s12 =   | -        | (mg/s) | 4,639.22  | (mg/s) | 52,669                | (mg/s) |
| _                      | mass flux of ground water into PM-12                        | M_g12 =   | 462.42   | (mg/s) | 462.42    | (mg/s) | 462.42                | (mg/s) |
| tio                    | mass flux in Babbitt WWTP discharge                         | M_sBab =  | -        | (mg/s) | 121.41    | (mg/s) | 121.41                | (mg/s) |
| itra                   | mass flux of surface water into PM-13                       | M_s13 =   | -        | (mg/s) | 22,636.89 | (mg/s) | 258,461               | (mg/s) |
| cer                    | mass flux of ground water into PM-13                        | M_g13 =   | 2,263.72 | (mg/s) | 2,263.72  | (mg/s) | 2,263.72              | (mg/s) |
| L O                    | mass flux of Area 5 Pit NW discharge                        | M_spit =  | -        | (mg/s) | 5,369.83  | (mg/s) | 5,369.83              | (mg/s) |
| t,                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =    | 444.46   | (mg/s) | 4,128.35  | (mg/s) | 4,128.35              | (mg/s) |
| Ň                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =   | 12.28    | (mg/s) | 12.28     | (mg/s) | 12.28                 | (mg/s) |
| ပိ ,                   | mass flux in seepage from cell 2W                           | M_s2w =   | 1,449.83 | (mg/s) | 13,466.52 | (mg/s) | 1.77                  | (mg/s) |
|                        |   |           | Low Flo  | w      | Average   | Flow   | High Fl               | ow     |
| lass balance           | mass flux in river at PM-12                                 | M_r12 =   | 462.42   | (mg/s) | 5,223.05  | (mg/s) | 53,252.39             | (mg/s) |
| 2                      | mass flux in river at PM-13                                 | IVI_F13 = | 4,032.71 | (mg/s) | 53,100.63 | (mg/s) | 323,489.12<br>High Fl | (mg/s) |
| convert mass<br>lux to | concentration in river at PM-12                             | C_r12 =   | 19.000   | (mg/L) | 13.374    | (mg/l) | 13.036                | (mg/l) |
| 0 = 0                  | concentration in river at PM-13                             | C_r13 =   | 26.104   | (mg/L) | 20.246    | (mg/I) | 13.227                | (mg/l) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Cadmium   |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00008     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00008     | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000117453 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004      | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188    | (mg/L) |
| ont       | concentration of ground water into PM-12                        | C_g12 =  | 0.0003      | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.0003      | (mg/L) |

|                           |   |          | Low Flo  | w      | Average | Flow         |  | High Fl | ow     |
|---------------------------|---|----------|----------|--------|---------|--------------|--|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.03    | (mg/s)       |  | 0       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.01     | (mg/s) | 0.01    | (mg/s)       |  | 0.01    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.00    | (mg/s)       |  | 0.00    | (mg/s) |
| Itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 0.14    | (mg/s)       |  | 2       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.04     | (mg/s) | 0.04    | (mg/s)       |  | 0.04    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.01    | (mg/s)       |  | 0.01    | (mg/s) |
| ert ss 1                  | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00     | (mg/s) | 0.01    | (mg/s)       |  | 0.01    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00    | (mg/s)       |  | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00     | (mg/s) | 0.04    | (mg/s)       |  | 0.04    | (mg/s) |
|                           |   |          | Low Flow |        | Average | Average Flow |  | High Fl | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.01     | (mg/s) | 0.04    | (mg/s)       |  | 0.33    | (mg/s) |
| Mass  <br>at eac          | mass flux in river at PM-13                                 | M_r13 =  | 0.05     | (mg/s) | 0.27    | (mg/s)       |  | 2.02    | (mg/s) |
|                           |   |          | Low Flo  | w      | Average | Flow         |  | High Fl | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L) | 0.000   | (mg/L)       |  | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.000    | (mg/L) | 0.000   | (mg/L)       |  | 0.000   | (mg/L) |

| Case      | Year 1  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Chloride  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.89E+01 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| d L       | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                            |   |          | Low Flo  | w      | Ave   | age Flow    | High Fl    | low    |
|----------------------------|---|----------|----------|--------|-------|-------------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3,56  | 3.63 (mg/s) | 40,514     | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 43.81    | (mg/s) | 4     | 3.81 (mg/s) | 43.81      | (mg/s) |
| ttion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | ę     | 3.39 (mg/s) | 93.39      | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 17,41 | 2.99 (mg/s) | 198,816    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 214.46   | (mg/s) | 21    | 4.46 (mg/s) | 214.46     | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 33    | 5.09 (mg/s) | 335.09     | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 183.09   | (mg/s) | 1,70  | 0.65 (mg/s) | 1,700.65   | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 51.97    | (mg/s) | Ę     | 1.97 (mg/s) | 51.97      | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 522.40   | (mg/s) | 4,85  | 2.27 (mg/s) | 4,852.27   | (mg/s) |
|                            |   |          | Low Flo  | w      | Ave   | age Flow    | High Fl    | low    |
| balance<br>th node         | mass flux in river at PM-12                                 | M_r12 =  | 43.81    | (mg/s) | 3,70  | 5.83 (mg/s) | 40,651.48  | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 1,015.74 | (mg/s) | 28,27 | 3.26 (mg/s) | 246,621.91 | (mg/s) |
|                            |   |          | LOW FIO  | W      | AVe   | age Flow    | High Fi    | low    |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 1.800    | (mg/L) |       | 489 (mg/L)  | 9.951      | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 5.723    | (mg/L) | 10    | 780 (mg/L)  | 10.084     | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Cobalt  |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0006      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| sb r      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tior      | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001174401 | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| it .      | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|                            |   |          | Low Flo | w      | Aver | ige Flow  | High Fl | ow     |
|----------------------------|---|----------|---------|--------|------|-----------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | (    | 21 (mg/s) | 2       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | (    | 03 (mg/s) | 0.03    | (mg/s) |
| ation                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | (    | 01 (mg/s) | 0.01    | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1    | 04 (mg/s) | 12      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.13    | (mg/s) | (    | 13 (mg/s) | 0.13    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | (    | 03 (mg/s) | 0.03    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0    | 11 (mg/s) | 0.11    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | (    | 00 (mg/s) | 0.00    | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.04    | (mg/s) | (    | 35 (mg/s) | 0.35    | (mg/s) |
|                            |   |          | Low Flo | w      | Aver | ige Flow  | High Fl | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) |      | 25 (mg/s) | 2.46    | (mg/s) |
| Mass  <br>at eac           | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) | 1    | 91 (mg/s) | 15.01   | (mg/s) |
|                            |   |          | Low Flo | w      | Aver | ige Flow  | High Fl | ow     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.   | 01 (mg/L) | 0.001   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.   | 01 (mg/L) | 0.001   | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Copper  |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| , pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.005888719 | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| cou       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.004       | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.54    | (mg/s) | 6       | (mg/s) |
| tion                                 | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
|                                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.61    | (mg/s) | 30      | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s) | 0.48    | (mg/s) | 0.48    | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.19    | (mg/s) | 0.19    | (mg/s) |
| ert o<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.06    | (mg/s) | 0.53    | (mg/s) | 0.53    | (mg/s) |
| mas                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ຊ ິ <u>ບ</u>                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.11    | (mg/s) | 1.03    | (mg/s) | 1.03    | (mg/s) |
|                                      |   |          | Low Flo | W      | Average | Flow   | High Fl | ow     |
| iss balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s) | 0.65    | (mg/s) | 6.19    | (mg/s) |
| Ma                                   | mass flux in river at PM-13                                 | M_r13 =  | 0.74    | (mg/s) | 5.49    | (mg/s) | 38.24   | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |
| ర≓ర                                  | concentration in river at PM-13                             | C_r13 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |

| Case      | Year 1  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Fluoride  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 4.57E+00 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|----------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69    | (mg/s) | 405      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s) | 9.37     | (mg/s) | 9.37     | (mg/s) |
| Ition                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93     | (mg/s) | 0.93     | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13   | (mg/s) | 1,988    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s) | 45.87    | (mg/s) | 45.87    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.04     | (mg/s) | 7.04     | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 44.38   | (mg/s) | 412.18   | (mg/s) | 412.18   | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.08    | (mg/s) | 0.08     | (mg/s) | 0.08     | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 37.59   | (mg/s) | 349.17   | (mg/s) | 349.17   | (mg/s) |
|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl  | ow     |
| oalance<br>1 node          | mass flux in river at PM-12                                 | M_r12 =  | 9.37    | (mg/s) | 45.99    | (mg/s) | 415.45   | (mg/s) |
| Mass ł<br>at eacl          | mass flux in river at PM-13                                 | M_r13 =  | 137.29  | (mg/s) | 1,034.46 | (mg/s) | 3,217.94 | (mg/s) |
|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl  | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L) | 0.118    | (mg/L) | 0.102    | (mg/L) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 0.774   | (mg/L) | 0.394    | (mg/L) | 0.132    | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Iron  |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| , di      | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 4.00E-03    | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| ort       | concentration of ground water into PM-12                        |          | 0.035       | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
|----------------------------|---|----------|---------|--------|----------|--------|-----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90 | (mg/s) | 11,749    | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85     | (mg/s) | 0.85      | (mg/s) |
| ation                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08    | (mg/s) | 27.08     | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77 | (mg/s) | 57,657    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17     | (mg/s) | 4.17      | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13     | (mg/s) | 2.13      | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.04    | (mg/s) | 0.36     | (mg/s) | 0.36      | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01     | (mg/s) | 0.01      | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 111.42  | (mg/s) | 1,034.88 | (mg/s) | 1,034.88  | (mg/s) |
|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| oalance<br>1 node          | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | 1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| Mass t<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 116.49  | (mg/s) | 7,154.16 | (mg/s) | 70,475.26 | (mg/s) |
|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | 2.721    | (mg/L) | 2.883     | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.656   | (mg/L) | 2.728    | (mg/L) | 2.882     | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 3.15E+02    | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|                                      |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
|--------------------------------------|---|----------|-----------|--------|------------|--------|--------------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,980.41  | (mg/s) | 283,600      | (mg/s) |
|                                      | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,129.58   | (mg/s) | 2,129.58     | (mg/s) |
| ntration                             | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 653.73     | (mg/s) | 653.73       | (mg/s) |
|                                      | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121,890.93 | (mg/s) | 1,391,712    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) | 10,425.01  | (mg/s) | 10,425.01    | (mg/s) |
| u XI                                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,090.84  | (mg/s) | 53,090.84    | (mg/s) |
| ert o<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,057.32  | (mg/s) | 28,397.48  | (mg/s) | 28,397.48    | (mg/s) |
| n ve<br>ma:                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 254.25    | (mg/s) | 254.25     | (mg/s) | 254.25       | (mg/s) |
| <u>۽</u> ک                           | mass flux in seepage from cell 2W                           | M_s2w =  | 10,588.73 | (mg/s) | 98,352.01  | (mg/s) | 98,352.01    | (mg/s) |
|                                      |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
| ass balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | 27,763.72  | (mg/s) | 286,383.27   | (mg/s) |
| Ma<br>at                             | mass flux in river at PM-13                                 | M_r13 =  | 26,454.88 | (mg/s) | 340,174.23 | (mg/s) | 1,868,614.78 | (mg/s) |
|                                      |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) | 71.091     | (mg/L) | 70.104       | (mg/L) |
| ŭ≓ŭ                                  | concentration in river at PM-13                             | C_r13 =  | 149.066   | (mg/L) | 129.701    | (mg/L) | 76.402       | (mg/L) |

| Case      | Year 1  |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   | -        | -     |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| ů p c     | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 9.15  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|                            |   |          | Low Flo | w      | Ave  | rage Fl  | low   | High Fl   | ow     |
|----------------------------|---|----------|---------|--------|------|----------|-------|-----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,3  | .0.39 (r | mg/s) | 14,990    | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | :    | 8.94 (r  | mg/s) | 38.94     | (mg/s) |
| tion                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.05    | (mg/s) |      | 0.05 (r  | mg/s) | 0.05      | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,4  | 2.81 (r  | mg/s) | 73,562    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 1    | 0.63 (r  | mg/s) | 190.63    | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | :    | 4.55 (r  | mg/s) | 34.55     | (mg/s) |
| ert o<br>Ss f              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,02 | .9.85 (r | mg/s) | 3,029.85  | (mg/s) |
| n ve<br>ma:                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 88.87   | (mg/s) | 8    | 25.45 (r | mg/s) | 825.45    | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 188.44  | (mg/s) | 1,7  | i0.33 (r | mg/s) | 1,750.33  | (mg/s) |
|                            |   |          | Low Flo | w      | Ave  | rage Fl  | low   | High Fl   | ow     |
| lance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 38.99   | (mg/s) | 1,3  | i9.39 (r | mg/s) | 15,029.28 | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 506.94  | (mg/s) | 13,6 | 3.01 (r  | mg/s) | 94,422.01 | (mg/s) |
|                            |   |          | Low Flo | w      | Ave  | rage Fl  | low   | High Fl   | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 1.602   | (mg/L) |      | 5.481 (r | mg/L) | 3.679     | (mg/l) |
| Conv<br>flux t             | concentration in river at PM-13                             | C_r13 =  | 2.856   | (mg/L) |      | i.198 (r | mg/L) | 3.861     | (mg/l) |

| Case<br>Parameter | Year 1<br>Magnesium   |          |        |        |
|-------------------|---|----------|--------|--------|
|                   |   |          |        |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 48.72  | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| ŭ L               | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|                                      |   |          | Low Flo  | w      | Average   | Flow   | High F     | low    |
|--------------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 2,141.18  | (mg/s) | 24,309     | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s) | 259.20    | (mg/s) | 259.20     | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 56.03     | (mg/s) | 56.03      | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 10,447.79 | (mg/s) | 119,290    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s) | 1,268.87  | (mg/s) | 1,268.87   | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 15,261.91 | (mg/s) | 15,261.91  | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 472.92   | (mg/s) | 4,392.66  | (mg/s) | 4,392.66   | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 6.29     | (mg/s) | 6.29      | (mg/s) | 6.29       | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 1,696.96 | (mg/s) | 15,762.00 | (mg/s) | 15,762.00  | (mg/s) |
|                                      |   |          | Low Flo  | w      | Average   | Flow   | High F     | low    |
| ss balance<br>sach node              | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s) | 2,456.41  | (mg/s) | 24,623.80  | (mg/s) |
| Ma<br>at e                           | mass flux in river at PM-13                                 | M_r13 =  | 3,704.25 | (mg/s) | 49,595.94 | (mg/s) | 180,605.13 | (mg/s) |
|                                      |   |          | Low Flo  | w      | Average   | Flow   | High F     | low    |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L) | 6.290     | (mg/l) | 6.028      | (mg/l) |
| ŬĘŭ                                  | concentration in river at PM-13                             | C_r13 =  | 20.872   | (mg/L) | 18.910    | (mg/l) | 7.384      | (mg/l) |

| Case      | Year 1  |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
| -         |   | -        |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.29 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 107.06  | (mg/s) | 1,215    | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 4.58    | (mg/s) | 4.58    | (mg/s) | 4.58     | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 2.80    | (mg/s) | 2.80     | (mg/s) |
| Itra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 522.39  | (mg/s) | 5,964    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 22.40   | (mg/s) | 22.40   | (mg/s) | 22.40    | (mg/s) |
| uo Xn                                | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 27.31   | (mg/s) | 27.31    | (mg/s) |
| ssfo                                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.81    | (mg/s) | 26.10   | (mg/s) | 26.10    | (mg/s) |
| ma                                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| <u>۽</u> ک                           | mass flux in seepage from cell 2W                           | M_s2w =  | 28.69   | (mg/s) | 266.49  | (mg/s) | 266.49   | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| iss balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 4.58    | (mg/s) | 114.44  | (mg/s) | 1,222.81 | (mg/s) |
| Ma                                   | mass flux in river at PM-13                                 | M_r13 =  | 58.48   | (mg/s) | 979.13  | (mg/s) | 7,529.59 | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.188   | (mg/L) | 0.293   | (mg/l) | 0.299    | (mg/l) |
| ŬĘŬ                                  | concentration in river at PM-13                             | C_r13 =  | 0.329   | (mg/L) | 0.373   | (mg/l) | 0.308    | (mg/l) |

| Case      | Year 1  |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Sodium  |          |        |        |
|           |   |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| р с       | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 66.13  | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| d L       | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|----------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180     | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.26     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69      | (mg/s) |
| itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,586     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.80     | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.88   | (mg/s) |
| ssfo                       | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 641.91   | (mg/s) | 5,962.27  | (mg/s) | 5,962.27   | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 7.53     | (mg/s) | 7.53      | (mg/s) | 7.53       | (mg/s) |
| ទ ប្                       | mass flux in seepage from cell 2W                           | M_s2w =  | 1,074.64 | (mg/s) | 9,981.63  | (mg/s) | 9,981.63   | (mg/s) |
|                            |   |          | Low Flo  | W      | Average   | Flow   | High Fl    | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94  | (mg/s) |
| Mass bé<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 2,427.13 | (mg/s) | 30,760.62 | (mg/s) | 107,182.65 | (mg/s) |
|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.508      | (mg/l) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 13.676   | (mg/L) | 11.728    | (mg/l) | 4.382      | (mg/l) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | NICKEI  | l        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| u dá      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.009513833 | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.43    | (mg/s) | 5       | (mg/s) |
| -                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| ation                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ıtra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.09    | (mg/s) | 24      | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.83    | (mg/s) | 0.83    | (mg/s) | 0.83    | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.29    | (mg/s) | 0.29    | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.09    | (mg/s) | 0.86    | (mg/s) | 0.86    | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.17    | (mg/s) | 1.55    | (mg/s) | 1.55    | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s) | 0.61    | (mg/s) | 5.04    | (mg/s) |
| Mass bê<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 1.27    | (mg/s) | 6.24    | (mg/s) | 32.44   | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>itration         | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001   | (mg/L) |
| Convel<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001   | (mg/L) |

| Case<br>Parameter | Year 1<br>Lead  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             | ı.     |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| ja na di          | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000585798 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| ů –               | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s) | 0.14    | (mg/s) | 0.14    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.27    | (mg/s) | 0.27    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) | 0.51    | (mg/s) | 0.51    | (mg/s) |
|                            |   | -        | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 1  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  |          |          |        |
|           |   | -        |          | -      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 4.83E-03 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage |          | 0.004    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         |          | 2.50E-04 | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.01    | (mg/s) | 0       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| tration                   | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.18    | (mg/s) | 0.18    | (mg/s) | 0.18    | (mg/s) |
| con                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.05    | (mg/s) | 0.44    | (mg/s) | 0.44    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.12    | (mg/s) |
| Mass I<br>at eacl         | mass flux in river at PM-13                                 | M_r13 =  | 0.27    | (mg/s) | 0.76    | (mg/s) | 1.20    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 1<br>Selenium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| , pr              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000967892 | (mg/L) |
| cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| ln p              | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-----------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.11    | (mg/s) | 1       | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| concentration<br>flux             | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                                   | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.52    | (mg/s) | 6       | (mg/s) |
|                                   | mass flux of ground water into PM-13                        | M_g13 =  | 0.35    | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
|                                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| ert o<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| mas                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ បំ                              | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| t balance<br>ch node              | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.18    | (mg/s) | 1.29    | (mg/s) |
| Mass<br>at ea                     | mass flux in river at PM-13                                 | M_r13 =  | 0.46    | (mg/s) | 1.48    | (mg/s) | 8.03    | (mg/s) |
|                                   |   | -        | Low Flo | w      | Average | Flow   | High Fl | ow     |
| nvert mass<br>t to<br>icentration | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Col<br>Col                        | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 1  |          |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
|           |   |          | -       |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| ů p c     | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 142.79  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                           |   |          | Low Flo  | w      | Average     | Flow   |          | High Fl    | ow     |
|---------------------------|---|----------|----------|--------|-------------|--------|----------|------------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,427.45    | (mg/s) |          | 16,206     | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 206.87   | (mg/s) | 206.87      | (mg/s) |          | 206.87     | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 37.36       | (mg/s) |          | 37.36      | (mg/s) |
| Itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,965.20    | (mg/s) |          | 79,526     | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72 | (mg/s) | 1,012.72    | (mg/s) |          | 1,012.72   | (mg/s) |
| u xn                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 58,922.60   | (mg/s) |          | 58,922.60  | (mg/s) |
| ert e<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,386.13 | (mg/s) | 12,874.84   | (mg/s) |          | 12,874.84  | (mg/s) |
| n ve<br>mas               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 216.95   | (mg/s) | 216.95      | (mg/s) |          | 216.95     | (mg/s) |
| ធ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 3,696.11 | (mg/s) | 34,330.84   | (mg/s) |          | 34,330.84  | (mg/s) |
|                           |   |          | Low Flow |        | Average     | Flow   | High Flo |            | ow     |
| balance<br>th node        | mass flux in river at PM-12                                 | M_r12 =  | 206.87   | (mg/s) | 1,671.68    | (mg/s) |          | 16,449.94  | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 6,518.78 | (mg/s) | 115,994.83  | (mg/s) |          | 203,334.29 | (mg/s) |
|                           |   |          | LOW FIO  | w      | <br>Average | FIOW   |          | High Fi    | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 8.500    | (mg/L) | 4.280       | (mg/l) |          | 4.027      | (mg/l) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 36.732   | (mg/L) | 44.226      | (mg/l) |          | 8.314      | (mg/l) |

| Case       | Year 1  |          |            |        |
|------------|---|----------|------------|--------|
| Parameter  | Thallium  |          |            |        |
| -          |   | -        |            |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 0.0002     | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 0.0002     | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002     | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006     | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00096816 | (mg/L) |
| ICE        | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002     | (mg/L) |
| co         | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002     | (mg/L) |
| nt         | concentration of ground water into PM-12                        | C_g12 =  | 0.000004   | (mg/L) |
| du du      | concentration of ground water into PM-13                        | C_g13 =  | 0.000004   | (mg/L) |

|                                      |   |          | Low Flo | w       | Average | Flow    | High Fl     | ow     |
|--------------------------------------|---|----------|---------|---------|---------|---------|-------------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)  | 0.07    | (mg/s)  | 1           | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s)  | 0.00    | (mg/s)  | 0.00        | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)  | 0.00    | (mg/s)  | 0.00        | (mg/s) |
| Itra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)  | 0.35    | (mg/s)  | 4           | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s)  | 0.00    | (mg/s)  | 0.00        | (mg/s) |
| u Xn                                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)  | 0.03    | (mg/s)  | 0.03        | (mg/s) |
| ert o<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s)  | 0.09    | (mg/s)  | 0.09        | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s)  | 0.00    | (mg/s)  | 0.00        | (mg/s) |
| <u>۽</u> ک                           | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s)  | 0.05    | (mg/s)  | 0.05        | (mg/s) |
|                                      |   | Low Flo  | w       | Average | Flow    | High Fl | ow          |        |
| ass balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s)  | 0.07    | (mg/s)  | <br>0.81    | (mg/s) |
| M,<br>at                             | mass flux in river at PM-13                                 | M_r13 =  | 0.01    | (mg/s)  | 0.59    | (mg/s)  | 4.96        | (mg/s) |
|                                      |   | -        | Low Flo | w       | Average | Flow    | <br>High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L)  | 0.000   | (mg/L)  | <br>0.000   | (mg/L) |
| ŭ≓ŭ                                  | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L)  | 0.000   | (mg/L)  | 0.000       | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Zinc  |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
| р с<br>р  | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.009842772 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| t         | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0.0115      | (mg/L) |

|                             |   |          | Low Flo | W      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 5.71    | (mg/s) | 65      | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28    | (mg/s) | 0.28    | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.15    | (mg/s) | 0.15    | (mg/s) |
| ntral                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 27.86   | (mg/s) | 318     | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.37    | (mg/s) | 1.37    | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.10    | (mg/s) | 0.89    | (mg/s) | 0.89    | (mg/s) |
| mas                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> دُ                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.35    | (mg/s) | 3.23    | (mg/s) | 3.23    | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14    | (mg/s) | 65.25   | (mg/s) |
| Mass ba<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 2.09    | (mg/s) | 39.66   | (mg/s) | 389.02  | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016   | (mg/L) | 0.016   | (mg/L) |
| Conver<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.012   | (mg/L) | 0.015   | (mg/L) | 0.016   | (mg/L) |

Appendix F.2 Embarrass River Proposed Action Year 5

#### FLOWS

| Case             | Year 5   |            |      |       |       |
|------------------|--|------------|------|-------|-------|
| Flows            | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| in<br>River      | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| flow i<br>arrass | flow in river at PM-13                         | Q_r13_L =  | 6.28 | (cfs) | PM-13 |
| Total<br>Emba    | flow check                                     | Q_ck_L =   | 6.28 | (cfs) |       |
|                  | surface water flow into PM-12                  | Q s12 L =  | 0.00 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q s13 L =  | 0.00 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| Ita              | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.41 | (cfs) | PM-13 |
| v da             | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.01 | (cfs) | PM-13 |
| flow             | seepage from cell 2W                           | Q_s2w_L =  | 0.79 | (cfs) | PM-13 |
| out              | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| Ing              | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case                  | Year 5   |            |       |       |       |
|-----------------------|--|------------|-------|-------|-------|
| Flow                  | Average Flow Conditions (mean annual)          |            |       |       |       |
| River                 | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| l flow in<br>arrass F | flow in river at PM-13                         | Q_r13_M =  | 93.61 | (cfs) | PM-13 |
| Total<br>Emb          | flow check                                     | Q_ck_M =   | 93.61 | (cfs) |       |
|                       | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|                       | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                       | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                       | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ta                    | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 4.10  | (cfs) | PM-13 |
| , da                  | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.01  | (cfs) | PM-13 |
| No <u>l</u>           | seepage from cell 2W                           | Q_s2w_M =  | 7.96  | (cfs) | PM-13 |
| out 1                 | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| aul                   | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case             | Year 5  |            |        |       |       |
|------------------|---|------------|--------|-------|-------|
| Flow             | High Flow Conditions (avg. annual 1-day max flow) |            |        |       | _     |
| n<br>River       | flow in river at PM-12                            | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>irrass | flow in river at PM-13                            | Q_r13_H =  | 865.16 | (cfs) | PM-13 |
| Total<br>Emba    | flow check  | Q_ck_H =   | 865.16 | (cfs) |       |
|                  | surface water flow into PM-12                     | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                     | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                            | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                           | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta               | seepage from Tailings Basin Cells 1E and 2E       | Q_fs_H =   | 4.10   | (cfs) | PM-13 |
| / da             | hydrometallurgical residue cells liner leakage    | Q_rrs_H =  | 0.01   | (cfs) | PM-13 |
| lov              | seepage from cell 2W                              | Q_s2w_H =  | 7.96   | (cfs) | PM-13 |
| nt 1             | ground water flow into PM-12                      | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| <u> </u>         | ground water flow into PM-13                      | Q g13 H =  | 4.21   | (cfs) | PM-13 |

| Case      | Year 5  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Silver  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00090  | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| out con   | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
|           | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.19    | (mg/s) | 2       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| oalance<br>1 node         | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.45    | (mg/s) |
| Mass k<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.01    | (mg/s) | 0.37    | (mg/s) | 2.77    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 5  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Aluminum  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| , pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325  | (mg/L) |
| centra    | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 9.61E-02 | (mg/L) |
|           | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.025    | (mg/L) |

|                             |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|-----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) | 0.61    | (mg/s) | 0.61     | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itrai                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) | 2.98    | (mg/s) | 2.98     | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.75    | (mg/s) | 0.75     | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.11    | (mg/s) | 11.16   | (mg/s) | 11.16    | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.08    | (mg/s) | 0.08    | (mg/s) | 0.08     | (mg/s) |
| ទ ប័                        | mass flux in seepage from cell 2W                           | M_s2w =  | 35.38   | (mg/s) | 355.65  | (mg/s) | 355.65   | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| balance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) | 37.23   | (mg/s) | 406.69   | (mg/s) |
| Mass t<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 40.15   | (mg/s) | 581.97  | (mg/s) | 2,765.46 | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| rt mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) | 0.095   | (mg/L) | 0.100    | (mg/L) |
| Convel<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.226   | (mg/L) | 0.220   | (mg/L) | 0.113    | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Arsenic   |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00075     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00075     | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00075     | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.001325    | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.006775027 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00291     | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 0.00273     | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.00273     | (mg/L) |

|                                      |   |          | Low Flo | W      |   | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |   | 0.27    | (mg/s) | 3       | (mg/s) |
|                                      | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) |   | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |   | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |   | 1.31    | (mg/s) | 15      | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) |   | 0.33    | (mg/s) | 0.33    | (mg/s) |
| u su l                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |   | 0.07    | (mg/s) | 0.07    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.08    | (mg/s) |   | 0.79    | (mg/s) | 0.79    | (mg/s) |
| mas                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) |   | 0.00    | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> دُ                          | mass flux in seepage from cell 2W                           | M_s2w =  | 0.07    | (mg/s) |   | 0.65    | (mg/s) | 0.65    | (mg/s) |
|                                      |   |          | Low Flo | w      |   | Average | Flow   | High Fl | ow     |
| iss balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) |   | 0.34    | (mg/s) | 3.11    | (mg/s) |
| Ma                                   | mass flux in river at PM-13                                 | M_r13 =  | 0.54    | (mg/s) |   | 3.49    | (mg/s) | 19.87   | (mg/s) |
|                                      |   |          | Low Flo | w      |   | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) |   | 0.001   | (mg/L) | 0.001   | (mg/L) |
| ° ≓ °                                | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 1 | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Boron   |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.135355742 | (mg/L) |
| ICer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                                   |   |          | Low Flor | w      | Average | Flow         |  | High Fl | ow     |
|-----------------------------------|---|----------|----------|--------|---------|--------------|--|---------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4.28    | (mg/s)       |  | 49      | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 0.52     | (mg/s) | 0.52    | (mg/s)       |  | 0.52    | (mg/s) |
| tior                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.11    | (mg/s)       |  | 0.11    | (mg/s) |
| Itra                              | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 20.90   | (mg/s)       |  | 239     | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 2.53     | (mg/s) | 2.53    | (mg/s)       |  | 2.53    | (mg/s) |
| lo XI                             | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 7.41    | (mg/s)       |  | 7.41    | (mg/s) |
| ssfo                              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.56     | (mg/s) | 15.72   | (mg/s)       |  | 15.72   | (mg/s) |
| ma                                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.05     | (mg/s) | 0.05    | (mg/s)       |  | 0.05    | (mg/s) |
| <u>۽</u> ک                        | mass flux in seepage from cell 2W                           | M_s2w =  | 7.40     | (mg/s) | 74.34   | (mg/s)       |  | 74.34   | (mg/s) |
|                                   |   |          | Low Flow |        | Average | Average Flow |  | High Fl | ow     |
| lance<br>node                     | mass flux in river at PM-12                                 | M_r12 =  | 0.52     | (mg/s) | 4.91    | (mg/s)       |  | 49.25   | (mg/s) |
| Mass ba<br>at each r              | mass flux in river at PM-13                                 | M_r13 =  | 12.05    | (mg/s) | 125.84  | (mg/s)       |  | 387.86  | (mg/s) |
|                                   |   |          | Low Flor | w      | Average | Flow         |  | High Fl | ow     |
| nvert mass<br>x to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 0.021    | (mg/L) | 0.013   | (mg/L)       |  | 0.012   | (mg/L) |
| CO CO                             | concentration in river at PM-13                             | C_r13 =  | 0.068    | (mg/L) | 0.048   | (mg/L)       |  | 0.016   | (mg/L) |

| Case      | Year 5  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Barium  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.011    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.03E-02 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| d L       | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 3.93    | (mg/s) | 45      | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 1.66    | (mg/s) | 1.66    | (mg/s) | 1.66    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 19.15   | (mg/s) | 219     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 8.11    | (mg/s) | 8.11    | (mg/s) | 8.11    | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.58    | (mg/s) | 5.84    | (mg/s) | 5.84    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 2.08    | (mg/s) | 20.95   | (mg/s) | 20.95   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>ch node         | mass flux in river at PM-12                                 | M_r12 =  | 1.66    | (mg/s) | 5.69    | (mg/s) | 46.33   | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 12.44   | (mg/s) | 59.99   | (mg/s) | 300.17  | (mg/s) |
|                            |   | -        | LOW FIO | w      | Average | FIOW   | High Fi | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.068   | (mg/L) | 0.015   | (mg/L) | 0.011   | (mg/L) |
| Conv<br>filux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.070   | (mg/L) | 0.023   | (mg/L) | 0.012   | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Beryllium   |          |             |        |
|           | -   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0001      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0001      | (mg/L) |
| , pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000454842 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0           | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075     | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 0.000023    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.000023    | (mg/L) |

|                            |   |          | Low Flo  | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|----------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00     | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 0.17    | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.00     | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01     | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -        | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02     | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
|                            |   |          | Low Flow |        | Average | Flow   | High Fl | ow     |
| lance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.00     | (mg/s) | 0.04    | (mg/s) | 0.41    | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.03     | (mg/s) | 0.44    | (mg/s) | 2.62    | (mg/s) |
|                            |   |          | Low Flo  | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>or<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.000    | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 5<br>Calcium   |                      |             |         |
|-------------------|---|----------------------|-------------|---------|
|                   | concentration of ourface water into DM 12                       | C a12 -              | 12          | (mg/l.) |
| ta                | concentration of surface water into PM-12                       | C_\$12 =<br>C_\$13 = | 13          | (mg/L)  |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab =             | 13          | (mg/L)  |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =             | 95.35       | (mg/L)  |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =               | 55.55427025 | (mg/L)  |
| Cei               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =              | 416         | (mg/L)  |
| co                | concentration in tailings basin cell 2W                         | C_s2w =              | 59.78       | (mg/L)  |
| ot                | concentration of ground water into PM-12                        | C_g12 =              | 19          | (mg/L)  |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =              | 19          | (mg/L)  |

|                               |   |          | Low Flo  | w      | Average   | Flow   | High     | n Flow    |
|-------------------------------|---|----------|----------|--------|-----------|--------|----------|-----------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4,639.22  | (mg/s) | 52,6     | 69 (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) | 462.42    | (mg/s) | 462.     | 42 (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 121.41    | (mg/s) | 121.     | 41 (mg/s) |
| Itrai                         | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 22,636.89 | (mg/s) | 258,4    | 61 (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) | 2,263.72  | (mg/s) | 2,263.   | 72 (mg/s) |
| uo:                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 5,369.83  | (mg/s) | 5,369.   | 83 (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 641.67   | (mg/s) | 6,450.21  | (mg/s) | 6,450.   | 21 (mg/s) |
| mag                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 176.59   | (mg/s) | 176.59    | (mg/s) | 176.     | 59 (mg/s) |
| ទ បំ                          | mass flux in seepage from cell 2W                           | M_s2w =  | 1,339.65 | (mg/s) | 13,466.52 | (mg/s) | 25.      | 38 (mg/s) |
|                               |   |          | Low Flo  | w      | Average   | Flow   | Higl     | n Flow    |
| balance<br>ch node            | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) | 5,223.05  | (mg/s) | 53,252.  | 39 (mg/s) |
| Mass<br>at ea                 | mass flux in river at PM-13                                 | M_r13 =  | 4,884.05 | (mg/s) | 55,586.80 | (mg/s) | 325,998. | 90 (mg/s) |
|                               |   |          | LOW FIO  | w      | Average   | Flow   | Higi     | TIOW      |
| /ert mass<br>to<br>:entration | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) | 13.374    | (mg/l) | 13.0     | 36 (mg/l) |
| Con<br>flux 1<br>conc         | concentration in river at PM-13                             | C_r13 =  | 27.459   | (mg/L) | 20.983    | (mg/l) | 13.3     | 15 (mg/l) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Cadmium   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00008     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00008     | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000238486 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004      | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188    | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0003      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0003      | (mg/L) |

|                           |   |          | Low Flo | w      | Averag | e Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|--------|----------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.0    | 8 (mg/s) | 0       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.01    | (mg/s) | 0.0    | (mg/s)   | 0.01    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.0    | ) (mg/s) | 0.00    | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.14   | (mg/s)   | 2       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.04    | (mg/s) | 0.04   | (mg/s)   | 0.04    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.0    | (mg/s)   | 0.01    | (mg/s) |
| ert o<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00    | (mg/s) | 0.0    | (mg/s)   | 0.03    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.0    | ) (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.04   | (mg/s)   | 0.04    | (mg/s) |
|                           |   |          | Low Flo | w      | Averag | e Flow   | High Fl | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.01    | (mg/s) | 0.04   | (mg/s)   | 0.33    | (mg/s) |
| Mass I<br>at eacl         | mass flux in river at PM-13                                 | M_r13 =  | 0.05    | (mg/s) | 0.2    | ) (mg/s) | 2.03    | (mg/s) |
|                           |   |          | Low Flo | w      | Averag | Flow     | High Fl | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.00   | ) (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.00   | ) (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 5<br>Chloride  |          |          |        |
|-------------------|---|----------|----------|--------|
|                   |   | J        |          |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.07E+01 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| 법                 | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                             |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|-----------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3,568.63  | (mg/s) | 40,514     | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 43.81    | (mg/s) | 43.81     | (mg/s) | 43.81      | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 93.39     | (mg/s) | 93.39      | (mg/s) |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 17,412.99 | (mg/s) | 198,816    | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 214.46   | (mg/s) | 214.46    | (mg/s) | 214.46     | (mg/s) |
| noc                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 335.09    | (mg/s) | 335.09     | (mg/s) |
| sste                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 123.84   | (mg/s) | 1,244.90  | (mg/s) | 1,244.90   | (mg/s) |
| n ve                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 747.10   | (mg/s) | 747.10    | (mg/s) | 747.10     | (mg/s) |
| ဒ္ ပိ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 482.71   | (mg/s) | 4,852.27  | (mg/s) | 4,852.27   | (mg/s) |
|                             |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 43.81    | (mg/s) | 3,705.83  | (mg/s) | 40,651.48  | (mg/s) |
| Mass ba<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 1,611.91 | (mg/s) | 28,512.64 | (mg/s) | 246,861.29 | (mg/s) |
|                             |   |          | Low Flo  | W      | Average   | Flow   | High Fl    | ow     |
| mass                        | concentration in river at PM-12                             | C_r12 =  | 1.800    | (mg/L) | 9.489     | (mg/L) | 9.951      | (mg/L) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C r13 =  | 9.063    | (mg/L) | 10.763    | (mg/L) | 10.083     | (mg/L) |

| Case<br>Parameter   | Year 5<br>Cobalt  |          |            |        |
|---|---|----------|------------|--------|
| rarameter   | oodalt  |          |            |        |
|   | concentration of surface water into PM-12                       | C_s12 =  | 0.0006     | (mg/L) |
| ata   | concentration of surface water into PM-13                       | C_s13 =  | 0.0006     | (mg/L) |
| ů provenské | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006     | (mg/L) |
| tio   | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555   | (mg/L) |
| ntra  | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00200513 | (mg/L) |
| cer   | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005      | (mg/L) |
| co  | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556   | (mg/L) |
| nt  | concentration of ground water into PM-12                        | C_g12 =  | 0.0011     | (mg/L) |
| du  | concentration of ground water into PM-13                        | C_g13 =  | 0.0011     | (mg/L) |

|                             |   |          | Low Flo | W      | Averag | e Flow   | High Fl | ow     |
|-----------------------------|---|----------|---------|--------|--------|----------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.2    | (mg/s)   | 2       | (mg/s) |
| ıtration                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03   | 8 (mg/s) | 0.03    | (mg/s) |
|                             | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.0    | (mg/s)   | 0.01    | (mg/s) |
|                             | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.04   | (mg/s)   | 12      | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.13    | (mg/s) | 0.13   | (mg/s)   | 0.13    | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03   | (mg/s)   | 0.03    | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.23   | (mg/s)   | 0.23    | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00   | ) (mg/s) | 0.00    | (mg/s) |
| ទ ប័                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.3    | i (mg/s) | 0.35    | (mg/s) |
|                             |   |          | Low Flo | w      | Averag | e Flow   | High Fl | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.25   | 5 (mg/s) | 2.46    | (mg/s) |
| Mass ba<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.22    | (mg/s) | 2.04   | (mg/s)   | 15.14   | (mg/s) |
|                             |   |          | Low Flo | w      | Averag | e Flow   | High Fl | ow     |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.00   | (mg/L)   | 0.001   | (mg/L) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.00   | (mg/L)   | 0.001   | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Copper  |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| β<br>β    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.007797191 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| ont       | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.004       | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.54    | (mg/s) | 6       | (mg/s) |
| tion                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.61    | (mg/s) | 30      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s) | 0.48    | (mg/s) | 0.48    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.19    | (mg/s) | 0.19    | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.09    | (mg/s) | 0.91    | (mg/s) | 0.91    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.10    | (mg/s) | 1.03    | (mg/s) | 1.03    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| oalance<br>1 node          | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s) | 0.65    | (mg/s) | 6.19    | (mg/s) |
| Mass k<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.77    | (mg/s) | 5.86    | (mg/s) | 38.61   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |

| Case      | Year 5  |             |          |        |
|-----------|---|-------------|----------|--------|
| Parameter | Fluoride  | l           |          |        |
|           | concentration of surface water into PM-12                       | C s12 =     | 0.1      | (mg/L) |
| Ita       | concentration of surface water into PM-13                       | <br>C_s13 = | 0.1      | (mg/L) |
| n da      | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.1      | (mg/L) |
| tior      | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.125    | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 2.25E+00 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 2.85E+00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =     | 1.55     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =     | 0.385    | (mg/L) |
| u du      | concentration of ground water into PM-13                        | C_g13 =     | 0.385    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| tion                       | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s) | 9.37    | (mg/s) | 9.37     | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s) | 45.87   | (mg/s) | 45.87    | (mg/s) |
| u Xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.04    | (mg/s) | 7.04     | (mg/s) |
| ert e<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 25.95   | (mg/s) | 260.89  | (mg/s) | 260.89   | (mg/s) |
| n ve<br>mas                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 1.21    | (mg/s) | 1.21    | (mg/s) | 1.21     | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 34.74   | (mg/s) | 349.17  | (mg/s) | 349.17   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| lance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 9.37    | (mg/s) | 45.99   | (mg/s) | 415.45   | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 117.14  | (mg/s) | 884.30  | (mg/s) | 3,067.79 | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L) | 0.118   | (mg/L) | 0.102    | (mg/L) |
| Conv<br>flux to<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.659   | (mg/L) | 0.334   | (mg/L) | 0.125    | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Iron  |          |             |        |
| -         |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.96E-02    | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                              |   |          | Low Flo | w      | Average      | Flow   | High Fl   | ow     |
|------------------------------|---|----------|---------|--------|--------------|--------|-----------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90     | (mg/s) | 11,749    | (mg/s) |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85         | (mg/s) | 0.85      | (mg/s) |
| ation                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08        | (mg/s) | 27.08     | (mg/s) |
| Itra                         | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77     | (mg/s) | 57,657    | (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17         | (mg/s) | 4.17      | (mg/s) |
|                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13         | (mg/s) | 2.13      | (mg/s) |
| ert e<br>ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.69    | (mg/s) | 6.92         | (mg/s) | 6.92      | (mg/s) |
| mag                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.17    | (mg/s) | 0.17         | (mg/s) | 0.17      | (mg/s) |
| ទ ប័                         | mass flux in seepage from cell 2W                           | M_s2w =  | 102.95  | (mg/s) | 1,034.88     | (mg/s) | 1,034.88  | (mg/s) |
|                              |   |          | Low Flo | w      | Average      | Flow   | High Fl   | ow     |
| balance<br>th node           | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | <br>1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| Mass<br>at eac               | mass flux in river at PM-13                                 | M_r13 =  | 108.83  | (mg/s) | 7,160.87     | (mg/s) | 70,481.98 | (mg/s) |
|                              |   |          | LOW FIU | vv     | Average      | FIOW   | підії гі  | 0₩     |
| /ert mass<br>:0<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | <br>2.721    | (mg/L) | 2.883     | (mg/L) |
| Conv<br>flux 1<br>conc       | concentration in river at PM-13                             | C_r13 =  | 0.612   | (mg/L) | 2.703        | (mg/L) | 2.879     | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| , p c     | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 2.61E+02    | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|  |   |          | Low Flo   | w        | Average    | Flow   | High Fl      | ow       |
|--|---|----------|-----------|----------|------------|--------|--------------|----------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s)   | 24,980.41  | (mg/s) | 283,600      | (mg/s)   |
| itration                               | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s)   | 2,129.58   | (mg/s) | 2,129.58     | (mg/s)   |
|  | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s)   | 653.73     | (mg/s) | 653.73       | (mg/s)   |
|  | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s)   | 121,890.93 | (mg/s) | 1,391,712    | (mg/s)   |
| cen                                    | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s)   | 10,425.01  | (mg/s) | 10,425.01    | (mg/s)   |
| u xn                                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s)   | 53,090.84  | (mg/s) | 53,090.84    | (mg/s)   |
| ert o<br>ss f                          | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,017.90  | (mg/s)   | 30,336.71  | (mg/s) | 30,336.71    | (mg/s)   |
| n ve<br>mas                            | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 3,654.83  | (mg/s)   | 3,654.83   | (mg/s) | 3,654.83     | (mg/s)   |
| ទ បំ                                   | mass flux in seepage from cell 2W                           | M_s2w =  | 9,784.08  | (mg/s)   | 98,352.01  | (mg/s) | 98,352.01    | (mg/s)   |
|  |   |          | Low Flo   | w        | Average    | Flow   | High Fl      | ow       |
| ss balance<br>ach node                 | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s)   | 27,763.72  | (mg/s) | 286,383.27   | (mg/s)   |
| Ma:<br>at e                            | mass flux in river at PM-13                                 | M r13 =  | 29,011.40 | (mg/s)   | 345,514.05 | (mg/s) | 1,873,954.60 | (mg/s)   |
|  |   |          | Low Flo   | w        | Average    | Flow   | High Fl      | ow       |
| Convert mass<br>lux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L)   | 71.091     | (mg/L) | 70.104       | (mg/L)   |
| 0 = 0                                  | concentration in river at Pivi-13                           | 0_113 =  | 163.109   | (IIIg/L) | 130.427    | (mg/∟) | 70.538       | (IIIg/L) |

| Case      | Year 5  |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   | -        |       |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 7.67  | (mg/L) |
| Cet       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| int       | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|                               |   |          | Low Flo | N      | Average   | Flow   | High Fl   | ow     |
|-------------------------------|---|----------|---------|--------|-----------|--------|-----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39  | (mg/s) | 14,990    | (mg/s) |
| ıtration                      | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94     | (mg/s) | 38.94     | (mg/s) |
|                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.76    | (mg/s) | 0.76      | (mg/s) | 0.76      | (mg/s) |
|                               | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81  | (mg/s) | 73,562    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 190.63    | (mg/s) | 190.63    | (mg/s) |
| u XI                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 34.55     | (mg/s) | 34.55     | (mg/s) |
| ert o<br>ss f                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,029.85  | (mg/s) | 3,029.85  | (mg/s) |
| n ve<br>ma:                   | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 88.61   | (mg/s) | 890.78    | (mg/s) | 890.78    | (mg/s) |
| <u>۽</u> ڳ                    | mass flux in seepage from cell 2W                           | M_s2w =  | 174.12  | (mg/s) | 1,750.33  | (mg/s) | 1,750.33  | (mg/s) |
|                               |   |          | Low Flo | N      | Average   | Flow   | High Fl   | ow     |
| alance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 39.70   | (mg/s) | 1,360.10  | (mg/s) | 15,029.99 | (mg/s) |
| Mass be<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 493.07  | (mg/s) | 13,699.05 | (mg/s) | 94,488.05 | (mg/s) |
|                               |   |          | Low Flo | N      | Average   | Flow   | High Fl   | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 1.631   | (mg/L) | 3.483     | (mg/L) | 3.679     | (mg/l) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 2.772   | (mg/L) | 5.171     | (mg/L) | 3.859     | (mg/l) |

| Case       | Year 5  |          |        |        |
|------------|---|----------|--------|--------|
| Parameter  | Magnesium   |          |        |        |
|            |   | -        |        |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 29.76  | (mg/L) |
| ICel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| co         | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| nt         | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| du du      | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|                                      |   | Low Flow |          | Average Flow |           | High Fl | ow         |        |
|--------------------------------------|---|----------|----------|--------------|-----------|---------|------------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s)       | 2,141.18  | (mg/s)  | 24,309     | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s)       | 259.20    | (mg/s)  | 259.20     | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s)       | 56.03     | (mg/s)  | 56.03      | (mg/s) |
| itrat                                | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s)       | 10,447.79 | (mg/s)  | 119,290    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s)       | 1,268.87  | (mg/s)  | 1,268.87   | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s)       | 15,261.91 | (mg/s)  | 15,261.91  | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 343.77   | (mg/s)       | 3,455.69  | (mg/s)  | 3,455.69   | (mg/s) |
| mas                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 90.42    | (mg/s)       | 90.42     | (mg/s)  | 90.42      | (mg/s) |
| <u>د</u> د م                         | mass flux in seepage from cell 2W                           | M_s2w =  | 1,568.01 | (mg/s)       | 15,762.00 | (mg/s)  | 15,762.00  | (mg/s) |
|                                      |   |          | Low Flor | W            | Average   | Flow    | High Fl    | ow     |
| lass balance<br>t each node          | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s)       | 2,456.41  | (mg/s)  | 24,623.80  | (mg/s) |
| a A                                  | mass flux in river at PM-13                                 | M_r13 =  | 3,530.27 | (mg/s)       | 48,743.09 | (mg/s)  | 179,752.28 | (mg/s) |
|                                      |   | 1        | LOW FIO  | W            | Average   | Flow    | High Fi    | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L)       | 6.290     | (mg/l)  | 6.028      | (mg/l) |
| ర≓ర                                  | concentration in river at PM-13                             | C_r13 =  | 19.848   | (mg/L)       | 18.400    | (mg/l)  | 7.342      | (mg/l) |

| Case      | Year 5  |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
|           |   | -        |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| , p r     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.31 | (mg/L) |
| ICer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| qu        | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                           |   |          | Low Flo  | w      | Average | Flow   | High Fl  | ow     |
|---------------------------|---|----------|----------|--------|---------|--------|----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 107.06  | (mg/s) | 1,215    | (mg/s) |
| tration                   | mass flux of ground water into PM-12                        | M_g12 =  | 4.58     | (mg/s) | 4.58    | (mg/s) | 4.58     | (mg/s) |
|                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 2.80    | (mg/s) | 2.80     | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 522.39  | (mg/s) | 5,964    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 22.40    | (mg/s) | 22.40   | (mg/s) | 22.40    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 27.31   | (mg/s) | 27.31    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3.58     | (mg/s) | 36.00   | (mg/s) | 36.00    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 26.51    | (mg/s) | 266.49  | (mg/s) | 266.49   | (mg/s) |
|                           |   |          | Low Flow |        | Average | Flow   | High Fl  | ow     |
| balance<br>n node         | mass flux in river at PM-12                                 | M_r12 =  | 4.58     | (mg/s) | 114.44  | (mg/s) | 1,222.81 | (mg/s) |
| Mass k<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 57.07    | (mg/s) | 989.03  | (mg/s) | 7,539.49 | (mg/s) |
|                           |   |          | Low Flo  | w      | Average | Flow   | High Fl  | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.188    | (mg/L) | 0.293   | (mg/l) | 0.299    | (mg/l) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.321    | (mg/L) | 0.373   | (mg/l) | 0.308    | (mg/l) |

| Case      | Year 5  |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Sodium  |          |        |        |
|           |   |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 34.82  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|                                   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|-----------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180     | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.26     | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69      | (mg/s) |
| ıtrat                             | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,586     | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.80     | (mg/s) |
| uo:                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.88   | (mg/s) |
| ert e<br>ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 402.15   | (mg/s) | 4,042.46  | (mg/s) | 4,042.46   | (mg/s) |
| mag                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 108.24   | (mg/s) | 108.24    | (mg/s) | 108.24     | (mg/s) |
| ទ ប័                              | mass flux in seepage from cell 2W                           | M_s2w =  | 992.97   | (mg/s) | 9,981.63  | (mg/s) | 9,981.63   | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| s balance<br>sch node             | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94  | (mg/s) |
| Mas:<br>at ea                     | mass flux in river at PM-13                                 | M_r13 =  | 2,206.42 | (mg/s) | 28,941.52 | (mg/s) | 105,363.55 | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| nvert mass<br>< to<br>icentration | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.508      | (mg/l) |
| Col Col                           | concentration in river at PM-13                             | C_r13 =  | 12.405   | (mg/L) | 10.925    | (mg/l) | 4.303      | (mg/l) |

| Case<br>Parameter | Year 5<br>Nickel  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   | 1        |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| p d               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.029814715 | (mg/L) |
| ICer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| d d               | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.43    | (mg/s) | 5       | (mg/s) |
| tion                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.09    | (mg/s) | 24      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.83    | (mg/s) | 0.83    | (mg/s) | 0.83    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.29    | (mg/s) | 0.29    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.34    | (mg/s) | 3.46    | (mg/s) | 3.46    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.15    | (mg/s) | 1.55    | (mg/s) | 1.55    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s) | 0.61    | (mg/s) | 5.04    | (mg/s) |
| Mass  <br>at eac           | mass flux in river at PM-13                                 | M_r13 =  | 1.54    | (mg/s) | 8.88    | (mg/s) | 35.08   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.009   | (mg/L) | 0.003   | (mg/L) | 0.001   | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Lead  |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| β<br>β    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| tra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000769203 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                           |   | Low Flow |         | Average Flow |  | Flow    | w      |  | High Flow |        |
|---------------------------|---|----------|---------|--------------|--|---------|--------|--|-----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)       |  | -       | (mg/s) |  | -         | (mg/s) |
| tration                   | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s)       |  | 0.03    | (mg/s) |  | 0.03      | (mg/s) |
|                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)       |  | -       | (mg/s) |  | -         | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)       |  | -       | (mg/s) |  | -         | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s)       |  | 0.14    | (mg/s) |  | 0.14      | (mg/s) |
| u xn                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)       |  | 0.02    | (mg/s) |  | 0.02      | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s)       |  | 0.09    | (mg/s) |  | 0.09      | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s)       |  | 0.00    | (mg/s) |  | 0.00      | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s)       |  | 0.27    | (mg/s) |  | 0.27      | (mg/s) |
|                           |   |          | Low Flo | w            |  | Average | Flow   |  | High Fl   | ow     |
| alance<br>n node          | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s)       |  | 0.03    | (mg/s) |  | 0.03      | (mg/s) |
| Mass b<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s)       |  | 0.55    | (mg/s) |  | 0.55      | (mg/s) |
|                           |   |          | Low Flo | w            |  | Average | Flow   |  | High Fl   | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L)       |  | 0.000   | (mg/L) |  | 0.000     | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L)       |  | 0.000   | (mg/L) |  | 0.000     | (mg/L) |

| Case      | Year 5  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  | l        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| , di      | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.47E-03 | (mg/L) |
| cei       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.01    | (mg/s) | 0       | (mg/s) |
| tration                   | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
|                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.18    | (mg/s) | 0.18    | (mg/s) | 0.18    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.07    | (mg/s) | 0.75    | (mg/s) | 0.75    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.12    | (mg/s) |
| Mass  <br>at eac          | mass flux in river at PM-13                                 | M_r13 =  | 0.30    | (mg/s) | 1.08    | (mg/s) | 1.52    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>ortration     | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Selenium  |          |             |        |
|           |   |          | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| n da      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| tra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001159434 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| ont       | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.11    | (mg/s) | 1       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tratior                   | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.52    | (mg/s) | 6       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.35    | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.02    | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.18    | (mg/s) | 1.29    | (mg/s) |
| Mass b<br>at eacl         | mass flux in river at PM-13                                 | M_r13 =  | 0.48    | (mg/s) | 1.55    | (mg/s) | 8.10    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 5  |          |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
|           |   |          |         |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| n da      | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 140.42  | (mg/L) |
| Icel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| U N       | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                            |   |          | Low Flo  | w      | Average    | Flow   | High Fl     | low    |
|----------------------------|---|----------|----------|--------|------------|--------|-------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,427.45   | (mg/s) | 16,206      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 206.87   | (mg/s) | 206.87     | (mg/s) | 206.87      | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 37.36      | (mg/s) | 37.36       | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,965.20   | (mg/s) | 79,526      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72 | (mg/s) | 1,012.72   | (mg/s) | 1,012.72    | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 58,922.60  | (mg/s) | 58,922.60   | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,621.93 | (mg/s) | 16,304.02  | (mg/s) | 16,304.02   | (mg/s) |
| n ve<br>mas                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 3,118.71 | (mg/s) | 3,118.71   | (mg/s) | 3,118.71    | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 3,415.24 | (mg/s) | 34,330.84  | (mg/s) | 34,330.84   | (mg/s) |
|                            |   |          | Low Flo  | w      | Average    | Flow   | High Fl     | low    |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 206.87   | (mg/s) | 1,671.68   | (mg/s) | 16,449.94   | (mg/s) |
| Mass I<br>at eacl          | mass flux in river at PM-13                                 | M_r13 =  | 9,375.46 | (mg/s) | 122,325.77 | (mg/s) | 209,665.23  | (mg/s) |
|                            |   | -        | Low Flo  | w      | Average    | Flow   | <br>High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 8.500    | (mg/L) | 4.280      | (mg/l) | 4.027       | (mg/l) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 52.711   | (mg/L) | 46.176     | (mg/l) | 8.563       | (mg/l) |

| Case<br>Parameter | Year 5<br>Thallium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          | -           |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0002      | (mg/L) |
| n data            | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
|                   | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006      | (mg/L) |
| itra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000906999 | (mg/L) |
| cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| Lo co             | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| E                 | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| dul               | concentration of ground water into PM-13                        | C_g13 =  | 0.000004    | (mg/L) |

|                               |   |          | Low Flo | w      | Average | Flow   | High Fl   | ow     |
|-------------------------------|---|----------|---------|--------|---------|--------|-----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.07    | (mg/s) | 1         | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00      | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00      | (mg/s) |
| ıtra                          | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.35    | (mg/s) | 4         | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00      | (mg/s) |
| uo:                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03      | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.11    | (mg/s) | 0.11      | (mg/s) |
| mag                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00      | (mg/s) |
| ទ ប័                          | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.05    | (mg/s) | 0.05      | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl   | ow     |
| balance<br>ch node            | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.07    | (mg/s) | 0.81      | (mg/s) |
| Mass<br>at eac                | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.61    | (mg/s) | 4.97      | (mg/s) |
|                               |   |          | Low Flo | W      | Average | Flow   | High Fl   | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | <br>0.000 | (mg/L) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000     | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Zinc  |          |             |        |
|           |   | 1        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
| р с<br>р  | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.017646569 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0115      | (mg/L) |

|                            |   |          | Low Flo | w      | Averag  | Flow     | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|----------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 5.7     | (mg/s)   | 65      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28    | (mg/s)   | 0.28    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.1     | (mg/s)   | 0.15    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 27.80   | i (mg/s) | 318     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.3     | (mg/s)   | 1.37    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.17    | (mg/s)   | 0.17    | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.20    | (mg/s) | 2.0     | (mg/s)   | 2.05    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s)   | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.32    | (mg/s) | 3.23    | (mg/s)   | 3.23    | (mg/s) |
|                            |   |          | Low Flo | w      | Averag  | Flow     | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14    | (mg/s)   | 65.25   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 2.18    | (mg/s) | 40.82   | (mg/s)   | 390.18  | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow     | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016   | i (mg/L) | 0.016   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.012   | (mg/L) | 0.01    | (mg/L)   | 0.016   | (mg/L) |

Appendix F.3 Embarrass River Proposed Action Year 8

## FLOWS

| Case             | Year 8   |            |      |       |       |
|------------------|--|------------|------|-------|-------|
| Flows            | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| in<br>s River    | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| l flow<br>arrass | flow in river at PM-13                         | Q_r13_L =  | 6.28 | (cfs) | PM-13 |
| Tota<br>Emb      | flow check                                     | Q_ck_L =   | 6.28 | (cfs) |       |
|                  | surface water flow into PM-12                  | Q_s12_L =  | 0.00 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| ata              | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.45 | (cfs) | PM-13 |
| v da             | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.01 | (cfs) | PM-13 |
| flov             | seepage from cell 2W                           | Q_s2w_L =  | 0.75 | (cfs) | PM-13 |
| out              | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| Ing              | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case                  | Year 8   |            |       |       |       |
|-----------------------|--|------------|-------|-------|-------|
| Flow                  | Average Flow Conditions (mean annual)          |            |       |       |       |
| n<br>River            | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| l flow ir<br>arrass I | flow in river at PM-13                         | Q_r13_M =  | 94.29 | (cfs) | PM-13 |
| Total<br>Emb          | flow check                                     | Q_ck_M =   | 94.29 | (cfs) | _     |
|                       | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|                       | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                       | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                       | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ta                    | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 4.79  | (cfs) | PM-13 |
| , da                  | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.01  | (cfs) | PM-13 |
| Nol 1                 | seepage from cell 2W                           | Q_s2w_M =  | 7.96  | (cfs) | PM-13 |
| ut f                  | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| au                    | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case                   | Year 8  |            |        |       |       |
|------------------------|---|------------|--------|-------|-------|
| Flow                   | High Flow Conditions (avg. annual 1-day max flow) |            |        |       |       |
| ו<br>River             | flow in river at PM-12                            | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow iı<br>arrass      | flow in river at PM-13                            | Q_r13_H =  | 865.84 | (cfs) | PM-13 |
| Total<br>Emb <b></b> ã | flow check  | Q_ck_H =   | 865.84 | (cfs) | _     |
|                        | surface water flow into PM-12                     | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                        | surface water flow into PM-13                     | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                        | Babbitt WWTP discharge                            | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                        | Area 5 Pit NW discharge                           | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta                     | seepage from Tailings Basin Cells 1E and 2E       | Q_fs_H =   | 4.79   | (cfs) | PM-13 |
| / da                   | hydrometallurgical residue cells liner leakage    | Q_rrs_H =  | 0.01   | (cfs) | PM-13 |
| low                    | seepage from cell 2W                              | Q_s2w_H =  | 7.96   | (cfs) | PM-13 |
| rt .                   | ground water flow into PM-12                      | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| Ľ Ľ                    | ground water flow into PM-13                      | Q a13 H =  | 4.21   | (cfs) | PM-13 |

| Case      | Year 8  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Silver  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| n data    | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
|           | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00089  | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| E         | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
|                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ntra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.19    | (mg/s) | 2       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| u xn                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.12    | (mg/s) | 0.12    | (mg/s) |
| n ve<br>mas               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ຊີ ເວິ                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
|                           |   |          | Low Flo | W      | Average | Flow   | High Fl | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.45    | (mg/s) |
| Mass  <br>at eac          | mass flux in river at PM-13                                 | M_r13 =  | 0.01    | (mg/s) | 0.38    | (mg/s) | 2.79    | (mg/s) |
|                           |   |          | LOW FIO | w      | Average | FIOW   | High Fi | ow     |
| ert mass<br>n<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 8  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Aluminum  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| , pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325  | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.01E-01 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| du<br>du  | concentration of ground water into PM-13                        | C_g13 =  | 0.025    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| ntration                   | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) | 0.61    | (mg/s) | 0.61     | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
|                            | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) | 2.98    | (mg/s) | 2.98     | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.75    | (mg/s) | 0.75     | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.28    | (mg/s) | 13.63   | (mg/s) | 13.63    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.06    | (mg/s) | 0.06    | (mg/s) | 0.06     | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 33.47   | (mg/s) | 355.65  | (mg/s) | 355.65   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| lance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) | 37.23   | (mg/s) | 406.69   | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 38.40   | (mg/s) | 584.42  | (mg/s) | 2,767.91 | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) | 0.095   | (mg/L) | 0.100    | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.216   | (mg/L) | 0.219   | (mg/L) | 0.113    | (mg/L) |

| Case       | Year 8  |          |             |        |
|------------|---|----------|-------------|--------|
| Parameter  | Arsenic   |          |             |        |
|            |   | -        |             |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 0.00075     | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 0.00075     | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00075     | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.001325    | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.007035766 | (mg/L) |
| ICel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| co         | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00291     | (mg/L) |
| t          | concentration of ground water into PM-12                        |          | 0.00273     | (mg/L) |
| du         | concentration of ground water into PM-13                        | C_g13 =  | 0.00273     | (mg/L) |

|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-----------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.27    | (mg/s) | 3       | (mg/s) |
| itration                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
|                                   | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
|                                   | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.31    | (mg/s) | 15      | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) | 0.33    | (mg/s) | 0.33    | (mg/s) |
| uo:                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| ert o<br>ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.09    | (mg/s) | 0.95    | (mg/s) | 0.95    | (mg/s) |
| mas                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> دُ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.06    | (mg/s) | 0.65    | (mg/s) | 0.65    | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| s balance<br>ch node              | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.34    | (mg/s) | 3.11    | (mg/s) |
| Mass<br>at ea                     | mass flux in river at PM-13                                 | M_r13 =  | 0.54    | (mg/s) | 3.66    | (mg/s) | 20.03   | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| nvert mass<br>k to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Co Co                             | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |

| Case      | Year 8  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Boron   |          |             |        |
|           |   | -        | -           | -      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| β<br>β    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.140897597 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| ont       | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                            |   |          | Low Flo  | N      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|----------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4.28    | (mg/s) | 49      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.52     | (mg/s) | 0.52    | (mg/s) | 0.52    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
| ntrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 20.90   | (mg/s) | 239     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 2.53     | (mg/s) | 2.53    | (mg/s) | 2.53    | (mg/s) |
| nos                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 7.41    | (mg/s) | 7.41    | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.80     | (mg/s) | 19.10   | (mg/s) | 19.10   | (mg/s) |
| mas                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.03     | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 7.00     | (mg/s) | 74.34   | (mg/s) | 74.34   | (mg/s) |
|                            |   |          | Low Flor | N      | Average | Flow   | High Fl | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.52     | (mg/s) | 4.91    | (mg/s) | 49.25   | (mg/s) |
| Mass  <br>at eac           | mass flux in river at PM-13                                 | M_r13 =  | 11.87    | (mg/s) | 129.21  | (mg/s) | 391.23  | (mg/s) |
|                            |   |          | Low Flo  | N      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.021    | (mg/L) | 0.013   | (mg/L) | 0.012   | (mg/L) |
| Conv<br>flux to<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.067    | (mg/L) | 0.048   | (mg/L) | 0.016   | (mg/L) |

| Case      | Year 8  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Barium  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.011    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.04E-02 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

|                             |   |          | Low Flo  | N      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|----------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3.93    | (mg/s) | 45      | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 1.66     | (mg/s) | 1.66    | (mg/s) | 1.66    | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| ntrai                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 19.15   | (mg/s) | 219     | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 8.11     | (mg/s) | 8.11    | (mg/s) | 8.11    | (mg/s) |
| nos                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
| ert o<br>Ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.64     | (mg/s) | 6.84    | (mg/s) | 6.84    | (mg/s) |
| mas                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                        | mass flux in seepage from cell 2W                           | M_s2w =  | 1.97     | (mg/s) | 20.95   | (mg/s) | 20.95   | (mg/s) |
|                             |   |          | Low Flor | N      | Average | Flow   | High Fl | ow     |
| balance<br>h node           | mass flux in river at PM-12                                 | M_r12 =  | 1.66     | (mg/s) | 5.69    | (mg/s) | 46.33   | (mg/s) |
| Mass  <br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 12.39    | (mg/s) | 60.98   | (mg/s) | 301.17  | (mg/s) |
|                             |   |          | Low Flo  | N      | Average | Flow   | High Fl | ow     |
| /ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.068    | (mg/L) | 0.015   | (mg/L) | 0.011   | (mg/L) |
| Conv<br>flux t<br>conc      | concentration in river at PM-13                             | C_r13 =  | 0.070    | (mg/L) | 0.023   | (mg/L) | 0.012   | (mg/L) |

| Case<br>Parameter | Year 8<br>Beryllium   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0001      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0001      | (mg/L) |
| , pr              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000543459 | (mg/L) |
| cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0           | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075     | (mg/L) |
| nt                | concentration of ground water into PM-12                        | C_g12 =  | 0.000023    | (mg/L) |
| dul               | concentration of ground water into PM-13                        | C_g13 =  | 0.000023    | (mg/L) |

|                            |   |          | Low Flo  | w      | Average I | Flow   | High Fl | ow     |
|----------------------------|---|----------|----------|--------|-----------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.04      | (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00     | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| centra                     | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 0.17      | (mg/s) | 2       | (mg/s) |
|                            | mass flux of ground water into PM-13                        | M_g13 =  | 0.00     | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.01      | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01     | (mg/s) | 0.07      | (mg/s) | 0.07    | (mg/s) |
| ma                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -        | (mg/s) | -         | (mg/s) | -       | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02     | (mg/s) | 0.17      | (mg/s) | 0.17    | (mg/s) |
|                            |   |          | Low Flo  | w      | Average I | Flow   | High Fl | ow     |
| balance<br>1 node          | mass flux in river at PM-12                                 | M_r12 =  | 0.00     | (mg/s) | 0.04      | (mg/s) | 0.41    | (mg/s) |
| Mass t<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.03     | (mg/s) | 0.46      | (mg/s) | 2.65    | (mg/s) |
|                            |   |          | Low Flor | w      | Average   | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L) | 0.000     | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.000    | (mg/L) | 0.000     | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 8  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Calcium   |          |             |        |
| -         |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 13          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 13          | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 13          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 95.35       | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 72.53696661 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 416         | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 59.78       | (mg/L) |
| ort       | concentration of ground water into PM-12                        |          | 19          | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 19          | (mg/L) |

|                                       |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|---------------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                       | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4,639.22  | (mg/s) | 52,669     | (mg/s) |
| _                                     | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) | 462.42    | (mg/s) | 462.42     | (mg/s) |
| tion                                  | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 121.41    | (mg/s) | 121.41     | (mg/s) |
| Itra                                  | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 22,636.89 | (mg/s) | 258,461    | (mg/s) |
| cen                                   | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) | 2,263.72  | (mg/s) | 2,263.72   | (mg/s) |
| u Xn                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 5,369.83  | (mg/s) | 5,369.83   | (mg/s) |
| ert o<br>Ss f                         | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 925.47   | (mg/s) | 9,833.30  | (mg/s) | 9,833.30   | (mg/s) |
| n ve<br>ma:                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 132.27   | (mg/s) | 132.27    | (mg/s) | 132.27     | (mg/s) |
| <u>د</u> د م                          | mass flux in seepage from cell 2W                           | M_s2w =  | 1,267.42 | (mg/s) | 13,466.52 | (mg/s) | 19.01      | (mg/s) |
|                                       |   |          | Low Flo  | W      | Average   | Flow   | High Fl    | ow     |
| is balance<br>ach node                | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) | 5,223.05  | (mg/s) | 53,252.39  | (mg/s) |
| Mas<br>ate                            | mass flux in river at PM-13                                 | M r13 =  | 5.051.30 | (ma/s) | 58.925.58 | (ma/s) | 329.331.31 | (ma/s) |
|                                       |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| convert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) | 13.374    | (mg/l) | 13.036     | (mg/l) |

| Case       | Year 8  |          |             |        |
|------------|---|----------|-------------|--------|
| Parameter  | Cadmium   |          |             |        |
|            |   |          |             |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 0.00008     | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 0.00008     | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008     | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ıtra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000383404 | (mg/L) |
| cei        | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004      | (mg/L) |
| co         | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188    | (mg/L) |
| nt         | concentration of ground water into PM-12                        | C_g12 =  | 0.0003      | (mg/L) |
| qr         | concentration of ground water into PM-13                        | C_g13 =  | 0.0003      | (mg/L) |

|  |   |          | Low Flo | w      | Average | Flow   | High Flo | w      |
|--|---|----------|---------|--------|---------|--------|----------|--------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.03    | (mg/s) | 0        | (mg/s) |
| -                                      | mass flux of ground water into PM-12                        | M_g12 =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| tion                                   | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| itrai                                  | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.14    | (mg/s) | 2        | (mg/s) |
| cen                                    | mass flux of ground water into PM-13                        | M_g13 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04     | (mg/s) |
| uo:                                    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| ert e<br>ss f                          | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00    | (mg/s) | 0.05    | (mg/s) | 0.05     | (mg/s) |
| ma                                     | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| ទ ប័                                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.04     | (mg/s) |
|  |   |          | Low Flo | w      | Average | Flow   | High Flo | w      |
| s balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.01    | (mg/s) | 0.04    | (mg/s) | <br>0.33 | (mg/s) |
| Mas<br>ate                             | mass flux in river at PM-13                                 | M r13 =  | 0.05    | (ma/s) | 0.31    | (ma/s) | 2.06     | (ma/s) |
|  |   |          | Low Flo | w      | Average | Flow   | High Flo | ow w   |
| convert mass<br>lux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000    | (mg/L) |

| Case      | Year 8  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Chloride  |          |          |        |
|           |   | -        | -        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.07E+00 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|----------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3,568.63  | (mg/s) | 40,514     | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 43.81    | (mg/s) | 43.81     | (mg/s) | 43.81      | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 93.39     | (mg/s) | 93.39      | (mg/s) |
| ntra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 17,412.99 | (mg/s) | 198,816    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 214.46   | (mg/s) | 214.46    | (mg/s) | 214.46     | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 335.09    | (mg/s) | 335.09     | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 77.48    | (mg/s) | 823.25    | (mg/s) | 823.25     | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 559.62   | (mg/s) | 559.62    | (mg/s) | 559.62     | (mg/s) |
| ទ ប្                       | mass flux in seepage from cell 2W                           | M_s2w =  | 456.68   | (mg/s) | 4,852.27  | (mg/s) | 4,852.27   | (mg/s) |
|                            |   |          | Low Flo  | W      | Average   | Flow   | High Fl    | ow     |
| balance<br>ch node         | mass flux in river at PM-12                                 | M_r12 =  | 43.81    | (mg/s) | 3,705.83  | (mg/s) | 40,651.48  | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 1,352.05 | (mg/s) | 27,903.51 | (mg/s) | 246,252.16 | (mg/s) |
|                            | 1   |          | LOW FIO  | w      | Average   | FIOW   | підп гі    | ow     |
| 't mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 1.800    | (mg/L) | 9.489     | (mg/L) | 9.951      | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 7.606    | (mg/L) | 10.457    | (mg/L) | 10.050     | (mg/L) |

| Case<br>Parameter | Year 8<br>Cobalt  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0.0006      | (ma/L) |
| ta                | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| sb c              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| itra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.002321539 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| COL               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| ot                | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| <u> </u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|                           |   |          | Low Flo  | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|----------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.21    | (mg/s) | 2       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.03     | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| tior                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ıtra                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 1.04    | (mg/s) | 12      | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.13     | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
| con con                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert o<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.03     | (mg/s) | 0.31    | (mg/s) | 0.31    | (mg/s) |
| ma                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ម ប័ ខ                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03     | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
|                           |   |          | Low Flow |        | Average | Flow   | High Fl | ow     |
| balance<br>node           | mass flux in river at PM-12                                 | M_r12 =  | 0.03     | (mg/s) | 0.25    | (mg/s) | 2.46    | (mg/s) |
| Mass                      | mass flux in river at PM-13                                 | M_r13 =  | 0.22     | (mg/s) | 2.12    | (mg/s) | 15.22   | (mg/s) |
|                           |   |          | LOW FIO  | w      | Average | FIOW   | High Fi | ow     |
| ert mass<br>htration      | concentration in river at PM-12                             | C_r12 =  | 0.001    | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.001    | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |

| Case      | Year 8  |          |            |        |
|-----------|---|----------|------------|--------|
| Parameter | Copper  |          |            |        |
|           |   | -        |            |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0015     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0015     | (mg/L) |
| , dâ      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345    | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00854201 | (mg/L) |
| Icel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015     | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555   | (mg/L) |
| t         | concentration of ground water into PM-12                        | C_g12 =  | 0.004      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.004      | (mg/L) |

|                                      |   |          | Low Flor | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|----------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.54    | (mg/s) | 6       | (mg/s) |
|                                      | mass flux of ground water into PM-12                        | M_g12 =  | 0.10     | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 2.61    | (mg/s) | 30      | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.48     | (mg/s) | 0.48    | (mg/s) | 0.48    | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.19    | (mg/s) | 0.19    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.11     | (mg/s) | 1.16    | (mg/s) | 1.16    | (mg/s) |
| mas                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ຊ ິ <u>ບ</u>                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.10     | (mg/s) | 1.03    | (mg/s) | 1.03    | (mg/s) |
|                                      |   |          | Low Flor | w      | Average | Flow   | High Fl | ow     |
| s balance<br>ach node                | mass flux in river at PM-12                                 | M_r12 =  | 0.10     | (mg/s) | 0.65    | (mg/s) | 6.19    | (mg/s) |
| Mas<br>at ea                         | mass flux in river at PM-13                                 | M_r13 =  | 0.78     | (mg/s) | 6.11    | (mg/s) | 38.87   | (mg/s) |
|                                      |   |          | Low Flor | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.004    | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |
| o⊊ŏ                                  | concentration in river at PM-13                             | C_r13 =  | 0.004    | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |

| Case<br>Parameter | Year 8<br>Eluoride  |          |          |        |
|-------------------|---|----------|----------|--------|
| i arameter        | Thomas  | 1        |          |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| βρι               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 7.89E-01 | (mg/L) |
| ICer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| ort .             | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|                                |   |          | Low Flo | w      | Average I | Flow   | High Fl  | ow     |
|--------------------------------|---|----------|---------|--------|-----------|--------|----------|--------|
|                                | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69     | (mg/s) | 405      | (mg/s) |
| _                              | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s) | 9.37      | (mg/s) | 9.37     | (mg/s) |
| tio                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93      | (mg/s) | 0.93     | (mg/s) |
| ıtra                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13    | (mg/s) | 1,988    | (mg/s) |
| cen                            | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s) | 45.87     | (mg/s) | 45.87    | (mg/s) |
| uo:                            | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.04      | (mg/s) | 7.04     | (mg/s) |
| ert e<br>ss f                  | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 10.06   | (mg/s) | 106.94    | (mg/s) | 106.94   | (mg/s) |
| mag                            | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.91    | (mg/s) | 0.91      | (mg/s) | 0.91     | (mg/s) |
| ۹ ٽ<br>۲                       | mass flux in seepage from cell 2W                           | M_s2w =  | 32.86   | (mg/s) | 349.17    | (mg/s) | 349.17   | (mg/s) |
|                                |   |          | Low Flo | w      | Average I | Flow   | High Fl  | ow     |
| alance<br>node                 | mass flux in river at PM-12                                 | M_r12 =  | 9.37    | (mg/s) | 45.99     | (mg/s) | 415.45   | (mg/s) |
| Mass ba<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 99.07   | (mg/s) | 730.04    | (mg/s) | 2,913.52 | (mg/s) |
|                                |   |          | Low Flo | w      | Average I | Flow   | High Fl  | ow     |
| ivert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L) | 0.118     | (mg/L) | 0.102    | (mg/L) |
| Cor<br>flux<br>con             | concentration in river at PM-13                             | C_r13 =  | 0.557   | (mg/L) | 0.274     | (mg/L) | 0.119    | (mg/L) |
| Case      | Year 8  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Iron  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.80E-02    | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| qr        | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                                      |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
|--------------------------------------|---|----------|---------|--------|----------|--------|-----------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90 | (mg/s) | 11,749    | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85     | (mg/s) | 0.85      | (mg/s) |
| tio                                  | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08    | (mg/s) | 27.08     | (mg/s) |
| Itra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77 | (mg/s) | 57,657    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17     | (mg/s) | 4.17      | (mg/s) |
| uo Xn                                | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13     | (mg/s) | 2.13      | (mg/s) |
| ert o<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.74    | (mg/s) | 7.86     | (mg/s) | 7.86      | (mg/s) |
| ma                                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.13    | (mg/s) | 0.13     | (mg/s) | 0.13      | (mg/s) |
| <u>۽</u> ک                           | mass flux in seepage from cell 2W                           | M_s2w =  | 97.40   | (mg/s) | 1,034.88 | (mg/s) | 1,034.88  | (mg/s) |
|                                      |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| ass balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | 1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| ate                                  | mass flux in river at PM-13                                 | M_r13 =  | 103.29  | (mg/s) | 7,161.77 | (mg/s) | 70,482.88 | (mg/s) |
|                                      | 1   | _        | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| onvert mass<br>ix to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | 2.721    | (mg/L) | 2.883     | (mg/L) |
| 5 ≓ 3                                | concentration in river at PM-13                             | C_r13 =  | 0.581   | (mg/L) | 2.684    | (mg/L) | 2.876     | (mg/L) |

| Case      | Year 8  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| ů p c     | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 2.52E+02    | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|                               |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
|-------------------------------|---|----------|-----------|--------|------------|--------|--------------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,980.41  | (mg/s) | 283,600      | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,129.58   | (mg/s) | 2,129.58     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 653.73     | (mg/s) | 653.73       | (mg/s) |
| itrat                         | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121,890.93 | (mg/s) | 1,391,712    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) | 10,425.01  | (mg/s) | 10,425.01    | (mg/s) |
|                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,090.84  | (mg/s) | 53,090.84    | (mg/s) |
| ert o<br>Ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,221.47  | (mg/s) | 34,228.62  | (mg/s) | 34,228.62    | (mg/s) |
| n ve<br>ma:                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 2,737.70  | (mg/s) | 2,737.70   | (mg/s) | 2,737.70     | (mg/s) |
| ទ ប្                          | mass flux in seepage from cell 2W                           | M_s2w =  | 9,256.51  | (mg/s) | 98,352.01  | (mg/s) | 98,352.01    | (mg/s) |
|                               |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
| alance<br>n node              | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | 27,763.72  | (mg/s) | 286,383.27   | (mg/s) |
| Mass b<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 27,770.27 | (mg/s) | 348,488.83 | (mg/s) | 1,876,929.38 | (mg/s) |
|                               |   | •        | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
| wert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) | 71.091     | (mg/L) | 70.104       | (mg/L) |
| flux<br>con                   | concentration in river at PM-13                             | C_r13 =  | 156.224   | (mg/L) | 130.596    | (mg/L) | 76.599       | (mg/L) |

| Case      | Year 8  |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   | l        |       |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| , då      | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.73  | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|   |   |          | Low Flo | w      | Average   | Flow          | High Fl       | ow     |
|---|---|----------|---------|--------|-----------|---------------|---------------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39  | (mg/s)        | 14,990        | (mg/s) |
| ntration                                | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94     | (mg/s)        | 38.94         | (mg/s) |
|   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.57    | (mg/s) | 0.57      | (mg/s)        | 0.57          | (mg/s) |
|   | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81  | (mg/s)        | 73,562        | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 190.63    | (mg/s)        | 190.63        | (mg/s) |
| u xn                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 34.55     | (mg/s)        | 34.55         | (mg/s) |
| ert o<br>Ss f                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,029.85  | (mg/s)        | 3,029.85      | (mg/s) |
| n ve<br>mas                             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 85.90   | (mg/s) | 912.75    | (mg/s)        | 912.75        | (mg/s) |
| ទ បំ                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 164.73  | (mg/s) | 1,750.33  | (mg/s)        | 1,750.33      | (mg/s) |
|   |   |          | Low Flo | w      | Average   | Flow          | High Fl       | ow     |
| s balance<br>ach node                   | mass flux in river at PM-12                                 | M_r12 =  | 39.51   | (mg/s) | 1,359.91  | <u>(mg/s)</u> | <br>15,029.80 | (mg/s) |
| Mas<br>at ea                            | mass flux in river at PM-13                                 | M r13 =  | 480 78  | (ma/s) | 13 720 83 | (ma/s)        | 94 509 83     | (mg/s) |
|   |   |          | Low Flo | w      | Average   | Flow          | High Fl       | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 1.624   | (mg/L) | 3.482     | (mg/L)        | 3.679         | (mg/l) |

| Case       | Year 8  |          |        |        |
|------------|---|----------|--------|--------|
| Parameter  | Magnesium   |          |        |        |
| -          |   | -        |        |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 17.33  | (mg/L) |
| ICel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| co         | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| nt         | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| du du      | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|                                      |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|--------------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 2,141.18  | (mg/s) | 24,309     | (mg/s) |
| ntration                             | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s) | 259.20    | (mg/s) | 259.20     | (mg/s) |
|                                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 56.03     | (mg/s) | 56.03      | (mg/s) |
|                                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 10,447.79 | (mg/s) | 119,290    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s) | 1,268.87  | (mg/s) | 1,268.87   | (mg/s) |
| u Xn                                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 15,261.91 | (mg/s) | 15,261.91  | (mg/s) |
| ert o<br>Ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 221.12   | (mg/s) | 2,349.41  | (mg/s) | 2,349.41   | (mg/s) |
| n ve<br>ma:                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 67.73    | (mg/s) | 67.73     | (mg/s) | 67.73      | (mg/s) |
| <u>د</u> د م                         | mass flux in seepage from cell 2W                           | M_s2w =  | 1,483.46 | (mg/s) | 15,762.00 | (mg/s) | 15,762.00  | (mg/s) |
|                                      |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| ass balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s) | 2,456.41  | (mg/s) | 24,623.80  | (mg/s) |
| Ma<br>at                             | mass flux in river at PM-13                                 | M_r13 =  | 3,300.38 | (mg/s) | 47,614.12 | (mg/s) | 178,623.31 | (mg/s) |
|                                      |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L) | 6.290     | (mg/l) | 6.028      | (mg/l) |
| õ≓ö                                  | concentration in river at PM-13                             | C_r13 =  | 18.567   | (mg/L) | 17.843    | (mg/l) | 7.290      | (mg/l) |

| Case      | Year 8  |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
|           |   |          |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.30 | (mg/L) |
| Cet       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                           |   | Low Flow |         | Average Flow |         | High Fl | ow       |        |
|---------------------------|---|----------|---------|--------------|---------|---------|----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)       | 107.06  | (mg/s)  | 1,215    | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 4.58    | (mg/s)       | 4.58    | (mg/s)  | 4.58     | (mg/s) |
| tior                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)       | 2.80    | (mg/s)  | 2.80     | (mg/s) |
| ntra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)       | 522.39  | (mg/s)  | 5,964    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 22.40   | (mg/s)       | 22.40   | (mg/s)  | 22.40    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)       | 27.31   | (mg/s)  | 27.31    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3.79    | (mg/s)       | 40.29   | (mg/s)  | 40.29    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s)       | 0.00    | (mg/s)  | 0.00     | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 25.08   | (mg/s)       | 266.49  | (mg/s)  | 266.49   | (mg/s) |
|                           |   |          | Low Flo | w            | Average | Flow    | High Fl  | ow     |
| oalance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 4.58    | (mg/s)       | 114.44  | (mg/s)  | 1,222.81 | (mg/s) |
| Mass ł<br>at eacl         | mass flux in river at PM-13                                 | M_r13 =  | 55.85   | (mg/s)       | 993.32  | (mg/s)  | 7,543.78 | (mg/s) |
|                           |   | -        | Low Flo | w            | Average | Flow    | High Fl  | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.188   | (mg/L)       | 0.293   | (mg/l)  | 0.299    | (mg/l) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.314   | (mg/L)       | 0.372   | (mg/l)  | 0.308    | (mg/l) |

| Case<br>Parameter | Year 8<br>Sodium  |          |        |        |
|-------------------|---|----------|--------|--------|
| i arameter        | oonum   |          |        |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 18.93  | (mg/L) |
| Cel               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| t                 | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| dul               | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|-------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180     | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.26     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69      | (mg/s) |
| itraf                         | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,586     | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.80     | (mg/s) |
|                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.88   | (mg/s) |
| ert o<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 241.52   | (mg/s) | 2,566.23  | (mg/s) | 2,566.23   | (mg/s) |
| mag                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 81.08    | (mg/s) | 81.08     | (mg/s) | 81.08      | (mg/s) |
| ទ ប័                          | mass flux in seepage from cell 2W                           | M_s2w =  | 939.43   | (mg/s) | 9,981.63  | (mg/s) | 9,981.63   | (mg/s) |
|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| lance<br>node                 | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94  | (mg/s) |
| Mass ba<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 1,965.10 | (mg/s) | 27,438.13 | (mg/s) | 103,860.16 | (mg/s) |
|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.508      | (mg/l) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 11.055   | (mg/L) | 10.282    | (mg/l) | 4.239      | (mg/l) |

| Case      | Year 8  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Nickel  |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| tra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.038551821 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.43    | (mg/s) | 5       | (mg/s) |
| tration                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
|                            | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.09    | (mg/s) | 24      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.83    | (mg/s) | 0.83    | (mg/s) | 0.83    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.29    | (mg/s) | 0.29    | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.49    | (mg/s) | 5.23    | (mg/s) | 5.23    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.15    | (mg/s) | 1.55    | (mg/s) | 1.55    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s) | 0.61    | (mg/s) | 5.04    | (mg/s) |
| Mass t<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 1.67    | (mg/s) | 10.63   | (mg/s) | 36.84   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.009   | (mg/L) | 0.004   | (mg/L) | 0.002   | (mg/L) |

| Case      | Year 8  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Lead  |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| β<br>β    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001239552 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| int       | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                           |   |          | Low Flo | w      | A | verage | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---|--------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |   | -      | (mg/s) | -       | (mg/s) |
| tration                   | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) |   | 0.03   | (mg/s) | 0.03    | (mg/s) |
|                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |   | -      | (mg/s) | -       | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |   | -      | (mg/s) | -       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s) |   | 0.14   | (mg/s) | 0.14    | (mg/s) |
|                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |   | 0.02   | (mg/s) | 0.02    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) |   | 0.17   | (mg/s) | 0.17    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) |   | 0.00   | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) |   | 0.27   | (mg/s) | 0.27    | (mg/s) |
|                           |   |          | Low Flo | w      | A | verage | Flow   | High Fl | ow     |
| alance<br>n node          | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) |   | 0.03   | (mg/s) | 0.03    | (mg/s) |
| Mass b<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) |   | 0.63   | (mg/s) | 0.63    | (mg/s) |
|                           |   |          | Low Flo | w      | A | verage | Flow   | High Fl | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) |   | 0.000  | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) |   | 0.000  | (mg/L) | 0.000   | (mg/L) |

| Case                                     | Year 8  |          |          |        |
|--|---|----------|----------|--------|
| Parameter                                | Antimony  | ]        |          |        |
|  | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata                                      | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| ep r                                     | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tion                                     | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ntra                                     | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 8.28E-03 | (mg/L) |
| cer                                      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| Lo L | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| rt                                       | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| lnp                                      | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                               |   |          | Low Flo | w      | Average | e Flow   | High Flo | ow     |
|-------------------------------|---|----------|---------|--------|---------|----------|----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.01    | (mg/s)   | 0        | (mg/s) |
| -                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s) | 0.04    | (mg/s)   | 0.04     | (mg/s) |
| itration                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s)   | 0.00     | (mg/s) |
|                               | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.03    | (mg/s)   | 0        | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 0.18    | (mg/s) | 0.18    | (mg/s)   | 0.18     | (mg/s) |
| nos                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s)   | 0.01     | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.11    | (mg/s) | 1.12    | (mg/s)   | 1.12     | (mg/s) |
| mas                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s)   | 0.00     | (mg/s) |
| ຊ ິວ<br>2                     | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s) | 0.06    | i (mg/s) | 0.06     | (mg/s) |
|                               |   |          | Low Flo | w      | Average | e Flow   | High Flo | ow     |
| s balance<br>ach node         | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s) | 0.04    | (mg/s)   | 0.12     | (mg/s) |
| Mas:<br>at ea                 | mass flux in river at PM-13                                 | M_r13 =  | 0.33    | (mg/s) | 1.45    | i (mg/s) | 1.89     | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow     | High Flo | ow     |
| wert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L) | 0.000   | ) (mg/L) | 0.000    | (mg/L) |
| flux<br>con                   | concentration in river at PM-13                             | C_r13 =  | 0.002   | (mg/L) | 0.001   | (mg/L)   | 0.000    | (mg/L) |

| Case      | Year 8  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Selenium  |          |             |        |
|           |   |          | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001331851 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| ont       | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.11    | (mg/s) | 1       | (mg/s) |
| itration                  | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
|                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.52    | (mg/s) | 6       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.35    | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| ert o<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.18    | (mg/s) | 0.18    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.02    | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
| ទ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>node           | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.18    | (mg/s) | 1.29    | (mg/s) |
| Mass                      | mass flux in river at PM-13                                 | M_r13 =  | 0.48    | (mg/s) | 1.59    | (mg/s) | 8.14    | (mg/s) |
|                           |   | _        | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 8  |          |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
|           |   |          |         |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 153.28  | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                               |   |          | Low Flo  | W      | Average    | Flow   | High Flow         |
|-------------------------------|---|----------|----------|--------|------------|--------|-------------------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,427.45   | (mg/s) | 16,206 (mg/s)     |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 206.87   | (mg/s) | 206.87     | (mg/s) | 206.87 (mg/s)     |
| tration                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 37.36      | (mg/s) | 37.36 (mg/s)      |
|                               | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,965.20   | (mg/s) | 79,526 (mg/s)     |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72 | (mg/s) | 1,012.72   | (mg/s) | 1,012.72 (mg/s)   |
|                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 58,922.60  | (mg/s) | 58,922.60 (mg/s)  |
| ert o<br>Ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,955.65 | (mg/s) | 20,779.12  | (mg/s) | 20,779.12 (mg/s)  |
| n ve<br>ma:                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 2,336.11 | (mg/s) | 2,336.11   | (mg/s) | 2,336.11 (mg/s)   |
| ទ ប័                          | mass flux in seepage from cell 2W                           | M_s2w =  | 3,231.09 | (mg/s) | 34,330.84  | (mg/s) | 34,330.84 (mg/s)  |
|                               |   |          | Low Flo  | w      | Average    | Flow   | High Flow         |
| balance<br>ch node            | mass flux in river at PM-12                                 | M_r12 =  | 206.87   | (mg/s) | 1,671.68   | (mg/s) | 16,449.94 (mg/s)  |
| Mass<br>at eac                | mass flux in river at PM-13                                 | M_r13 =  | 8,742.44 | (mg/s) | 126,018.27 | (mg/s) | 213,357.73 (mg/s) |
|                               |   |          | LOWIN    | vv     | Average    | Ilow   | Tigit Low         |
| wert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 8.500    | (mg/L) | 4.280      | (mg/l) | 4.027 (mg/l)      |
| Con<br>flux<br>con            | concentration in river at PM-13                             | C_r13 =  | 49.181   | (mg/L) | 47.225     | (mg/l) | 8.707 (mg/l)      |

| Case<br>Parameter | Year 8<br>Thallium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   | 4        |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0002      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
| , pr              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006      | (mg/L) |
| itra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000934618 | (mg/L) |
| cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| nt                | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| dul               | concentration of ground water into PM-13                        | C_g13 =  | 0.000004    | (mg/L) |

|                              |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
|------------------------------|---|----------|---------|--------|-----------|--------|---------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.07      | (mg/s) | 1       | (mg/s) |
| itration                     | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
|                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
|                              | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.35      | (mg/s) | 4       | (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| uo:                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03      | (mg/s) | 0.03    | (mg/s) |
| ert e<br>ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.13      | (mg/s) | 0.13    | (mg/s) |
| ma                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.05      | (mg/s) | 0.05    | (mg/s) |
|                              |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
| alance<br>n node             | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.07      | (mg/s) | 0.81    | (mg/s) |
| Mass b<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.63      | (mg/s) | 4.99    | (mg/s) |
|                              |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
| t mass<br>tration            | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | <br>0.000 | (mg/L) | 0.000   | (mg/L) |
| Convei<br>filux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000     | (mg/L) | 0.000   | (mg/L) |

| Case       | Year 8  |          |             |        |
|------------|---|----------|-------------|--------|
| Parameter  | Zinc  |          |             |        |
|            |   |          |             |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.029073121 | (mg/L) |
| ICel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| co         | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| t          | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| du         | concentration of ground water into PM-13                        | C_g13 =  | 0.0115      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 5.71    | (mg/s) | 65      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28    | (mg/s) | 0.28    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.15    | (mg/s) | 0.15    | (mg/s) |
| tral                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 27.86   | (mg/s) | 318     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.37    | (mg/s) | 1.37    | (mg/s) |
| uo Xn                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.37    | (mg/s) | 3.94    | (mg/s) | 3.94    | (mg/s) |
| mas                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប្                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.30    | (mg/s) | 3.23    | (mg/s) | 3.23    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| lance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14    | (mg/s) | 65.25   | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 2.33    | (mg/s) | 42.72   | (mg/s) | 392.07  | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016   | (mg/L) | 0.016   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.013   | (mg/L) | 0.016   | (mg/L) | 0.016   | (mg/L) |

Appendix F.4 Embarrass River Proposed Action Year 9

### **FLOWS**

| Case             | Year 9   |            |      |       |       |
|------------------|--|------------|------|-------|-------|
| Flows            | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| r in<br>is River | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| low<br>ras       | flow in river at PM-13                         | Q_r13_L =  | 6.28 | (cfs) | PM-13 |
| Total f<br>Embar | flow check                                     | Q_ck_L =   | 6.28 | (cfs) | _     |
|                  | surface water flow into PM-12                  | Q_s12_L =  | 0.00 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| Ita              | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.48 | (cfs) | PM-13 |
| v da             | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.01 | (cfs) | PM-13 |
| flow             | seepage from cell 2W                           | Q_s2w_L =  | 0.72 | (cfs) | PM-13 |
| out 1            | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| dul              | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case             | Year 9   |            |       |       |       |
|------------------|--|------------|-------|-------|-------|
| Flow             | Average Flow Conditions (mean annual)          |            |       |       |       |
| in<br>: River    | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| l flow<br>arrass | flow in river at PM-13                         | Q_r13_M =  | 94.76 | (cfs) | PM-13 |
| Tota<br>Emb      | flow check                                     | Q_ck_M =   | 94.76 | (cfs) |       |
|                  | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ta               | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 5.26  | (cfs) | PM-13 |
| v da             | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.01  | (cfs) | PM-13 |
| llow             | seepage from cell 2W                           | Q_s2w_M =  | 7.96  | (cfs) | PM-13 |
| out              | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| dul              | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case             | Year 9   |            |        |       |       |
|------------------|--|------------|--------|-------|-------|
| Flow             | High Flow Conditions (avg. annual 1-day ma     | x flow)    |        |       |       |
| n<br>River       | flow in river at PM-12                         | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>arrass | flow in river at PM-13                         | Q_r13_H =  | 866.31 | (cfs) | PM-13 |
| Total<br>Emba    | flow check                                     | Q_ck_H =   | 866.31 | (cfs) |       |
|                  | surface water flow into PM-12                  | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta               | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_H =   | 5.26   | (cfs) | PM-13 |
| / da             | hydrometallurgical residue cells liner leakage | Q_rrs_H =  | 0.01   | (cfs) | PM-13 |
| low              | seepage from cell 2W                           | Q_s2w_H =  | 7.96   | (cfs) | PM-13 |
| nt i             | ground water flow into PM-12                   | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| 법                | ground water flow into PM-13                   | Q_g13_H =  | 4.21   | (cfs) | PM-13 |

| Case      | Year 9  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Silver  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00090  | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| cou       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| ont       | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                              |   |          | Low Flo  | w      |  |  | High Fl | ow     |
|------------------------------|---|----------|----------|--------|--|--|---------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  |  | 0       | (mg/s) |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.00     | (mg/s) |  |  | 0.00    | (mg/s) |
| tion                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  |  | 0.00    | (mg/s) |
| itrai                        | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  |  | 2       | (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 0.00     | (mg/s) |  |  | 0.00    | (mg/s) |
| uo:                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  |  | 0.01    | (mg/s) |
| ert o<br>Ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01     | (mg/s) |  |  | 0.13    | (mg/s) |
| n ve<br>ma:                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) |  |  | 0.00    | (mg/s) |
| ទ ទ័                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00     | (mg/s) |  |  | 0.02    | (mg/s) |
|                              |   |          | Low Flow |        |  |  | High Fl | ow     |
| alance<br>node               | mass flux in river at PM-12                                 | M_r12 =  | 0.00     | (mg/s) |  |  | 0.45    | (mg/s) |
| Mass ba<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 0.02     | (mg/s) |  |  | 2.80    | (mg/s) |
|                              |   |          | Low Flo  | w      |  |  | High Fl | ow     |
| rt mass<br>ntration          | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L) |  |  | 0.000   | (mg/L) |
| Convel<br>filux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.000    | (mg/L) |  |  | 0.000   | (mg/L) |

| Case      | Year 9  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Aluminum  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| , p d     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325  | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.07E-01 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| du<br>du  | concentration of ground water into PM-13                        | C_g13 =  | 0.025    | (mg/L) |

|                            |   |          | Low Flo | w      |  |  | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|--|--|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |  |  | 405      | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) |  |  | 0.61     | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |  |  | 0.93     | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |  |  | 1,988    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) |  |  | 2.98     | (mg/s) |
| Lon Xuli                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |  |  | 0.75     | (mg/s) |
| ert e<br>ss t              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.44    | (mg/s) |  |  | 15.88    | (mg/s) |
| ma c                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.07    | (mg/s) |  |  | 0.07     | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 32.29   | (mg/s) |  |  | 355.65   | (mg/s) |
|                            |   |          | Low Flo | w      |  |  | High Fl  | ow     |
| balance<br>ch node         | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) |  |  | 406.69   | (mg/s) |
| Mass<br>at ea              | mass flux in river at PM-13                                 | M_r13 =  | 37.38   | (mg/s) |  |  | 2,770.18 | (mg/s) |
|                            |   | -        | Low Flo | w      |  |  | High Fl  | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) |  |  | 0.100    | (mg/L) |
| Conv<br>flux to<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.210   | (mg/L) |  |  | 0.113    | (mg/L) |

| Case<br>Parameter | Year 9<br>Arsenic   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0.00075     | (ma/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.00075     | (mg/L) |
| , pr              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00075     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.001325    | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.007592467 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| com               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00291     | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =  | 0.00273     | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.00273     | (mg/L) |

|                           |   |          | Low Flo  | w      |  |  | High Fl | ow     |
|---------------------------|---|----------|----------|--------|--|--|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  |  | 3       | (mg/s) |
| -                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.07     | (mg/s) |  |  | 0.07    | (mg/s) |
| tio                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  |  | 0.01    | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  |  | 15      | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.33     | (mg/s) |  |  | 0.33    | (mg/s) |
| u xnt                     | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  |  | 0.07    | (mg/s) |
| ert o<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.10     | (mg/s) |  |  | 1.13    | (mg/s) |
| n ve<br>mai               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) |  |  | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.06     | (mg/s) |  |  | 0.65    | (mg/s) |
|                           |   |          | Low Flow |        |  |  | High Fl | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.07     | (mg/s) |  |  | 3.11    | (mg/s) |
| Mass I<br>at eacl         | mass flux in river at PM-13                                 | M_r13 =  | 0.56     | (mg/s) |  |  | 20.21   | (mg/s) |
|                           |   | -        | Low Flo  | w      |  |  | High Fl | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.003    | (mg/L) |  |  | 0.001   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.003    | (mg/L) |  |  | 0.001   | (mg/L) |

| Case       | Year 9  |          |             |        |
|------------|---|----------|-------------|--------|
| Parameter  | Boron   |          |             |        |
|            |   | -        |             |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.145082047 | (mg/L) |
| cei        | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| co         | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| t          | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| du         | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                              |   |          | Low Flo | w      |  | High Fl | ow     |
|------------------------------|---|----------|---------|--------|--|---------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |  | 49      | (mg/s) |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) |  | 0.52    | (mg/s) |
| tion                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |  | 0.11    | (mg/s) |
| itra                         | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |  | 239     | (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) |  | 2.53    | (mg/s) |
| uo:                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |  | 7.41    | (mg/s) |
| ert e<br>ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.96    | (mg/s) |  | 21.59   | (mg/s) |
| mag                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.04    | (mg/s) |  | 0.04    | (mg/s) |
| ទ ប័                         | mass flux in seepage from cell 2W                           | M_s2w =  | 6.75    | (mg/s) |  | 74.34   | (mg/s) |
|                              |   |          | Low Flo | w      |  | High Fl | ow     |
| alance<br>node               | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) |  | 49.25   | (mg/s) |
| Mass b<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 11.79   | (mg/s) |  | 393.72  | (mg/s) |
|                              |   |          | Low Flo | w      |  | High Fl | ow     |
| t mass<br>tration            | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) |  | 0.012   | (mg/L) |
| Conver<br>filux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.066   | (mg/L) |  | 0.016   | (mg/L) |

| Case      | Year 9  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Barium  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.011    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| tra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.05E-02 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

|                            |   |          | Low Flo | W      |  |  | High Fl | ow     |
|----------------------------|---|----------|---------|--------|--|--|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |  |  | 45      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 1.66    | (mg/s) |  |  | 1.66    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |  |  | 0.10    | (mg/s) |
| itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |  |  | 219     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 8.11    | (mg/s) |  |  | 8.11    | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |  |  | 0.25    | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.68    | (mg/s) |  |  | 7.51    | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) |  |  | 0.00    | (mg/s) |
| ទ ទ័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 1.90    | (mg/s) |  |  | 20.95   | (mg/s) |
|                            |   |          | Low Flo | w      |  |  | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 1.66    | (mg/s) |  |  | 46.33   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 12.36   | (mg/s) |  |  | 301.85  | (mg/s) |
|                            |   | -        | Low Flo | w      |  |  | High Fl | ow     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.068   | (mg/L) |  |  | 0.011   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.069   | (mg/L) |  |  | 0.012   | (mg/L) |

| Case<br>Parameter | Year 9<br>Beryllium   |          |            |        |
|-------------------|---|----------|------------|--------|
|                   |   |          |            |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0001     | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0001     | (mg/L) |
| , då              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001     | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00056357 | (mg/L) |
| cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0          | (mg/L) |
| cou               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075    | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =  | 0.000023   | (mg/L) |
| lnp               | concentration of ground water into PM-13                        | C_g13 =  | 0.000023   | (mg/L) |

|                             |   |          | Low Flo | w      |  |  | High Fl | ow     |
|-----------------------------|---|----------|---------|--------|--|--|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |  |  | 0       | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) |  |  | 0.00    | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |  |  | 0.00    | (mg/s) |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |  |  | 2       | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) |  |  | 0.00    | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |  |  | 0.01    | (mg/s) |
| ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) |  |  | 0.08    | (mg/s) |
| n ve<br>ma:                 | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -       | (mg/s) |  |  | -       | (mg/s) |
| ទ ប្                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) |  |  | 0.17    | (mg/s) |
|                             |   |          | Low Flo | w      |  |  | High Fl | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) |  |  | 0.41    | (mg/s) |
| Mass bi<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.03    | (mg/s) |  |  | 2.66    | (mg/s) |
|                             |   |          | Low Flo | w      |  |  | High Fl | ow     |
| t mass<br>ntration          | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) |  |  | 0.000   | (mg/L) |
| Conver<br>flux to<br>concer | concentration in river at PM-13                             | C r13 =  | 0.000   | (mg/L) |  |  | 0.000   | (mg/L) |

| Case      | Year 9  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Calcium   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 13          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 13          | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 13          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 95.35       | (mg/L) |
| tra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 75.53238205 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 416         | (mg/L) |
| co        | concentration in tailings basin cell 2W                         |          | 59.78       | (mg/L) |
| int       | concentration of ground water into PM-12                        | C_g12 =  | 19          | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 19          | (mg/L) |

|                             |   |          | Low Flo  | w      |  | High Fl    | ow     |
|-----------------------------|---|----------|----------|--------|--|------------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  | 52,669     | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) |  | 462.42     | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  | 121.41     | (mg/s) |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  | 258,461    | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) |  | 2,263.72   | (mg/s) |
| nos                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  | 5,369.83   | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,020.37 | (mg/s) |  | 11,239.50  | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 156.22   | (mg/s) |  | 156.22     | (mg/s) |
| ۹<br>۵                      | mass flux in seepage from cell 2W                           | M_s2w =  | 1,222.55 | (mg/s) |  | 22.45      | (mg/s) |
|                             |   |          | Low Flo  | w      |  | High Fl    | ow     |
| alance<br>n node            | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) |  | 53,252.39  | (mg/s) |
| Mass b<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 5,125.29 | (mg/s) |  | 330,764.89 | (mg/s) |
|                             |   |          | Low Flo  | w      |  | High Fl    | ow     |
| 't mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) |  | 13.036     | (mg/l) |
| Conver<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 28.823   | (mg/L) |  | 13.491     | (mg/l) |

| Case      | Year 9  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Cadmium   |          |             |        |
| -         |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00008     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00008     | (mg/L) |
| ů p c     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000407879 | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage |          | 0.0004      | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188    | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0003      | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.0003      | (mg/L) |

|                              |   |          | Low Flo | W      |  |  | High Fl | ow     |
|------------------------------|---|----------|---------|--------|--|--|---------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |  |  | 0       | (mg/s) |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.01    | (mg/s) |  |  | 0.01    | (mg/s) |
| tion                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |  |  | 0.00    | (mg/s) |
| Itra                         | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |  |  | 2       | (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 0.04    | (mg/s) |  |  | 0.04    | (mg/s) |
| uo no                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |  |  | 0.01    | (mg/s) |
| sst                          | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) |  |  | 0.06    | (mg/s) |
| n ve<br>ma                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) |  |  | 0.00    | (mg/s) |
| ទ ប្                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) |  |  | 0.04    | (mg/s) |
|                              |   |          | Low Flo | w      |  |  | High Fl | ow     |
| alance<br>node               | mass flux in river at PM-12                                 | M_r12 =  | 0.01    | (mg/s) |  |  | 0.33    | (mg/s) |
| Mass b:<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 0.05    | (mg/s) |  |  | 2.07    | (mg/s) |
|                              |   |          | Low Flo | w      |  |  | High Fl | ow     |
| rt mass<br>ntration          | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) |  |  | 0.000   | (mg/L) |
| Conver<br>filux to<br>concer | concentration in river at PM-13                             | C r13 =  | 0.000   | (mg/L) |  |  | 0.000   | (mg/L) |

| Case       | Year 9  |          |          |        |
|------------|---|----------|----------|--------|
| Parameter  | Chloride  |          |          |        |
|            |   | -        | -        |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.89E+00 | (mg/L) |
| ICE        | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| co         | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| t          | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| du du      | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                             |   |          | Low Flo  | w      |  | High Fl    | low    |
|-----------------------------|---|----------|----------|--------|--|------------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  | 40,514     | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 43.81    | (mg/s) |  | 43.81      | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  | 93.39      | (mg/s) |
| ıtra                        | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  | 198,816    | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 214.46   | (mg/s) |  | 214.46     | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  | 335.09     | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 79.55    | (mg/s) |  | 876.22     | (mg/s) |
| mas                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 660.93   | (mg/s) |  | 660.93     | (mg/s) |
| <u>ې</u> د ک                | mass flux in seepage from cell 2W                           | M_s2w =  | 440.51   | (mg/s) |  | 4,852.27   | (mg/s) |
|                             |   |          | Low Flo  | w      |  | High Fl    | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 43.81    | (mg/s) |  | 40,651.48  | (mg/s) |
| Mass be<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 1,439.26 | (mg/s) |  | 246,406.43 | (mg/s) |
|                             |   |          | Low Flo  | w      |  | High Fl    | low    |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 1.800    | (mg/L) |  | 9.951      | (mg/L) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 8.094    | (mg/L) |  | 10.051     | (mg/L) |

| Case<br>Parameter | Year 9<br>Cobalt  |          |             |        |
|-------------------|---|----------|-------------|--------|
| R                 |   | 4        |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0006      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.002481389 | (mg/L) |
| Icer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| or t              | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|                            |   |          | Low Flow |        |  |  | High Flow    |
|----------------------------|---|----------|----------|--------|--|--|--------------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  |  | 2 (mg/s)     |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.03     | (mg/s) |  |  | 0.03 (mg/s)  |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  |  | 0.01 (mg/s)  |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  |  | 12 (mg/s)    |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.13     | (mg/s) |  |  | 0.13 (mg/s)  |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  |  | 0.03 (mg/s)  |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.03     | (mg/s) |  |  | 0.37 (mg/s)  |
| mas                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) |  |  | 0.00 (mg/s)  |
| ۹ <sup>۵</sup>             | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03     | (mg/s) |  |  | 0.35 (mg/s)  |
|                            |   |          | Low Flo  | w      |  |  | High Flow    |
| alance                     | mass flux in river at PM-12                                 | M_r12 =  | 0.03     | (mg/s) |  |  | 2.46 (mg/s)  |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.23     | (mg/s) |  |  | 15.28 (mg/s) |
|                            |   |          | Low Flo  | w      |  |  | High Flow    |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.001    | (mg/L) |  |  | 0.001 (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.001    | (mg/L) |  |  | 0.001 (mg/L) |

| Case       | Year 9  |          |             |        |
|------------|---|----------|-------------|--------|
| Parameter  | Copper  |          |             |        |
|            |   | -        |             |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| ıtra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.008625606 | (mg/L) |
| Cer        | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| Con        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| it .       | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| 브          | concentration of ground water into PM-13                        | C_g13 =  | 0.004       | (mg/L) |

|                             |   |          | Low Flow |        |  |  | High Flow    |
|-----------------------------|---|----------|----------|--------|--|--|--------------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  |  | 6 (mg/s)     |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.10     | (mg/s) |  |  | 0.10 (mg/s)  |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  |  | 0.01 (mg/s)  |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  |  | 30 (mg/s)    |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.48     | (mg/s) |  |  | 0.48 (mg/s)  |
|                             | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  |  | 0.19 (mg/s)  |
| ert o<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.12     | (mg/s) |  |  | 1.28 (mg/s)  |
| mas                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) |  |  | 0.00 (mg/s)  |
| ទ ប្                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.09     | (mg/s) |  |  | 1.03 (mg/s)  |
|                             |   |          | Low Flo  | w      |  |  | High Flow    |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.10     | (mg/s) |  |  | 6.19 (mg/s)  |
| Mass b<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 0.78     | (mg/s) |  |  | 38.99 (mg/s) |
|                             |   |          | Low Flo  | w      |  |  | High Flow    |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 0.004    | (mg/L) |  |  | 0.002 (mg/L) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C r13 =  | 0.004    | (mq/L) |  |  | 0.002 (mg/L) |

| Case<br>Parameter | Year 9<br>Fluoride  |          |          |        |
|-------------------|---|----------|----------|--------|
|                   |   | 4        |          |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| , då              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.91E-01 | (mg/L) |
| cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| t                 | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| dul               | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|                            |   | Low Flow |          |        |  | High Fl | ow       |        |
|----------------------------|---|----------|----------|--------|--|---------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  |         | 405      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 9.37     | (mg/s) |  |         | 9.37     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  |         | 0.93     | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  |         | 1,988    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 45.87    | (mg/s) |  |         | 45.87    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  |         | 7.04     | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 9.34     | (mg/s) |  |         | 102.84   | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 1.07     | (mg/s) |  |         | 1.07     | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 31.70    | (mg/s) |  |         | 349.17   | (mg/s) |
|                            |   |          | Low Flow |        |  |         | High Fl  | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 9.37     | (mg/s) |  |         | 415.45   | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 97.35    | (mg/s) |  |         | 2,909.59 | (mg/s) |
|                            |   |          | Low Flo  | w      |  |         | High Fl  | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.385    | (mg/L) |  |         | 0.102    | (mg/L) |
| Conv<br>flux to<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.547    | (mg/L) |  |         | 0.119    | (mg/L) |

| Case      | Year 9  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Iron  |          |             |        |
| -         |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.91E-02    | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                             |   |          | Low Flo  | w      |  |  | High Fl   | ow     |
|-----------------------------|---|----------|----------|--------|--|--|-----------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  |  | 11,749    | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.85     | (mg/s) |  |  | 0.85      | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  |  | 27.08     | (mg/s) |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  |  | 57,657    | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 4.17     | (mg/s) |  |  | 4.17      | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  |  | 2.13      | (mg/s) |
| sste                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.80     | (mg/s) |  |  | 8.80      | (mg/s) |
| n ve<br>ma                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.15     | (mg/s) |  |  | 0.15      | (mg/s) |
| ຊ ິບ                        | mass flux in seepage from cell 2W                           | M_s2w =  | 93.95    | (mg/s) |  |  | 1,034.88  | (mg/s) |
|                             |   |          | Low Flow |        |  |  | High Fl   | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.85     | (mg/s) |  |  | 11,777.08 | (mg/s) |
| Mass b<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 99.92    | (mg/s) |  |  | 70,483.84 | (mg/s) |
|                             |   |          | Low Flo  | w      |  |  | High Fl   | ow     |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 0.035    | (mg/L) |  |  | 2.883     | (mg/L) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C r13 =  | 0.562    | (mg/L) |  |  | 2.875     | (mg/L) |

| Case      | Year 9  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
|           | -   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| , p d     | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 2.56E+02    | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| du l      | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|  |   |          | Low Flow  |        |  |   | High Flow             |
|--|---|----------|-----------|--------|--|---|-----------------------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) |  |   | 283,600 (mg/s)        |
| _                                      | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) |  |   | 2,129.58 (mg/s)       |
| tio                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) |  |   | 653.73 (mg/s)         |
| itrai                                  | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) |  |   | 1,391,712 (mg/s)      |
| cen                                    | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) |  |   | 10,425.01 (mg/s)      |
| u Xn                                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) |  |   | 53,090.84 (mg/s)      |
| ert e<br>ss f                          | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,453.69  | (mg/s) |  |   | 38,042.63 (mg/s)      |
| ma en a                                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 3,233.31  | (mg/s) |  |   | 3,233.31 (mg/s)       |
| ទ ប័                                   | mass flux in seepage from cell 2W                           | M_s2w =  | 8,928.86  | (mg/s) |  |   | 98,352.01 (mg/s)      |
|  |   |          | Low Flo   | w      |  |   | High Flow             |
| s balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) |  |   | <br>286,383.27 (mg/s) |
| Mas<br>at ea                           | mass flux in river at PM-13                                 | M r13 =  | 28 170 45 | (ma/s) |  |   | 1 881 239 00 (mg/s)   |
|  |   | 1        | Low Flo   | w      |  | I | High Flow             |
| convert mass<br>lux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) |  |   | 70.104 (mg/L)         |
| 0 ₽ S                                  | concentration in river at Pivi-13                           | C_F13 =  | 158.424   | (mg/L) |  |   | 76.733 (mg/L)         |

| Case      | Year 9  |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   | 1        |       |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 7.04  | (mg/L) |
| Icel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|  |   | Low Flow |         |          |  | High Fl | low       |          |
|--|---|----------|---------|----------|--|---------|-----------|----------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)   |  |         | 14,990    | (mg/s)   |
| _                                      | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s)   |  |         | 38.94     | (mg/s)   |
| tratior                                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.68    | (mg/s)   |  |         | 0.68      | (mg/s)   |
|  | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)   |  |         | 73,562    | (mg/s)   |
| cen                                    | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s)   |  |         | 190.63    | (mg/s)   |
| uo: Xn                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)   |  |         | 34.55     | (mg/s)   |
| ert o<br>ss f                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)   |  |         | 3,029.85  | (mg/s)   |
| n ve<br>ma:                            | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 95.16   | (mg/s)   |  |         | 1,048.24  | (mg/s)   |
| <u>و</u> د ک                           | mass flux in seepage from cell 2W                           | M_s2w =  | 158.90  | (mg/s)   |  |         | 1,750.33  | (mg/s)   |
|  |   |          | Low Flo | w        |  |         | High Fl   | low      |
| s balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 39.62   | (mg/s)   |  |         | 15,029.90 | (mg/s)   |
| Mas<br>at ea                           | mass flux in river at PM-13                                 | M r13 =  | 484 31  | (ma/s)   |  |         | 94 645 42 | (ma/s)   |
|  |   |          | Low Flo | w        |  |         | High Fl   | low      |
| convert mass<br>lux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 1.628   | (mg/L)   |  |         | 3.679     | (mg/l)   |
|  |   | 0 113 -  | 2.724   | (IIIg/L) |  | 1       | 3.860     | (1119/1) |

| Case       | Year 9  |          |        |        |
|------------|---|----------|--------|--------|
| Parameter  | Magnesium   |          |        |        |
| -          |   | -        |        |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 16.28  | (mg/L) |
| ICel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| co         | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| nt         | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| du du      | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|                                      |   | Low Flow |          |        |  |  | High Fl | ow         |        |
|--------------------------------------|---|----------|----------|--------|--|--|---------|------------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  |  |         | 24,309     | (mg/s) |
| tration                              | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s) |  |  |         | 259.20     | (mg/s) |
|                                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  |  |         | 56.03      | (mg/s) |
|                                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  |  |         | 119,290    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s) |  |  |         | 1,268.87   | (mg/s) |
| u xn                                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  |  |         | 15,261.91  | (mg/s) |
| ert o<br>Ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 219.96   | (mg/s) |  |  |         | 2,422.93   | (mg/s) |
| n ve<br>mas                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 79.99    | (mg/s) |  |  |         | 79.99      | (mg/s) |
| ទ បំ                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 1,430.95 | (mg/s) |  |  |         | 15,762.00  | (mg/s) |
|                                      |   |          | Low Flo  | w      |  |  |         | High Fl    | ow     |
| ss balance<br>ach node               | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s) |  |  |         | 24,623.80  | (mg/s) |
| Mas<br>at e                          | mass flux in river at PM-13                                 | M r13 =  | 3,258.97 | (mg/s) |  |  |         | 178,709.09 | (mq/s) |
|                                      |   |          | Low Flo  | W      |  |  |         | High Fl    | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L) |  |  |         | 6.028      | (mg/l) |
| č≓č                                  | concentration in river at PM-13                             | C_r13 =  | 18.328   | (mg/L) |  |  |         | 7.289      | (mg/l) |

| Case      | Year 9  |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
|           |   | -        |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| р<br>р    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.29 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                                       |   |          | Low Flo | w      |  |  | High Fl  | ow     |
|---------------------------------------|---|----------|---------|--------|--|--|----------|--------|
|                                       | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |  |  | 1,215    | (mg/s) |
| tion                                  | mass flux of ground water into PM-12                        | M_g12 =  | 4.58    | (mg/s) |  |  | 4.58     | (mg/s) |
|                                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |  |  | 2.80     | (mg/s) |
| itra                                  | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |  |  | 5,964    | (mg/s) |
| cen                                   | mass flux of ground water into PM-13                        | M_g13 =  | 22.40   | (mg/s) |  |  | 22.40    | (mg/s) |
| u s n                                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |  |  | 27.31    | (mg/s) |
| ert e<br>ss f                         | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3.90    | (mg/s) |  |  | 42.96    | (mg/s) |
| ma:<br>ma:                            | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) |  |  | 0.00     | (mg/s) |
| ទ ប័                                  | mass flux in seepage from cell 2W                           | M_s2w =  | 24.19   | (mg/s) |  |  | 266.49   | (mg/s) |
|                                       |   |          | Low Flo | w      |  |  | High Fl  | ow     |
| is balance<br>ach node                | mass flux in river at PM-12                                 | M_r12 =  | 4.58    | (mg/s) |  |  | 1,222.81 | (mg/s) |
| Mas<br>ate                            | mass flux in river at PM-13                                 | M r13 =  | 55.07   | (ma/s) |  |  | 7.546.45 | (ma/s) |
|                                       |   |          | Low Flo | w      |  |  | High Fl  | ow     |
| convert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.188   | (mg/L) |  |  | 0.299    | (mg/l) |
| 0 = 0                                 | concentration in river at PM-13                             | C_r13 =  | 0.310   | (mg/L) |  |  | 0.308    | (mg/l) |

| Case      | Year 9  |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Sodium  |          |        |        |
|           |   |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| tra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 22.11  | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|                               |   |          | Low Flo  | w      |  |  | High Fl    | ow     |
|-------------------------------|---|----------|----------|--------|--|--|------------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  |  | 14,180     | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) |  |  | 119.26     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  |  | 32.69      | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  |  | 69,586     | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) |  |  | 583.80     | (mg/s) |
| uo:                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  |  | 6,729.88   | (mg/s) |
| ert o<br>Ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 298.66   | (mg/s) |  |  | 3,289.71   | (mg/s) |
| ma                            | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 95.76    | (mg/s) |  |  | 95.76      | (mg/s) |
| ទ ប័ ខ                        | mass flux in seepage from cell 2W                           | M_s2w =  | 906.18   | (mg/s) |  |  | 9,981.63   | (mg/s) |
|                               |   |          | Low Flo  | w      |  |  | High Fl    | ow     |
| alance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) |  |  | 14,331.94  | (mg/s) |
| Mass ba<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 2,003.65 | (mg/s) |  |  | 104,598.32 | (mg/s) |
|                               |   |          | Low Flo  | w      |  |  | High Fl    | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) |  |  | 3.508      | (mg/l) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 11.268   | (mg/L) |  |  | 4.266      | (mg/l) |

| Case<br>Parameter | Year 9<br>Nickel  |          |             |        |
|-------------------|---|----------|-------------|--------|
| r urumotor        | monor   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| u dá              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.041162911 | (mg/L) |
| Icer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|                            |   |          | Low Flow |        |  |  | High Flow    |   |
|----------------------------|---|----------|----------|--------|--|--|--------------|---|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  |  | 5 (mg/s)     | ) |
| tion                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.17     | (mg/s) |  |  | 0.17 (mg/s)  | ) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  |  | 0.01 (mg/s)  | ) |
| itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  |  | 24 (mg/s)    | ) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.83     | (mg/s) |  |  | 0.83 (mg/s)  | ) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  |  | 0.29 (mg/s)  | ) |
| ssfo                       | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.56     | (mg/s) |  |  | 6.13 (mg/s)  | 1 |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.04     | (mg/s) |  |  | 0.04 (mg/s)  | ) |
| ទ ប្                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.14     | (mg/s) |  |  | 1.55 (mg/s)  | ) |
|                            |   |          | Low Flo  | w      |  |  | High Flow    |   |
| alance                     | mass flux in river at PM-12                                 | M_r12 =  | 0.17     | (mg/s) |  |  | 5.04 (mg/s)  | , |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 1.74     | (mg/s) |  |  | 37.74 (mg/s) | , |
|                            |   |          | Low Flo  | w      |  |  | High Flow    |   |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.007    | (mg/L) |  |  | 0.001 (mg/L) | ) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.010    | (mg/L) |  |  | 0.002 (mg/L) | ) |

| Case  | Year 9  |          |             |        |
|---|---|----------|-------------|--------|
| Parameter   | Lead  |          |             |        |
|   |   | -        | -           |        |
|   | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| ata   | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| ů provenské | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio   | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| ntra  | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001749429 | (mg/L) |
| cei   | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| co  | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| t   | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| du du   | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                             |   |          | Low Flo | W      |  |  | High Fl | low    |
|-----------------------------|---|----------|---------|--------|--|--|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |  |  | -       | (mg/s) |
| tration                     | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) |  |  | 0.03    | (mg/s) |
|                             | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |  |  | -       | (mg/s) |
|                             | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |  |  | -       | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s) |  |  | 0.14    | (mg/s) |
| u con                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |  |  | 0.02    | (mg/s) |
| ssf                         | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) |  |  | 0.26    | (mg/s) |
| n ve<br>ma                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) |  |  | 0.00    | (mg/s) |
| <u>د</u> د                  | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) |  |  | 0.27    | (mg/s) |
|                             |   |          | Low Flo | w      |  |  | High Fl | ow     |
| balance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) |  |  | 0.03    | (mg/s) |
| Mass                        | mass flux in river at PM-13                                 | M_r13 =  | 0.22    | (mg/s) |  |  | 0.72    | (mg/s) |
|                             | -   |          | Low Flo | w      |  |  | High Fl | low    |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) |  |  | 0.000   | (mg/L) |
| Conver<br>flux to<br>concer | concentration in river at PM-13                             | C r13 =  | 0.001   | (mg/L) |  |  | 0.000   | (mg/L) |

| Case      | Year 9  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| , da      | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 8.83E-03 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                              |   |          | Low Flow |        |  |  | High Flow    |
|------------------------------|---|----------|----------|--------|--|--|--------------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |  |  | 0 (mg/s)     |
| tion                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.04     | (mg/s) |  |  | 0.04 (mg/s)  |
|                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |  |  | 0.00 (mg/s)  |
| itrai                        | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |  |  | 0 (mg/s)     |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 0.18     | (mg/s) |  |  | 0.18 (mg/s)  |
| u xn                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |  |  | 0.01 (mg/s)  |
| ssfo                         | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.12     | (mg/s) |  |  | 1.31 (mg/s)  |
| mas                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) |  |  | 0.00 (mg/s)  |
| ទ ប្                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01     | (mg/s) |  |  | 0.06 (mg/s)  |
|                              |   |          | Low Flo  | w      |  |  | High Flow    |
| alance<br>node               | mass flux in river at PM-12                                 | M_r12 =  | 0.04     | (mg/s) |  |  | 0.12 (mg/s)  |
| Mass b<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 0.34     | (mg/s) |  |  | 2.08 (mg/s)  |
|                              |   |          | Low Flo  | w      |  |  | High Flow    |
| rt mass<br>ntration          | concentration in river at PM-12                             | C_r12 =  | 0.002    | (mg/L) |  |  | 0.000 (mg/L) |
| Convei<br>filux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.002    | (mg/L) |  |  | 0.000 (mg/L) |
| Case      | Year 9  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Selenium  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001403839 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                            |   |          | Low Flo | w      |  | High Flow    |
|----------------------------|---|----------|---------|--------|--|--------------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |  | 1 (mg/s)     |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) |  | 0.07 (mg/s)  |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |  | 0.00 (mg/s)  |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |  | 6 (mg/s)     |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.35    | (mg/s) |  | 0.35 (mg/s)  |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |  | 0.09 (mg/s)  |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) |  | 0.21 (mg/s)  |
| n ve<br>mas                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.02    | (mg/s) |  | 0.02 (mg/s)  |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) |  | 0.25 (mg/s)  |
|                            |   |          | Low Flo | w      |  | High Flow    |
| oalance<br>1 node          | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) |  | 1.29 (mg/s)  |
| Mass k<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.48    | (mg/s) |  | 8.17 (mg/s)  |
|                            |   | -        | Low Flo | w      |  | High Flow    |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) |  | 0.000 (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) |  | 0.000 (mg/L) |

| Case      | Year 9  |          |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
| -         |   | -        |         |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| , pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 166.62  | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                                      |   |          | Low Flo  | w      |      | High Flow         |
|--------------------------------------|---|----------|----------|--------|------|-------------------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |      | 16,206 (mg/s)     |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 206.87   | (mg/s) |      | 206.87 (mg/s)     |
| tio                                  | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |      | 37.36 (mg/s)      |
| itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |      | 79,526 (mg/s)     |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72 | (mg/s) |      | 1,012.72 (mg/s)   |
| u xn                                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |      | 58,922.60 (mg/s)  |
| ssfo                                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2,250.82 | (mg/s) |      | 24,792.97 (mg/s)  |
| n ve<br>ma:                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 2,759.02 | (mg/s) |      | 2,759.02 (mg/s)   |
| <u>ع</u> ک                           | mass flux in seepage from cell 2W                           | M_s2w =  | 3,116.72 | (mg/s) |      | 34,330.84 (mg/s)  |
|                                      |   |          | Low Flo  | w      |      | High Flow         |
| ss balance<br>sach node              | mass flux in river at PM-12                                 | M_r12 =  | 206.87   | (mg/s) | <br> | 16,449.94 (mg/s)  |
| Ma:<br>ate                           | mass flux in river at PM-13                                 | M_r13 =  | 9,346.14 | (mg/s) |      | 217,794.48 (mg/s) |
|                                      |   |          | Low Flo  | w      |      | High Flow         |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 8.500    | (mg/L) |      | 4.027 (mg/l)      |
| ర≓ర                                  | concentration in river at PM-13                             | C_r13 =  | 52.561   | (mg/L) |      | 8.884 (mg/l)      |

| Case      | Year 9  |             |             |        |
|-----------|---|-------------|-------------|--------|
| Parameter | Ihallium  | l           |             |        |
|           | concentration of surface water into PM-12                       | C s12 =     | 0.0002      | (mg/L) |
| ita       | concentration of surface water into PM-13                       | <br>C_s13 = | 0.0002      | (mg/L) |
| n da      | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.0002      | (mg/L) |
| tion      | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.0006      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 0.000967503 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 0.0002      | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =     | 0.0002      | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =     | 0.000004    | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =     | 0.000004    | (mg/L) |

|                                      |   |          | Low Flo | w      |  |  | High Flow  | /     |
|--------------------------------------|---|----------|---------|--------|--|--|------------|-------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |  |  | 1 (m       | ng/s) |
| -                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) |  |  | 0.00 (m    | ng/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |  |  | 0.00 (m    | ng/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |  |  | 4 (m       | ng/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) |  |  | 0.00 (m    | ng/s) |
| nos                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |  |  | 0.03 (m    | ng/s) |
| ert o<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) |  |  | 0.14 (m    | ng/s) |
| mas                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) |  |  | 0.00 (m    | ng/s) |
| ຊ ິວ                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) |  |  | 0.05 (m    | ng/s) |
|                                      |   |          | Low Flo | w      |  |  | High Flow  | 1     |
| lass balance<br>t each node          | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) |  |  | 0.81 (m    | ng/s) |
| a ≤                                  | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) |  |  | 5.01 (m    | ng/s) |
|                                      |   |          | LOW FID | vv     |  |  | Tight Flow |       |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) |  |  | 0.000 (m   | ng/L) |
| ŬĘŏ                                  | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) |  |  | 0.000 (m   | ng/L) |

| Case      | Year 9  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Zinc  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
| ů pů      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.039738069 | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| t         | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.0115      | (mg/L) |

|                            |   |          | Low Flo | w      |  |  | High Fl | ow     |
|----------------------------|---|----------|---------|--------|--|--|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |  |  | 65      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) |  |  | 0.28    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |  |  | 0.15    | (mg/s) |
| itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |  |  | 318     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) |  |  | 1.37    | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |  |  | 0.17    | (mg/s) |
| ssfo                       | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.54    | (mg/s) |  |  | 5.91    | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) |  |  | 0.00    | (mg/s) |
| ទ ប្                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.29    | (mg/s) |  |  | 3.23    | (mg/s) |
|                            |   |          | Low Flo | w      |  |  | High Fl | ow     |
| alance                     | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) |  |  | 65.25   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 2.48    | (mg/s) |  |  | 394.05  | (mg/s) |
|                            |   |          | Low Flo | w      |  |  | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) |  |  | 0.016   | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.014   | (mg/L) |  |  | 0.016   | (mg/L) |

Appendix F.5 Embarrass River Proposed Action Year 15

#### FLOWS

| Case             | Year 15  |            |      |       |       |
|------------------|--|------------|------|-------|-------|
| Flows            | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| in<br>s River    | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| flow<br>rras:    | flow in river at PM-13                         | Q_r13_L =  | 6.29 | (cfs) | PM-13 |
| Total 1<br>Embaı | flow check                                     | Q_ck_L =   | 6.29 | (cfs) | _     |
|                  | surface water flow into PM-12                  | Q_s12_L =  | 0.00 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| Ita              | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.50 | (cfs) | PM-13 |
| v da             | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.02 | (cfs) | PM-13 |
| flov             | seepage from cell 2W                           | Q_s2w_L =  | 0.70 | (cfs) | PM-13 |
| out              | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| Ing              | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case                | Year 15  |            |       |       |       |
|---------------------|--|------------|-------|-------|-------|
| Flow                | Average Flow Conditions (mean annual)          |            |       |       |       |
| River               | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| flow in<br>arrass F | flow in river at PM-13                         | Q_r13_M =  | 95.15 | (cfs) | PM-13 |
| Total<br>Embi       | flow check                                     | Q_ck_M =   | 95.15 | (cfs) | 4     |
|                     | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|                     | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                     | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                     | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ta                  | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 5.65  | (cfs) | PM-13 |
| , da                | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.02  | (cfs) | PM-13 |
| <u>o</u> l          | seepage from cell 2W                           | Q_s2w_M =  | 7.96  | (cfs) | PM-13 |
| rt 1                | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| au                  | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case              | Year 15   |            |        |       |       |
|-------------------|---|------------|--------|-------|-------|
| Flow              | High Flow Conditions (avg. annual 1-day max flow) |            |        |       | _     |
| ן<br>River        | flow in river at PM-12                            | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow in<br>arrass | flow in river at PM-13                            | Q_r13_H =  | 866.70 | (cfs) | PM-13 |
| Total<br>Emba     | flow check  | Q_ck_H =   | 866.70 | (cfs) |       |
|                   | surface water flow into PM-12                     | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                   | surface water flow into PM-13                     | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                   | Babbitt WWTP discharge                            | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                   | Area 5 Pit NW discharge                           | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta                | seepage from Tailings Basin Cells 1E and 2E       | Q_fs_H =   | 5.65   | (cfs) | PM-13 |
| / da              | hydrometallurgical residue cells liner leakage    | Q_rrs_H =  | 0.02   | (cfs) | PM-13 |
| lo v              | seepage from cell 2W                              | Q_s2w_H =  | 7.96   | (cfs) | PM-13 |
| t t               | ground water flow into PM-12                      | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| du                | ground water flow into PM-13                      | Q g13 H =  | 4.21   | (cfs) | PM-13 |

#### Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Silver  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| n data    | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
|           | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00122  | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| u du      | concentration of ground water into PM-13                        | C_g13 =  | 0.000000 | (mg/L) |

|  |   | Low Flow                      |                                   | Average                         | Flow                    | High Flow                          |                         |                                  |
|--|---|-------------------------------|-----------------------------------|---------------------------------|-------------------------|------------------------------------|-------------------------|----------------------------------|
|  | mass flux of surface water into PM-12   | M_s12 =                       | -                                 | (mg/s)                          | 0.04                    | (mg/s)                             | 0                       | (mg/s)                           |
| _                                      | mass flux of ground water into PM-12  | M_g12 =                       | 0.00                              | (mg/s)                          | 0.00                    | (mg/s)                             | 0.00                    | (mg/s)                           |
| tion                                   | mass flux in Babbitt WWTP discharge   | M_sBab =                      | -                                 | (mg/s)                          | 0.00                    | (mg/s)                             | 0.00                    | (mg/s)                           |
| Itra                                   | mass flux of surface water into PM-13   | M_s13 =                       | -                                 | (mg/s)                          | 0.19                    | (mg/s)                             | 2                       | (mg/s)                           |
| concer<br>flux                         | mass flux of ground water into PM-13  | M_g13 =                       | -                                 | (mg/s)                          | -                       | (mg/s)                             | -                       | (mg/s)                           |
|  | mass flux of Area 5 Pit NW discharge  | M_spit =                      | -                                 | (mg/s)                          | 0.01                    | (mg/s)                             | 0.01                    | (mg/s)                           |
| ert o<br>ss f                          | mass flux in seepage from Tailings Basin Cells 1E and 2E                                      | M_fs =                        | 0.02                              | (mg/s)                          | 0.19                    | (mg/s)                             | 0.19                    | (mg/s)                           |
| n ve<br>ma:                            | mass flux in hydrometallurgical residue cells liner leakage                                   | M_rrs =                       | 0.00                              | (mg/s)                          | 0.00                    | (mg/s)                             | 0.00                    | (mg/s)                           |
| t S                                    | mass flux in seepage from cell 2W   | M_s2w =                       | 0.00                              | (mg/s)                          | 0.02                    | (mg/s)                             | 0.02                    | (mg/s)                           |
|  |   |                               | Low Flow                          |                                 | Average                 | Average Flow                       |                         | ow                               |
| e c                                    |   |                               |                                   |                                 |                         |                                    |                         |                                  |
| alan                                   | mass flux in river at PM-12   | M_r12 =                       | 0.00                              | (mg/s)                          | 0.04                    | (mg/s)                             | 0.45                    | (mg/s)                           |
| Mass balan<br>at each noc              | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 0.00                              | (mg/s)<br>(mg/s)                | 0.04                    | (mg/s)<br>(mg/s)                   | 0.45                    | (mg/s)<br>(mg/s)                 |
| Mass balan<br>at each noc              | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 0.00<br>0.02<br>Low Flor          | (mg/s)<br>(mg/s)                | 0.04<br>0.46<br>Average | (mg/s)<br>(mg/s)<br>Flow           | 0.45<br>2.86<br>High Fl | (mg/s)<br>(mg/s)<br><b>ow</b>    |
| vert mass Mass balan<br>to at each noc | mass flux in river at PM-12<br>mass flux in river at PM-13<br>concentration in river at PM-12 | M_r12 =<br>M_r13 =<br>C_r12 = | 0.00<br>0.02<br>Low Flor<br>0.000 | (mg/s)<br>(mg/s)<br>w<br>(mg/L) | 0.04<br>0.46<br>Average | (mg/s)<br>(mg/s)<br>Flow<br>(mg/L) | 0.45<br>2.86<br>High Fl | (mg/s)<br>(mg/s)<br>ow<br>(mg/L) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |  |          |        |
|-----------|---|--|----------|--------|
| Parameter | Aluminum  |  |          |        |
|           | concentration of ourfeed water into DM 12                       | C a12 -  | 0.1      | (mg/l) |
| ta        | concentration of surface water into PM-12                       | $C_{s12} = C_{s13} = C_{s$ | 0.1      | (mg/L) |
| n da      | concentration in Babbitt WWTP discharge                         | C_sBab =   | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit =   | 0.01325  | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 4.43E-01 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| Con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0        | (mg/L) |

|                                |   |          | Low Flo  | w      | Average      | Flow   |           | High Fl  | ow     |
|--------------------------------|---|----------|----------|--------|--------------|--------|-----------|----------|--------|
|                                | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 35.69        | (mg/s) |           | 405      | (mg/s) |
| _                              | mass flux of ground water into PM-12                        | M_g12 =  | 0.61     | (mg/s) | 0.61         | (mg/s) |           | 0.61     | (mg/s) |
| tion                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.93         | (mg/s) |           | 0.93     | (mg/s) |
| itra                           | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 174.13       | (mg/s) |           | 1,988    | (mg/s) |
| cen                            | mass flux of ground water into PM-13                        | M_g13 =  | -        | (mg/s) | -            | (mg/s) |           | -        | (mg/s) |
| con                            | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.75         | (mg/s) |           | 0.75     | (mg/s) |
| ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 6.25     | (mg/s) | 70.86        | (mg/s) |           | 70.86    | (mg/s) |
| n ve<br>ma:                    | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.09     | (mg/s) | 0.09         | (mg/s) |           | 0.09     | (mg/s) |
| န ပိ                           | mass flux in seepage from cell 2W                           | M_s2w =  | 31.37    | (mg/s) | 355.65       | (mg/s) |           | 355.65   | (mg/s) |
|                                |   |          | Low Flow |        | Average Flow |        | High Flow |          | ow     |
| lance<br>node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.61     | (mg/s) | 37.23        | (mg/s) |           | 406.69   | (mg/s) |
| Mass ba<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 38.31    | (mg/s) | 638.71       | (mg/s) |           | 2,822.19 | (mg/s) |
|                                |   |          | Low Flo  | w      | Average      | Flow   |           | High Fl  | ow     |
| ss                             |   |          |          |        |              |        |           |          |        |
| onvert ma<br>x to<br>ncentrati | concentration in river at PM-12                             | C_r12 =  | 0.025    | (mg/L) | <br>0.095    | (mg/L) |           | 0.100    | (mg/L) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Arsenic   |          |             |        |
|           |   | -        |             | r      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00075     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00075     | (mg/L) |
| ų<br>r    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00075     | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.001325    | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.015514819 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00291     | (mg/L) |
| but       | concentration of ground water into PM-12                        | C_g12 =  | 0.00273     | (mg/L) |
| dul       | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|                                      |   | Low Flow |          | Average Flow |         | High Flo |           | W        |        |
|--------------------------------------|---|----------|----------|--------------|---------|----------|-----------|----------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s)       | 0.27    | (mg/s)   |           | 3 (      | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.07     | (mg/s)       | 0.07    | (mg/s)   |           | 0.07     | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s)       | 0.01    | (mg/s)   |           | 0.01 (   | (mg/s) |
| ntra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s)       | 1.31    | (mg/s)   |           | 15 (     | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | -        | (mg/s)       | -       | (mg/s)   |           | - (      | (mg/s) |
| ert con<br>iss flux                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s)       | 0.07    | (mg/s)   |           | 0.07     | (mg/s) |
|                                      | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.22     | (mg/s)       | 2.48    | (mg/s)   |           | 2.48     | (mg/s) |
| nve<br>mas                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s)       | 0.00    | (mg/s)   |           | 0.00     | (mg/s) |
| <u>د</u> ک                           | mass flux in seepage from cell 2W                           | M_s2w =  | 0.06     | (mg/s)       | 0.65    | (mg/s)   |           | 0.65 (   | (mg/s) |
|                                      |   |          | Low Flow |              | Average | Flow     | High Flow |          | W      |
| llance<br>node                       | mass flux in river at PM-12                                 | M_r12 =  | 0.07     | (mg/s)       | 0.34    | (mg/s)   |           | 3.11 (   | (mg/s) |
| Mass ba<br>at each                   | mass flux in river at PM-13                                 | M_r13 =  | 0.34     | (mg/s)       | 4.86    | (mg/s)   |           | 21.23 (  | mg/s)  |
|                                      |   |          | Low Flo  | W            | Average | Flow     |           | High Flo | W      |
| onvert mass<br>ix to<br>incentration | concentration in river at PM-12                             | C_r12 =  | 0.003    | (mg/L)       | 0.001   | (mg/L)   |           | 0.001 (  | (mg/L) |
| 0 3 0                                |   | 0.10     |          |              |         | / // ·   |           | 0.004    |        |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   | 1        |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Boron   |          |             |        |
|           | 1   | 1        |             | 1      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| n de      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.173169588 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| CO        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| u u       | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|                                       |   |             | 201110  | VV     | Avelage |        | HIGH FI | UW     |
|---------------------------------------|---|-------------|---------|--------|---------|--------|---------|--------|
| n                                     | nass flux of surface water into PM-12                       | M_s12 =     | -       | (mg/s) | 4.28    | (mg/s) | 49      | (mg/s) |
|                                       | nass flux of ground water into PM-12                        | M_g12 =     | 0.52    | (mg/s) | 0.52    | (mg/s) | 0.52    | (mg/s) |
| n tion                                | nass flux in Babbitt WWTP discharge                         | M_sBab =    | -       | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
| n trat                                | nass flux of surface water into PM-13                       | M_s13 =     | -       | (mg/s) | 20.90   | (mg/s) | 239     | (mg/s) |
| n ceu                                 | nass flux of ground water into PM-13                        | M_g13 =     | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| ü Xin                                 | nass flux of Area 5 Pit NW discharge                        | M_spit =    | -       | (mg/s) | 7.41    | (mg/s) | 7.41    | (mg/s) |
| n sur                                 | nass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =      | 2.44    | (mg/s) | 27.67   | (mg/s) | 27.67   | (mg/s) |
| n ve<br>mas                           | nass flux in hydrometallurgical residue cells liner leakage | M_rrs =     | 0.05    | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
| n 5 3                                 | nass flux in seepage from cell 2W                           | M_s2w =     | 6.56    | (mg/s) | 74.34   | (mg/s) | 74.34   | (mg/s) |
|                                       |   |             | Low Flo | w      | Average | Flow   | High Fl | ow     |
| lance<br>node                         | nass flux in river at PM-12                                 | M r12 =     | 0.52    | (mg/s) | 4.91    | (mg/s) | 49.25   | (mg/s) |
| Mass ba<br>at each                    | nass flux in river at PM-13                                 | <br>M_r13 = | 9.57    | (mg/s) | 135.28  | (mg/s) | 397.30  | (mg/s) |
|                                       |   |             | Low Flo | w      | Average | Flow   | High Fl | ow     |
| convert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =     | 0.021   | (mg/L) | 0.013   | (mg/L) | 0.012   | (mg/L) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Barium  |          |          |        |
|           |   | -        |          | 1      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.011    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| n de      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.35E-02 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| u u       | concentration of ground water into PM-13                        | C_g13 =  | 0        | (mg/L) |

|                      |   |          | Low Flo  | w      | Average | Flow         |  | High Flo  | w      |
|----------------------|---|----------|----------|--------|---------|--------------|--|-----------|--------|
|                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3.93    | (mg/s)       |  | 45        | (mg/s) |
| _                    | mass flux of ground water into PM-12                        | M_g12 =  | 1.66     | (mg/s) | 1.66    | (mg/s)       |  | 1.66      | (mg/s) |
| tion                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.10    | (mg/s)       |  | 0.10      | (mg/s) |
| itra                 | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 19.15   | (mg/s)       |  | 219       | (mg/s) |
| cen                  | mass flux of ground water into PM-13                        | M_g13 =  | -        | (mg/s) | -       | (mg/s)       |  | - (       | (mg/s) |
| con                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.25    | (mg/s)       |  | 0.25      | (mg/s) |
| ert o<br>Ss f        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.89     | (mg/s) | 10.14   | (mg/s)       |  | 10.14     | (mg/s) |
| n ve<br>ma:          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00    | (mg/s)       |  | 0.00      | (mg/s) |
| ຊ ິວ                 | mass flux in seepage from cell 2W                           | M_s2w =  | 1.85     | (mg/s) | 20.95   | (mg/s)       |  | 20.95     | (mg/s) |
|                      |   |          | Low Flow |        | Average | Average Flow |  | High Flow |        |
| lance<br>node        | mass flux in river at PM-12                                 | M_r12 =  | 1.66     | (mg/s) | 5.69    | (mg/s)       |  | 46.33     | (mg/s) |
| Mass ba<br>at each   | mass flux in river at PM-13                                 | M_r13 =  | 4.40     | (mg/s) | 56.18   | (mg/s)       |  | 296.36    | (mg/s) |
|                      |   |          | Low Flo  | w      | Average | Flow         |  | High Flo  | W      |
| rt mass<br>htration  | concentration in river at PM-12                             | C r12 =  | 0.068    | (mg/L) | 0.015   | (mg/L)       |  | 0.011     | (mg/L) |
| inve<br>x to<br>ncer |   |          |          |        |         |              |  |           |        |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Beryllium   |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0001      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0001      | (mg/L) |
| ğ         | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001410903 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0           | (mg/L) |
| cou       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075     | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 0.000023    | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|                            |   |          | Low Flo  | w      | Average | Flow   | Hig       | gh Flow     |
|----------------------------|---|----------|----------|--------|---------|--------|-----------|-------------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.04    | (mg/s) |           | 0 (mg/s)    |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00     | (mg/s) | 0.00    | (mg/s) | (         | 0.00 (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.00    | (mg/s) | (         | 0.00 (mg/s) |
| itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 0.17    | (mg/s) |           | 2 (mg/s)    |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | -        | (mg/s) | -       | (mg/s) |           | - (mg/s)    |
| onvert con<br>mass flux    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.01    | (mg/s) | (         | 0.01 (mg/s) |
|                            | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02     | (mg/s) | 0.23    | (mg/s) | (         | 0.23 (mg/s) |
|                            | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -        | (mg/s) | -       | (mg/s) |           | - (mg/s)    |
| ຊ ິວ<br>2                  | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01     | (mg/s) | 0.17    | (mg/s) | (         | 0.17 (mg/s) |
|                            |   |          | Low Flow |        | Average | Flow   | High Flow |             |
| lance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.00     | (mg/s) | 0.04    | (mg/s) | (         | 0.41 (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.04     | (mg/s) | 0.61    | (mg/s) |           | 2.79 (mg/s) |
|                            |   |          | Low Flo  | w      | Average | Flow   | Hię       | gh Flow     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L) | 0.000   | (mg/L) | 0.        | 000 (mg/L)  |
| onve<br>ux to<br>once      |   |          |          |        |         |        |           |             |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Calcium   |          |             |        |
|           |   | 1        | 1           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 13          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 13          | (mg/L) |
| n da      | concentration in Babbitt WWTP discharge                         | C_sBab = | 13          | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 95.35       | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 95.38057957 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 416         | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 59.78       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 19          | (mg/L) |
| u u       | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|  |   |                               | Low Flo                                  | w                               | Average   | Flow                               | High Fl                                      | ow                               |
|--|---|-------------------------------|--|---------------------------------|---|------------------------------------|--|----------------------------------|
|  | mass flux of surface water into PM-12   | M_s12 =                       | -  | (mg/s)                          | 4,639.22  | (mg/s)                             | 52,669                                       | (mg/s)                           |
|  | mass flux of ground water into PM-12  | M_g12 =                       | 462.42                                   | (mg/s)                          | 462.42  | (mg/s)                             | 462.42                                       | (mg/s)                           |
| tion                                       | mass flux in Babbitt WWTP discharge   | M_sBab =                      | -  | (mg/s)                          | 121.41  | (mg/s)                             | 121.41                                       | (mg/s)                           |
| itra                                       | mass flux of surface water into PM-13   | M_s13 =                       | -  | (mg/s)                          | 22,636.89   | (mg/s)                             | 258,461                                      | (mg/s)                           |
| cen  | mass flux of ground water into PM-13  | M_g13 =                       | -  | (mg/s)                          | -   | (mg/s)                             | -  | (mg/s)                           |
| uo:  | mass flux of Area 5 Pit NW discharge  | M_spit =                      | -  | (mg/s)                          | 5,369.83  | (mg/s)                             | 5,369.83                                     | (mg/s)                           |
| ert o<br>Ss f                              | mass flux in seepage from Tailings Basin Cells 1E and 2E                                      | M_fs =                        | 1,344.25                                 | (mg/s)                          | 15,242.69   | (mg/s)                             | 15,242.69                                    | (mg/s)                           |
| n ve<br>ma:                                | mass flux in hydrometallurgical residue cells liner leakage                                   | M_rrs =                       | 205.46                                   | (mg/s)                          | 205.46  | (mg/s)                             | 205.46                                       | (mg/s)                           |
| ဒ္ ပိ                                      | mass flux in seepage from cell 2W   | M_s2w =                       | 1,187.61                                 | (mg/s)                          | 13,466.52   | (mg/s)                             | 29.52  | (mg/s)                           |
|  |   |                               | Low Flo                                  | w                               | Average   | Flow                               | High Fl                                      | ow                               |
|  |   |                               |  |                                 |   |                                    |  |                                  |
| lance<br>node                              | mass flux in river at PM-12   | M_r12 =                       | 462.42                                   | (mg/s)                          | 5,223.05  | (mg/s)                             | 53,252.39                                    | (mg/s)                           |
| Mass balance<br>at each node               | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 462.42<br>3,199.75                       | (mg/s)<br>(mg/s)                | 5,223.05  | (mg/s)<br>(mg/s)                   | 53,252.39<br>332,560.68                      | (mg/s)<br>(mg/s)                 |
| Mass balance<br>at each node               | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 462.42<br>3,199.75<br>Low Flor           | (mg/s)<br>(mg/s)<br><b>w</b>    | 5,223.05<br>62,144.43<br>Average                  | (mg/s)<br>(mg/s)<br>Flow           | 53,252.39<br>332,560.68<br>High Fl           | (mg/s)<br>(mg/s)<br><b>ow</b>    |
| vert mass<br>to<br>contration at each node | mass flux in river at PM-12<br>mass flux in river at PM-13<br>concentration in river at PM-12 | M_r12 =<br>M_r13 =<br>C_r12 = | 462.42<br>3,199.75<br>Low Flor<br>19.000 | (mg/s)<br>(mg/s)<br>w<br>(mg/L) | 5,223.05<br>62,144.43<br><b>Average</b><br>13.374 | (mg/s)<br>(mg/s)<br>Flow<br>(mg/l) | 53,252.39<br>332,560.68<br>High Fl<br>13.036 | (mg/s)<br>(mg/s)<br>ow<br>(mg/l) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Cadmium   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00008     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00008     | (mg/L) |
| ÿu        | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000705708 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004      | (mg/L) |
| CO        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188    | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0003      | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|  |   |                               | Low Flor                          | w                               | Average                                 | Flow                               | High Fl                          | ow                                      |
|--|---|-------------------------------|-----------------------------------|---------------------------------|---|------------------------------------|----------------------------------|---|
|  | mass flux of surface water into PM-12   | M_s12 =                       | -                                 | (mg/s)                          | 0.03                                    | (mg/s)                             | 0                                | (mg/s)                                  |
| ation  | mass flux of ground water into PM-12  | M_g12 =                       | 0.01                              | (mg/s)                          | 0.01                                    | (mg/s)                             | 0.01                             | (mg/s)                                  |
|  | mass flux in Babbitt WWTP discharge   | M_sBab =                      | -                                 | (mg/s)                          | 0.00                                    | (mg/s)                             | 0.00                             | (mg/s)                                  |
| itra   | mass flux of surface water into PM-13   | M_s13 =                       | -                                 | (mg/s)                          | 0.14                                    | (mg/s)                             | 2                                | (mg/s)                                  |
| cen  | mass flux of ground water into PM-13  | M_g13 =                       | -                                 | (mg/s)                          | -                                       | (mg/s)                             | -                                | (mg/s)                                  |
| no:  | mass flux of Area 5 Pit NW discharge  | M_spit =                      | -                                 | (mg/s)                          | 0.01                                    | (mg/s)                             | 0.01                             | (mg/s)                                  |
| ert o<br>ss f                                  | mass flux in seepage from Tailings Basin Cells 1E and 2E                                      | M_fs =                        | 0.01                              | (mg/s)                          | 0.11                                    | (mg/s)                             | 0.11                             | (mg/s)                                  |
| a vu   | mass flux in hydrometallurgical residue cells liner leakage                                   | M_rrs =                       | 0.00                              | (mg/s)                          | 0.00                                    | (mg/s)                             | 0.00                             | (mg/s)                                  |
| န ပိ   | mass flux in seepage from cell 2W   | M_s2w =                       | 0.00                              | (mg/s)                          | 0.04                                    | (mg/s)                             | 0.04                             | (mg/s)                                  |
|  |   |                               | Low Flor                          | w                               | Average                                 | Flow                               | High Fl                          | ow                                      |
|  |   |                               |                                   |                                 |   |                                    |                                  |   |
| lance<br>node                                  | mass flux in river at PM-12   | M r12 =                       | 0.01                              | (mg/s)                          | 0.04                                    | (mg/s)                             | 0.33                             | (mg/s)                                  |
| Mass balance<br>at each node                   | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =                       | 0.01                              | (mg/s)<br>(mg/s)                | 0.04                                    | (mg/s)<br>(mg/s)                   | 0.33                             | (mg/s)<br>(mg/s)                        |
| Mass balance<br>at each node                   | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 0.01<br>0.02<br><b>Low Flo</b>    | (mg/s)<br>(mg/s)<br>w           | 0.04<br>0.34<br>Average                 | (mg/s)<br>(mg/s)<br>Flow           | 0.33<br>2.08<br><b>High Fl</b>   | (mg/s)<br>(mg/s)<br>ow                  |
| rt mass Mass balance Mass balance at each node | mass flux in river at PM-12<br>mass flux in river at PM-13<br>concentration in river at PM-12 | M_r12 =<br>M_r13 =<br>C_r12 = | 0.01<br>0.02<br>Low Flov<br>0.000 | (mg/s)<br>(mg/s)<br>w<br>(mg/L) | 0.04<br>0.34<br><b>Average</b><br>0.000 | (mg/s)<br>(mg/s)<br>Flow<br>(mg/L) | 0.33<br>2.08<br>High Fl<br>0.000 | (mg/s)<br>(mg/s)<br><b>ow</b><br>(mg/L) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Chloride  |          |          |        |
|           |   | 1        | 1        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| ig<br>L   | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 7.60E+00 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| but       | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0        | (mg/L) |

|   |   |                               | Low Flor                               | w                               | Average                                   | Flow                               | High Fl                                     | ow                                      |
|---|---|-------------------------------|--|---------------------------------|---|------------------------------------|---|---|
|   | mass flux of surface water into PM-12   | M_s12 =                       | -                                      | (mg/s)                          | 3,568.63                                  | (mg/s)                             | 40,514                                      | (mg/s)                                  |
| _   | mass flux of ground water into PM-12  | M_g12 =                       | 43.81                                  | (mg/s)                          | 43.81                                     | (mg/s)                             | 43.81                                       | (mg/s)                                  |
| tion                                      | mass flux in Babbitt WWTP discharge   | M_sBab =                      | -                                      | (mg/s)                          | 93.39                                     | (mg/s)                             | 93.39                                       | (mg/s)                                  |
| itra                                      | mass flux of surface water into PM-13   | M_s13 =                       | -                                      | (mg/s)                          | 17,412.99                                 | (mg/s)                             | 198,816                                     | (mg/s)                                  |
| cen                                       | mass flux of ground water into PM-13  | M_g13 =                       | -                                      | (mg/s)                          | -   | (mg/s)                             | -   | (mg/s)                                  |
| u con                                     | mass flux of Area 5 Pit NW discharge  | M_spit =                      | -                                      | (mg/s)                          | 335.09                                    | (mg/s)                             | 335.09                                      | (mg/s)                                  |
| ert o<br>ss f                             | mass flux in seepage from Tailings Basin Cells 1E and 2E                                      | M_fs =                        | 107.17                                 | (mg/s)                          | 1,215.25                                  | (mg/s)                             | 1,215.25                                    | (mg/s)                                  |
| n ve<br>ma:                               | mass flux in hydrometallurgical residue cells liner leakage                                   | M_rrs =                       | 869.24                                 | (mg/s)                          | 869.24                                    | (mg/s)                             | 869.24                                      | (mg/s)                                  |
| ຊ ິວ                                      | mass flux in seepage from cell 2W   | M_s2w =                       | 427.92                                 | (mg/s)                          | 4,852.27                                  | (mg/s)                             | 4,852.27                                    | (mg/s)                                  |
|   |   |                               | Low Flo                                | w                               | Average                                   | Flow                               | High Fl                                     | ow                                      |
|   |   |                               |  |                                 |   |                                    |   |   |
| lance<br>node                             | mass flux in river at PM-12   | M r12 =                       | 43.81                                  | (mg/s)                          | 3,705.83                                  | (mg/s)                             | 40,651.48                                   | (mg/s)                                  |
| Mass balance<br>at each node              | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 43.81<br>1,448.15                      | (mg/s)<br>(mg/s)                | 3,705.83<br>28,390.67                     | (mg/s)<br>(mg/s)                   | 40,651.48<br>246,739.32                     | (mg/s)<br>(mg/s)                        |
| Mass balance<br>at each node              | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 43.81<br>1,448.15<br><b>Low Flo</b>    | (mg/s)<br>(mg/s)                | 3,705.83<br>28,390.67<br>Average          | (mg/s)<br>(mg/s)<br>Flow           | 40,651.48<br>246,739.32<br>High Fl          | (mg/s)<br>(mg/s)<br><b>ow</b>           |
| vert mass Mass balance<br>to at each node | mass flux in river at PM-12<br>mass flux in river at PM-13<br>concentration in river at PM-12 | M_r12 =<br>M_r13 =<br>C_r12 = | 43.81<br>1,448.15<br>Low Flor<br>1.800 | (mg/s)<br>(mg/s)<br>w<br>(mg/L) | 3,705.83<br>28,390.67<br>Average<br>9.489 | (mg/s)<br>(mg/s)<br>Flow<br>(mg/L) | 40,651.48<br>246,739.32<br>High Fl<br>9.951 | (mg/s)<br>(mg/s)<br><b>ow</b><br>(mg/L) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Cobalt  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0006      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| ÿ         | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.008661931 | (mg/L) |
| Cei       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| CO        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| u u       | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|  |   |                               | Low Flo                                 | w                               | Average                          | Flow                               | High Fl                                  | ow                               |
|--|---|-------------------------------|---|---------------------------------|----------------------------------|------------------------------------|--|----------------------------------|
|  | mass flux of surface water into PM-12   | M_s12 =                       | -                                       | (mg/s)                          | 0.21                             | (mg/s)                             | 2  | (mg/s)                           |
| ation  | mass flux of ground water into PM-12  | M_g12 =                       | 0.03                                    | (mg/s)                          | 0.03                             | (mg/s)                             | 0.03                                     | (mg/s)                           |
|  | mass flux in Babbitt WWTP discharge   | M_sBab =                      | -                                       | (mg/s)                          | 0.01                             | (mg/s)                             | 0.01                                     | (mg/s)                           |
| ıtrai  | mass flux of surface water into PM-13   | M_s13 =                       | -                                       | (mg/s)                          | 1.04                             | (mg/s)                             | 12                                       | (mg/s)                           |
| cen  | mass flux of ground water into PM-13  | M_g13 =                       | -                                       | (mg/s)                          | -                                | (mg/s)                             | -  | (mg/s)                           |
| no:  | mass flux of Area 5 Pit NW discharge  | M_spit =                      | -                                       | (mg/s)                          | 0.03                             | (mg/s)                             | 0.03                                     | (mg/s)                           |
| ert o  | mass flux in seepage from Tailings Basin Cells 1E and 2E                                      | M_fs =                        | 0.12                                    | (mg/s)                          | 1.38                             | (mg/s)                             | 1.38                                     | (mg/s)                           |
| e n  | mass flux in hydrometallurgical residue cells liner leakage                                   | M_rrs =                       | 0.00                                    | (mg/s)                          | 0.00                             | (mg/s)                             | 0.00                                     | (mg/s)                           |
| to Co  | mass flux in seepage from cell 2W   | M_s2w =                       | 0.03                                    | (mg/s)                          | 0.35                             | (mg/s)                             | 0.35                                     | (mg/s)                           |
|  |   |                               | Low Flo                                 | w                               | Average                          | Flow                               | High Fl                                  | ow                               |
|  |   |                               |   |                                 |                                  |                                    |  |                                  |
| lance<br>node  | mass flux in river at PM-12   | M r12 =                       | 0.03                                    | (mg/s)                          | 0.25                             | (mg/s)                             | 2.46                                     | (mg/s)                           |
| Mass balance<br>at each node                                   | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 0.03                                    | (mg/s)<br>(mg/s)                | 0.25                             | (mg/s)<br>(mg/s)                   | 2.46                                     | <u>(mg/s)</u><br>(mg/s)          |
| Mass balance<br>at each node                                   | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 0.03<br>0.18<br>Low Flo                 | (mg/s)<br>(mg/s)<br>w           | 0.25<br>3.06<br>Average          | (mg/s)<br>(mg/s)<br>Flow           | 2.46<br>16.16<br><b>High Fl</b>          | (mg/s)<br>(mg/s)<br>ow           |
| onvert mass<br>Lx to Mass balance<br>Incentration at each node | mass flux in river at PM-12<br>mass flux in river at PM-13<br>concentration in river at PM-12 | M_r12 =<br>M_r13 =<br>C_r12 = | 0.03<br>0.18<br><b>Low Flo</b><br>0.001 | (mg/s)<br>(mg/s)<br>w<br>(mg/L) | 0.25<br>3.06<br>Average<br>0.001 | (mg/s)<br>(mg/s)<br>Flow<br>(mg/L) | 2.46<br>16.16<br><b>High Fl</b><br>0.001 | (mg/s)<br>(mg/s)<br>ow<br>(mg/L) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   | 1        |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Copper  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| р<br>ц    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.020766721 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| dul       | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|                                  |   |          | Low Flo | w      | Average | Flow   | High Flo | w      |
|----------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                                  | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.54    | (mg/s) | 6        | (mg/s) |
| _                                | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s) | 0.10    | (mg/s) | 0.10     | (mg/s) |
| tion                             | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| itra                             | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.61    | (mg/s) | 30       | (mg/s) |
| cen                              | mass flux of ground water into PM-13                        | M_g13 =  | -       | (mg/s) | -       | (mg/s) | -        | (mg/s) |
| uo; Xn                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.19    | (mg/s) | 0.19     | (mg/s) |
| ert o<br>ss f                    | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.29    | (mg/s) | 3.32    | (mg/s) | 3.32     | (mg/s) |
| n ve<br>ma:                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| <u>د</u> ک                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.09    | (mg/s) | 1.03    | (mg/s) | 1.03     | (mg/s) |
|                                  |   |          | Low Flo | w      | Average | Flow   | High Flo | w      |
| lance<br>node                    | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s) | 0.65    | (mg/s) | 6.19     | (mg/s) |
| Mass ba<br>at each               | mass flux in river at PM-13                                 | M_r13 =  | 0.48    | (mg/s) | 7.80    | (mg/s) | 40.55    | (mg/s) |
|                                  |   |          | Low Flo | w      | Average | Flow   | High Flo | w      |
| rvert mass<br>t to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002    | (mg/L) |
|                                  |   |          |         |        |         |        |          |        |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   | 1        |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Fluoride  |          |          |        |
|           |   | 0        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| Ö<br>u    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 8.26E-01 | (mg/L) |
| Cei       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| u<br>1    | concentration of ground water into PM-13                        | C_g13 =  | 0        | (mg/L) |

|   |   |                               | Low Flo                            | w                               | Average                                    | Flow                               | High Fl                                | ow                                      |
|---|---|-------------------------------|------------------------------------|---------------------------------|--|------------------------------------|--|---|
|   | mass flux of surface water into PM-12   | M_s12 =                       | -                                  | (mg/s)                          | 35.69                                      | (mg/s)                             | 405                                    | (mg/s)                                  |
| _   | mass flux of ground water into PM-12  | M_g12 =                       | 9.37                               | (mg/s)                          | 9.37                                       | (mg/s)                             | 9.37                                   | (mg/s)                                  |
| ntration  | mass flux in Babbitt WWTP discharge   | M_sBab =                      | -                                  | (mg/s)                          | 0.93                                       | (mg/s)                             | 0.93                                   | (mg/s)                                  |
|   | mass flux of surface water into PM-13   | M_s13 =                       | -                                  | (mg/s)                          | 174.13                                     | (mg/s)                             | 1,988                                  | (mg/s)                                  |
| cen   | mass flux of ground water into PM-13  | M_g13 =                       | -                                  | (mg/s)                          | -  | (mg/s)                             | -                                      | (mg/s)                                  |
| u xn  | mass flux of Area 5 Pit NW discharge  | M_spit =                      | -                                  | (mg/s)                          | 7.04                                       | (mg/s)                             | 7.04                                   | (mg/s)                                  |
| ert o<br>ss f   | mass flux in seepage from Tailings Basin Cells 1E and 2E                                      | M_fs =                        | 11.65                              | (mg/s)                          | 132.08                                     | (mg/s)                             | 132.08                                 | (mg/s)                                  |
| nve<br>mas  | mass flux in hydrometallurgical residue cells liner leakage                                   | M_rrs =                       | 1.41                               | (mg/s)                          | 1.41                                       | (mg/s)                             | 1.41                                   | (mg/s)                                  |
| <u>ب</u> ې  | mass flux in seepage from cell 2W   | M_s2w =                       | 30.79                              | (mg/s)                          | 349.17                                     | (mg/s)                             | 349.17                                 | (mg/s)                                  |
|   |   |                               | Low Flo                            | w                               | Average                                    | Flow                               | High Fl                                | ow                                      |
| 0 e   |   |                               |                                    |                                 |  |                                    |  |   |
| land  | mass flux in river at PM-12   | M_r12 =                       | 9.37                               | (mg/s)                          | 45.99                                      | (mg/s)                             | 415.45                                 | (mg/s)                                  |
| Mass balanc<br>at each nod  | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 9.37<br>53.22                      | (mg/s)<br>(mg/s)                | 45.99<br>709.81                            | (mg/s)<br>(mg/s)                   | 415.45<br>2,893.30                     | (mg/s)<br>(mg/s)                        |
| Mass balanc<br>at each nod  | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 9.37<br>53.22<br>Low Flor          | (mg/s)<br>(mg/s)<br>w           | 45.99<br>709.81<br>Average                 | (mg/s)<br>(mg/s)<br>Flow           | 415.45<br>2,893.30<br>High Fl          | (mg/s)<br>(mg/s)<br><b>ow</b>           |
| onvert mass Mass balance to the model of the model of the mass mass mass mass balance the model of the model | mass flux in river at PM-12<br>mass flux in river at PM-13<br>concentration in river at PM-12 | M_r12 =<br>M_r13 =<br>C_r12 = | 9.37<br>53.22<br>Low Flor<br>0.385 | (mg/s)<br>(mg/s)<br>w<br>(mg/L) | 45.99<br>709.81<br><b>Average</b><br>0.118 | (mg/s)<br>(mg/s)<br>Flow<br>(mg/L) | 415.45<br>2,893.30<br>High Fl<br>0.102 | (mg/s)<br>(mg/s)<br><b>ow</b><br>(mg/L) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Iron  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| ÿu        | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ltra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 9.82E-02    | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| l lo      | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|   |   |                               | Low Flo                            | w                               | Average                                  | Flow                               | High Fl   | ow                               |
|---|---|-------------------------------|------------------------------------|---------------------------------|--|------------------------------------|---|----------------------------------|
|   | mass flux of surface water into PM-12   | M_s12 =                       | -                                  | (mg/s)                          | 1,034.90                                 | (mg/s)                             | 11,749  | (mg/s)                           |
| _   | mass flux of ground water into PM-12  | M_g12 =                       | 0.85                               | (mg/s)                          | 0.85                                     | (mg/s)                             | 0.85  | (mg/s)                           |
| tion  | mass flux in Babbitt WWTP discharge   | M_sBab =                      | -                                  | (mg/s)                          | 27.08                                    | (mg/s)                             | 27.08   | (mg/s)                           |
| itra  | mass flux of surface water into PM-13   | M_s13 =                       | -                                  | (mg/s)                          | 5,049.77                                 | (mg/s)                             | 57,657  | (mg/s)                           |
| cen   | mass flux of ground water into PM-13  | M_g13 =                       | -                                  | (mg/s)                          | -  | (mg/s)                             | -   | (mg/s)                           |
| uo:   | mass flux of Area 5 Pit NW discharge  | M_spit =                      | -                                  | (mg/s)                          | 2.13                                     | (mg/s)                             | 2.13  | (mg/s)                           |
| ert o<br>ss f   | mass flux in seepage from Tailings Basin Cells 1E and 2E                                      | M_fs =                        | 1.38                               | (mg/s)                          | 15.69                                    | (mg/s)                             | 15.69   | (mg/s)                           |
| nve   | mass flux in hydrometallurgical residue cells liner leakage                                   | M_rrs =                       | 0.20                               | (mg/s)                          | 0.20                                     | (mg/s)                             | 0.20  | (mg/s)                           |
| e S   | mass flux in seepage from cell 2W   | M_s2w =                       | 91.27                              | (mg/s)                          | 1,034.88                                 | (mg/s)                             | 1,034.88  | (mg/s)                           |
|   |   |                               | Low Flo                            | w                               | Average                                  | Flow                               | High Fl   | ow                               |
|   |   |                               |                                    |                                 |  |                                    |   |                                  |
| lance<br>node   | mass flux in river at PM-12   | M_r12 =                       | 0.85                               | (mg/s)                          | 1,062.84                                 | (mg/s)                             | 11,777.08   | (mg/s)                           |
| Mass balance<br>at each node                                | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 0.85<br>93.70                      | (mg/s)<br>(mg/s)                | 1,062.84                                 | (mg/s)<br>(mg/s)                   | 11,777.08   | (mg/s)<br>(mg/s)                 |
| Mass balance<br>at each node                                | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 0.85<br>93.70<br>Low Flor          | (mg/s)<br>(mg/s)<br>w           | 1,062.84<br>7,165.50<br><b>Average</b>   | (mg/s)<br>(mg/s)<br>Flow           | 11,777.08<br>70,486.61<br>High Fl                 | (mg/s)<br>(mg/s)<br><b>ow</b>    |
| nvert mass Mass balance acch node nceentration at each node | mass flux in river at PM-12<br>mass flux in river at PM-13<br>concentration in river at PM-12 | M_r12 =<br>M_r13 =<br>C_r12 = | 0.85<br>93.70<br>Low Flor<br>0.035 | (mg/s)<br>(mg/s)<br>w<br>(mg/L) | 1,062.84<br>7,165.50<br>Average<br>2.721 | (mg/s)<br>(mg/s)<br>Flow<br>(mg/L) | 11,777.08<br>70,486.61<br><b>High Fl</b><br>2.883 | (mg/s)<br>(mg/s)<br>ow<br>(mg/L) |

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
|           |   | -        |             | r      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| , di      | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 3.20E+02    | (mg/L) |
| Icel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| dul       | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|                            |   |          | Low Flow  |        | Average    | Flow   | High F |              | ow     |
|----------------------------|---|----------|-----------|--------|------------|--------|--------|--------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,980.41  | (mg/s) |        | 283,600      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,129.58   | (mg/s) |        | 2,129.58     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 653.73     | (mg/s) |        | 653.73       | (mg/s) |
| itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121,890.93 | (mg/s) |        | 1,391,712    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | -         | (mg/s) | -          | (mg/s) |        | -            | (mg/s) |
| u Xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,090.84  | (mg/s) |        | 53,090.84    | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 4,507.05  | (mg/s) | 51,106.04  | (mg/s) |        | 51,106.04    | (mg/s) |
| nve<br>mas                 | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 4,252.38  | (mg/s) | 4,252.38   | (mg/s) |        | 4,252.38     | (mg/s) |
| to Co                      | mass flux in seepage from cell 2W                           | M_s2w =  | 8,673.67  | (mg/s) | 98,352.01  | (mg/s) |        | 98,352.01    | (mg/s) |
|                            |   |          | Low Flo   | w      | Average    | Flow   |        | High Fl      | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | 27,763.72  | (mg/s) |        | 286,383.27   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 19,562.68 | (mg/s) | 356,455.91 | (mg/s) |        | 1,884,896.46 | (mg/s) |
|                            |   |          | Low Flo   | w      | Average    | Flow   |        | High Fl      | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) | 71.091     | (mg/L) |        | 70.104       | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C r13 =  | 109 943   | (ma/L) | 132 370    | (ma/L) |        | 76 848       | (ma/L) |

#### Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   | 1        |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   |          |       |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| u di      | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 14.58 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| but       | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.00  | (mg/L) |

|                               |   |          | Low Flo | w      | Average   | Flow   | High    | n Flow    |
|-------------------------------|---|----------|---------|--------|-----------|--------|---------|-----------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39  | (mg/s) | 14,9    | 90 (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94     | (mg/s) | 38.     | 94 (mg/s) |
| tion                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.89    | (mg/s) | 0.89      | (mg/s) | 0.      | 89 (mg/s) |
| itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81  | (mg/s) | 73,5    | 62 (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | -       | (mg/s) | -         | (mg/s) | -       | (mg/s)    |
| uo:                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 34.55     | (mg/s) | 34.     | 55 (mg/s) |
| ert o<br>Ss f                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,029.85  | (mg/s) | 3,029.  | 85 (mg/s) |
| n ve<br>ma:                   | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 205.50  | (mg/s) | 2,330.24  | (mg/s) | 2,330.  | 24 (mg/s) |
| ဒ္ ပိ                         | mass flux in seepage from cell 2W                           | M_s2w =  | 154.36  | (mg/s) | 1,750.33  | (mg/s) | 1,750.  | 33 (mg/s) |
|                               |   |          | Low Flo | w      | Average   | Flow   | High    | n Flow    |
| lance<br>node                 | mass flux in river at PM-12                                 | M r12 =  | 39.83   | (mg/s) | 1,360.22  | (mg/s) | 15,030. | 11 (mg/s) |
| Mass ba<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 399.70  | (mg/s) | 14,948.01 | (mg/s) | 95,737. | 01 (mg/s) |
|                               |   |          | Low Flo | W      | Average   | Flow   | High    | n Flow    |
| /ert mass<br>to<br>tentration | concentration in river at PM-12                             | C_r12 =  | 1.637   | (mg/L) | 3.483     | (mg/L) | 3.6     | 79 (mg/l) |
| un di nu                      |   |          |         |        |           |        |         |           |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Magnesium   |          |        |        |
|           |   | 0        | 0.00   |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| p<br>u    | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 19.82  | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| u<br>u    | concentration of ground water into PM-13                        | C_g13 =  | 0.00   | (mg/L) |

|  |   |                               | Low Flo                                  | w                               | Average                                   | Flow                               | High Fl                                     | ow                               |
|--|---|-------------------------------|--|---------------------------------|---|------------------------------------|---|----------------------------------|
|  | mass flux of surface water into PM-12   | M_s12 =                       | -  | (mg/s)                          | 2,141.18                                  | (mg/s)                             | 24,309                                      | (mg/s)                           |
| _  | mass flux of ground water into PM-12  | M_g12 =                       | 259.20                                   | (mg/s)                          | 259.20                                    | (mg/s)                             | 259.20                                      | (mg/s)                           |
| tion                                     | mass flux in Babbitt WWTP discharge   | M_sBab =                      | -  | (mg/s)                          | 56.03                                     | (mg/s)                             | 56.03                                       | (mg/s)                           |
| itra                                     | mass flux of surface water into PM-13   | M_s13 =                       | -  | (mg/s)                          | 10,447.79                                 | (mg/s)                             | 119,290                                     | (mg/s)                           |
| cen                                      | mass flux of ground water into PM-13  | M_g13 =                       | -  | (mg/s)                          | -   | (mg/s)                             | -   | (mg/s)                           |
| u xn                                     | mass flux of Area 5 Pit NW discharge  | M_spit =                      | -  | (mg/s)                          | 15,261.91                                 | (mg/s)                             | 15,261.91                                   | (mg/s)                           |
| ert o<br>ss f                            | mass flux in seepage from Tailings Basin Cells 1E and 2E                                      | M_fs =                        | 279.37                                   | (mg/s)                          | 3,167.81                                  | (mg/s)                             | 3,167.81                                    | (mg/s)                           |
| ma:<br>ma:                               | mass flux in hydrometallurgical residue cells liner leakage                                   | M_rrs =                       | 105.20                                   | (mg/s)                          | 105.20                                    | (mg/s)                             | 105.20                                      | (mg/s)                           |
| ຊ<br>ເວິ                                 | mass flux in seepage from cell 2W   | M_s2w =                       | 1,390.05                                 | (mg/s)                          | 15,762.00                                 | (mg/s)                             | 15,762.00                                   | (mg/s)                           |
|  |   |                               | Low Flo                                  | w                               | Average                                   | Flow                               | High Fl                                     | ow                               |
|  |   |                               |  |                                 |   |                                    |   |                                  |
| lance<br>node                            | mass flux in river at PM-12   | M_r12 =                       | 259.20                                   | (mg/s)                          | 2,456.41                                  | (mg/s)                             | 24,623.80                                   | (mg/s)                           |
| Mass balance<br>at each node             | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 259.20                                   | (mg/s)<br>(mg/s)                | 2,456.41<br>47,201.12                     | (mg/s)<br>(mg/s)                   | 24,623.80                                   | (mg/s)<br>(mg/s)                 |
| Mass balance<br>at each node             | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 259.20<br>2,033.82<br>Low Flor           | (mg/s)<br>(mg/s)<br><b>w</b>    | 2,456.41<br>47,201.12<br>Average          | (mg/s)<br>(mg/s)<br>Flow           | 24,623.80<br>178,210.31<br>High Fl          | (mg/s)<br>(mg/s)<br><b>ow</b>    |
| lert mass Mass balance<br>o at each node | mass flux in river at PM-12<br>mass flux in river at PM-13<br>concentration in river at PM-12 | M_r12 =<br>M_r13 =<br>C_r12 = | 259.20<br>2,033.82<br>Low Flor<br>10.650 | (mg/s)<br>(mg/s)<br>w<br>(mg/L) | 2,456.41<br>47,201.12<br>Average<br>6.290 | (mg/s)<br>(mg/s)<br>Flow<br>(mg/l) | 24,623.80<br>178,210.31<br>High Fl<br>6.028 | (mg/s)<br>(mg/s)<br>ow<br>(mg/l) |

#### Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   | 1        |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
|           |   | 1        |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| р<br>ц    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.43 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0.00 | (mg/L) |

|                                |   |                               | Low Flo                           | w                               | Average                              | Flow                               | High Flow   |
|--------------------------------|---|-------------------------------|-----------------------------------|---------------------------------|--------------------------------------|------------------------------------|---|
|                                | mass flux of surface water into PM-12   | M_s12 =                       | -                                 | (mg/s)                          | 107.06                               | (mg/s)                             | 1,215 (mg/s)  |
| _                              | mass flux of ground water into PM-12  | M_g12 =                       | 4.58                              | (mg/s)                          | 4.58                                 | (mg/s)                             | 4.58 (mg/s)   |
| tion                           | mass flux in Babbitt WWTP discharge   | M_sBab =                      | -                                 | (mg/s)                          | 2.80                                 | (mg/s)                             | 2.80 (mg/s)   |
| itrai                          | mass flux of surface water into PM-13   | M_s13 =                       | -                                 | (mg/s)                          | 522.39                               | (mg/s)                             | 5,964 (mg/s)  |
| cen                            | mass flux of ground water into PM-13  | M_g13 =                       | -                                 | (mg/s)                          | -                                    | (mg/s)                             | - (mg/s)  |
| uo:                            | mass flux of Area 5 Pit NW discharge  | M_spit =                      | -                                 | (mg/s)                          | 27.31                                | (mg/s)                             | 27.31 (mg/s)  |
| ert o<br>ss f                  | mass flux in seepage from Tailings Basin Cells 1E and 2E                                      | M_fs =                        | 6.09                              | (mg/s)                          | 69.10                                | (mg/s)                             | 69.10 (mg/s)  |
| nve                            | mass flux in hydrometallurgical residue cells liner leakage                                   | M_rrs =                       | 0.00                              | (mg/s)                          | 0.00                                 | (mg/s)                             | 0.00 (mg/s)   |
| to<br>to                       | mass flux in seepage from cell 2W   | M_s2w =                       | 23.50                             | (mg/s)                          | 266.49                               | (mg/s)                             | 266.49 (mg/s)   |
|                                |   |                               | Low Flo                           | w                               | Average                              | Flow                               | High Flow   |
| nce                            |   |                               |                                   |                                 |                                      |                                    |   |
|                                | mass flux in river at PM-12   | M_r12 =                       | 4.58                              | (mg/s)                          | 114.44                               | (mg/s)                             | 1,222.81 (mg/s)   |
| Mass bala.<br>at each no       | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 4.58<br>34.17                     | (mg/s)<br>(mg/s)                | 999.74                               | (mg/s)<br>(mg/s)                   | 1,222.81 (mg/s)   |
| Mass bala<br>at each no        | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 4.58<br>34.17<br>Low Flo          | (mg/s)<br>(mg/s)<br>w           | 999.74<br>Average                    | (mg/s)<br>(mg/s)<br>Flow           | 1,222.81 (mg/s)<br>7,550.19 (mg/s)<br>High Flow                 |
| onvert mass<br>Lx to Mass bala | mass flux in river at PM-12<br>mass flux in river at PM-13<br>concentration in river at PM-12 | M_r12 =<br>M_r13 =<br>C_r12 = | 4.58<br>34.17<br>Low Flo<br>0.188 | (mg/s)<br>(mg/s)<br>w<br>(mg/L) | 114.44<br>999.74<br>Average<br>0.293 | (mg/s)<br>(mg/s)<br>Flow<br>(mg/l) | 1,222.81 (mg/s)<br>7,550.19 (mg/s)<br>High Flow<br>0.299 (mg/l) |

#### Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   | 1        |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Sodium  |          |        |        |
|           |   |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| ų<br>n    | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 22.52  | (mg/L) |
| Icel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| ul du     | concentration of ground water into PM-13                        | C_g13 =  | 0.00   | (mg/L) |

|   |   |                               | Low Flo                                | w                               | Average                                   | Flow                               | High Fl  | ow                               |
|---|---|-------------------------------|--|---------------------------------|---|------------------------------------|--|----------------------------------|
|   | mass flux of surface water into PM-12   | M_s12 =                       | -                                      | (mg/s)                          | 1,249.02                                  | (mg/s)                             | 14,180   | (mg/s)                           |
| _   | mass flux of ground water into PM-12  | M_g12 =                       | 119.26                                 | (mg/s)                          | 119.26                                    | (mg/s)                             | 119.26   | (mg/s)                           |
| tion  | mass flux in Babbitt WWTP discharge   | M_sBab =                      | -                                      | (mg/s)                          | 32.69                                     | (mg/s)                             | 32.69  | (mg/s)                           |
| ıtrai   | mass flux of surface water into PM-13   | M_s13 =                       | -                                      | (mg/s)                          | 6,094.55                                  | (mg/s)                             | 69,586   | (mg/s)                           |
| cen   | mass flux of ground water into PM-13  | M_g13 =                       | -                                      | (mg/s)                          | -   | (mg/s)                             | -  | (mg/s)                           |
|   | mass flux of Area 5 Pit NW discharge  | M_spit =                      | -                                      | (mg/s)                          | 6,729.88                                  | (mg/s)                             | 6,729.88   | (mg/s)                           |
| ar of a start   | mass flux in seepage from Tailings Basin Cells 1E and 2E                                      | M_fs =                        | 317.45                                 | (mg/s)                          | 3,599.56                                  | (mg/s)                             | 3,599.56   | (mg/s)                           |
|   | mass flux in hydrometallurgical residue cells liner leakage                                   | M_rrs =                       | 125.94                                 | (mg/s)                          | 125.94                                    | (mg/s)                             | 125.94   | (mg/s)                           |
| မိ မိ   | mass flux in seepage from cell 2W   | M_s2w =                       | 880.28                                 | (mg/s)                          | 9,981.63                                  | (mg/s)                             | 9,981.63   | (mg/s)                           |
|   |   |                               | Low Flo                                | w                               | Average                                   | Flow                               | High Fl  | ow                               |
|   |   |                               |  |                                 |   |                                    |  |                                  |
| lance<br>node   | mass flux in river at PM-12   | M_r12 =                       | 119.26                                 | (mg/s)                          | 1,400.96                                  | (mg/s)                             | 14,331.94  | (mg/s)                           |
| Mass balance<br>at each node                                  | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 119.26                                 | (mg/s)<br>(mg/s)                | 1,400.96                                  | (mg/s)<br>(mg/s)                   | 14,331.94  | (mg/s)<br>(mg/s)                 |
| Mass balance<br>at each node                                  | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 119.26<br>1,442.92<br>Low Flo          | (mg/s)<br>(mg/s)<br><b>w</b>    | 1,400.96<br>27,932.52<br>Average          | (mg/s)<br>(mg/s)<br>Flow           | 14,331.94<br>104,354.55<br>High Fl                 | (mg/s)<br>(mg/s)<br><b>ow</b>    |
| onvert mass<br>ax to Mass balance<br>moentration at each node | mass flux in river at PM-12<br>mass flux in river at PM-13<br>concentration in river at PM-12 | M_r12 =<br>M_r13 =<br>C_r12 = | 119.26<br>1,442.92<br>Low Flo<br>4.900 | (mg/s)<br>(mg/s)<br>w<br>(mg/L) | 1,400.96<br>27,932.52<br>Average<br>3.587 | (mg/s)<br>(mg/s)<br>Flow<br>(mg/l) | 14,331.94<br>104,354.55<br><b>High Fl</b><br>3.508 | (mg/s)<br>(mg/s)<br>ow<br>(mg/l) |

#### Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Nickel  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| p<br>u    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ) tra     | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.153655831 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| u u       | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|                                   |   |          | Low Flo | w      | Average | Flow   | High Flo | w      |
|-----------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.43    | (mg/s) | 5        | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s) | 0.17    | (mg/s) | 0.17     | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| concentra                         | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.09    | (mg/s) | 24       | (mg/s) |
|                                   | mass flux of ground water into PM-13                        | M_g13 =  | -       | (mg/s) | -       | (mg/s) | -        | (mg/s) |
|                                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.29    | (mg/s) | 0.29     | (mg/s) |
| ert o<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.17    | (mg/s) | 24.56   | (mg/s) | 24.56    | (mg/s) |
| n ve<br>ma:                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.05    | (mg/s) | 0.05    | (mg/s) | 0.05     | (mg/s) |
| ຊ ິວ                              | mass flux in seepage from cell 2W                           | M_s2w =  | 0.14    | (mg/s) | 1.55    | (mg/s) | 1.55     | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Flo | w      |
| lance<br>node                     | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s) | 0.61    | (mg/s) | 5.04     | (mg/s) |
| Mass ba<br>at each                | mass flux in river at PM-13                                 | M_r13 =  | 2.52    | (mg/s) | 29.15   | (mg/s) | 55.35    | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Flo | w      |
| nvert mass<br>< to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001    | (mg/L) |
| 0 G G                             |   | 0.10     |         |        | 0.011   | (      | 0.000    | (      |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Lead  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| n data    | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
|           | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.002409879 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| u u       | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|  |   |                               | Low Flo                           | w                               | Average                            | Flow                               | High Fl                          | ow                               |
|--|---|-------------------------------|-----------------------------------|---------------------------------|------------------------------------|------------------------------------|----------------------------------|----------------------------------|
|  | mass flux of surface water into PM-12   | M_s12 =                       | -                                 | (mg/s)                          | -                                  | (mg/s)                             | -                                | (mg/s)                           |
| _  | mass flux of ground water into PM-12  | M_g12 =                       | 0.03                              | (mg/s)                          | 0.03                               | (mg/s)                             | 0.03                             | (mg/s)                           |
| tion   | mass flux in Babbitt WWTP discharge   | M_sBab =                      | -                                 | (mg/s)                          | -                                  | (mg/s)                             | -                                | (mg/s)                           |
| nvert concentra<br>mass flux   | mass flux of surface water into PM-13   | M_s13 =                       | -                                 | (mg/s)                          | -                                  | (mg/s)                             | -                                | (mg/s)                           |
|  | mass flux of ground water into PM-13  | M_g13 =                       | -                                 | (mg/s)                          | -                                  | (mg/s)                             | -                                | (mg/s)                           |
|  | mass flux of Area 5 Pit NW discharge  | M_spit =                      | -                                 | (mg/s)                          | 0.02                               | (mg/s)                             | 0.02                             | (mg/s)                           |
|  | mass flux in seepage from Tailings Basin Cells 1E and 2E                                      | M_fs =                        | 0.03                              | (mg/s)                          | 0.39                               | (mg/s)                             | 0.39                             | (mg/s)                           |
|  | mass flux in hydrometallurgical residue cells liner leakage                                   | M_rrs =                       | 0.00                              | (mg/s)                          | 0.00                               | (mg/s)                             | 0.00                             | (mg/s)                           |
| e S  | mass flux in seepage from cell 2W   | M_s2w =                       | 0.02                              | (mg/s)                          | 0.27                               | (mg/s)                             | 0.27                             | (mg/s)                           |
|  |   |                               | Low Flo                           | w                               | Average                            | Flow                               | High Fl                          | ow                               |
|  |   |                               |                                   |                                 |                                    |                                    |                                  |                                  |
| lance<br>node  | mass flux in river at PM-12   | M_r12 =                       | 0.03                              | (mg/s)                          | 0.03                               | (mg/s)                             | 0.03                             | (mg/s)                           |
| Mass balance<br>at each node   | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 0.03                              | (mg/s)<br>(mg/s)                | 0.03                               | (mg/s)<br>(mg/s)                   | 0.03                             | (mg/s)<br>(mg/s)                 |
| Mass balance<br>at each node   | mass flux in river at PM-12<br>mass flux in river at PM-13                                    | M_r12 =<br>M_r13 =            | 0.03<br>0.09<br>Low Flor          | (mg/s)<br>(mg/s)<br>₩           | <br>0.03<br>0.70<br><b>Average</b> | (mg/s)<br>(mg/s)<br>Flow           | 0.03<br>0.70<br>High Fl          | (mg/s)<br>(mg/s)<br><b>ow</b>    |
| nivert mass Mass balance Actor | mass flux in river at PM-12<br>mass flux in river at PM-13<br>concentration in river at PM-12 | M_r12 =<br>M_r13 =<br>C_r12 = | 0.03<br>0.09<br>Low Flor<br>0.001 | (mg/s)<br>(mg/s)<br>w<br>(mg/L) | 0.03<br>0.70<br>Average<br>0.000   | (mg/s)<br>(mg/s)<br>Flow<br>(mg/L) | 0.03<br>0.70<br>High Fl<br>0.000 | (mg/s)<br>(mg/s)<br>ow<br>(mg/L) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| n da      | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.13E-02 | (mg/L) |
| ICer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| u du      | concentration of ground water into PM-13                        | C_g13 =  | 0.00E+00 | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | low    |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.01    | (mg/s) | 0       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ert concentra<br>ss flux  | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
|                           | mass flux of ground water into PM-13                        | M_g13 =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
|                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
|                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.16    | (mg/s) | 1.81    | (mg/s) | 1.81    | (mg/s) |
| n ve<br>ma:               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ຊ ິວ<br>ຊ                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | low    |
| alance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.12    | (mg/s) |
| Mass ba<br>at each        | mass flux in river at PM-13                                 | M_r13 =  | 0.20    | (mg/s) | 1.96    | (mg/s) | 2.40    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | low    |
| ert mass<br>o<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>lux to<br>conce  | concentration in river at PM-13                             | C r13 =  | 0.001   | (ma/L) | 0.001   | (mg/L) | 0.000   | (ma/L) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |        |             |        |
|-----------|---|----------|--------|-------------|--------|
| Parameter | Selenium  |          |        |             |        |
|           | concentration of curfere water into DM 40                       | <u> </u> | - 10 - | 0.0000      | (      |
| e e       | concentration of surface water into PM-12                       | C_9      | s12 =  | 0.0003      | (mg/L) |
| n dat     | concentration in Babbitt WWTP discharge                         | C_9      | sBab = | 0.0003      | (mg/L) |
| tior      | concentration in Area 5 Pit NW discharge                        | C_:      | spit = | 0.0016      | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_1      | fs =   | 0.002521801 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_1      | rrs =  | 0.054       | (mg/L) |
| Cor       | concentration in tailings basin cell 2W                         | C_9      | s2w =  | 0.00109     | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_9      | g12 =  | 0.00295     | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_0      | g13 =  | 0           | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | low    |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.11    | (mg/s) | 1       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tio                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.52    | (mg/s) | 6       | (mg/s) |
| anvert concen<br>mass flux | mass flux of ground water into PM-13                        | M_g13 =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
|                            | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
|                            | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.04    | (mg/s) | 0.40    | (mg/s) | 0.40    | (mg/s) |
|                            | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| <u>۽</u> دُ                | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | low    |
| ulance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.18    | (mg/s) | 1.29    | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.16    | (mg/s) | 1.47    | (mg/s) | 8.02    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | low    |
| rt mass<br>itration        | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Convei<br>lux to<br>concer | concentration in river at PM-13                             | C r13 =  | 0.001   | (ma/L) | 0.001   | (ma/L) | 0.000   | (ma/L) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   | 1        |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
|           | 1   | 1        |         |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| n data    | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
|           | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 241.92  | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| u u       | concentration of ground water into PM-13                        | C_g13 =  | 0.00    | (mg/L) |

|                               |   |          | Low Flo   | w      | Average    | Flow   | High Fl    | ow     |
|-------------------------------|---|----------|-----------|--------|------------|--------|------------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 1,427.45   | (mg/s) | 16,206     | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 206.87    | (mg/s) | 206.87     | (mg/s) | 206.87     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 37.36      | (mg/s) | 37.36      | (mg/s) |
| :oncentrat<br>lux             | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 6,965.20   | (mg/s) | 79,526     | (mg/s) |
|                               | mass flux of ground water into PM-13                        | M_g13 =  | -         | (mg/s) | -          | (mg/s) | -          | (mg/s) |
|                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 58,922.60  | (mg/s) | 58,922.60  | (mg/s) |
| ert o<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,409.53  | (mg/s) | 38,661.16  | (mg/s) | 38,661.16  | (mg/s) |
| nve<br>mas                    | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 3,628.60  | (mg/s) | 3,628.60   | (mg/s) | 3,628.60   | (mg/s) |
| ຊ<br>ເວິ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 3,027.64  | (mg/s) | 34,330.84  | (mg/s) | 34,330.84  | (mg/s) |
|                               |   |          | Low Flo   | w      | Average    | Flow   | High Fl    | ow     |
| ulance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 206.87    | (mg/s) | 1,671.68   | (mg/s) | 16,449.94  | (mg/s) |
| Mass ba<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 10,272.65 | (mg/s) | 144,180.08 | (mg/s) | 231,519.54 | (mg/s) |
|                               |   |          | Low Flo   | w      | Average    | Flow   | High Fl    | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 8.500     | (mg/L) | 4.280      | (mg/l) | 4.027      | (mg/l) |
| · · ·                         |   |          |           |        |            |        |            |        |

#### Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   | 1        |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Thallium  |          |             |        |
|           |   | 1        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0002      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
| n da      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006      | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001193197 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|                              |   |          | Low Flo | w      | Ave | rage Flo | W     | High F | low    |
|------------------------------|---|----------|---------|--------|-----|----------|-------|--------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |     | 0.07 (m  | ig/s) | 1      | (mg/s) |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) |     | 0.00 (m  | ig/s) | 0.00   | (mg/s) |
| tion                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |     | 0.00 (m  | ig/s) | 0.00   | (mg/s) |
| nvert concentra<br>mass flux | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |     | 0.35 (m  | ig/s) | 4      | (mg/s) |
|                              | mass flux of ground water into PM-13                        | M_g13 =  | -       | (mg/s) |     | - (m     | ig/s) | -      | (mg/s) |
|                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |     | 0.03 (m  | ig/s) | 0.03   | (mg/s) |
|                              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) |     | 0.19 (m  | ig/s) | 0.19   | (mg/s) |
|                              | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) |     | 0.00 (m  | ig/s) | 0.00   | (mg/s) |
| ຊ ິວ<br>ຊ                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) |     | 0.05 (m  | ig/s) | 0.05   | (mg/s) |
|                              |   |          | Low Flo | w      | Ave | rage Flo | w     | High F | low    |
| alance<br>node               | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) |     | 0.07 (m  | ıg/s) | 0.81   | (mg/s) |
| Mass ba<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) |     | 0.69 (m  | ıg/s) | 5.06   | (mg/s) |
|                              |   |          | Low Flo | w      | Ave | rage Flo | W     | High F | low    |
| rt mass<br>utration          | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | C   | .000 (m  | ig/L) | 0.000  | (mg/L) |
| Convei<br>flux to<br>concer  | concentration in river at PM-13                             | C r13 =  | 0.000   | (mg/L) | C   | .000 (mg | ıg/L) | 0.000  | (mg/L) |

## Embarrass River Mass-Balance Model-Tailings Basin-Proposed Action

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Zinc  |          |             |        |
|           |   | -        | n           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
| р<br>ц    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.081197396 | (mg/L) |
| ICer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| out       | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| u du      | concentration of ground water into PM-13                        | C_g13 =  | 0           | (mg/L) |

|                    |   |             | Low Flo | w      | Average | Flow     | High Flow | 1     |
|--------------------|---|-------------|---------|--------|---------|----------|-----------|-------|
|                    | mass flux of surface water into PM-12                       | M_s12 =     | -       | (mg/s) | 5.71    | (mg/s)   | 65 (m     | ng/s) |
| _                  | mass flux of ground water into PM-12                        | M_g12 =     | 0.28    | (mg/s) | 0.28    | (mg/s)   | 0.28 (m   | ng/s) |
| tion               | mass flux in Babbitt WWTP discharge                         | M_sBab =    | -       | (mg/s) | 0.15    | (mg/s)   | 0.15 (m   | ng/s) |
| itra               | mass flux of surface water into PM-13                       | M_s13 =     | -       | (mg/s) | 27.86   | (mg/s)   | 318 (m    | ng/s) |
| cen                | mass flux of ground water into PM-13                        | M_g13 =     | -       | (mg/s) | -       | (mg/s)   | - (m      | ng/s) |
| uo; Xn             | mass flux of Area 5 Pit NW discharge                        | M_spit =    | -       | (mg/s) | 0.17    | (mg/s)   | 0.17 (m   | ng/s) |
| ss fo              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =      | 1.14    | (mg/s) | 12.98   | (mg/s)   | 12.98 (m  | ng/s) |
| n ve<br>mas        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =     | 0.00    | (mg/s) | 0.00    | (mg/s)   | 0.00 (m   | ng/s) |
| <u>۽</u> ک         | mass flux in seepage from cell 2W                           | M_s2w =     | 0.29    | (mg/s) | 3.23    | (mg/s)   | 3.23 (m   | ng/s) |
|                    |   |             | Low Flo | w      | Average | Flow     | High Flow | 1     |
| lance<br>node      | mass flux in river at PM-12                                 | M r12 =     | 0.28    | (mg/s) | 6.14    | (mg/s)   | 65.25 (m  | ng/s) |
| Mass ba<br>at each | mass flux in river at PM-13                                 | <br>M_r13 = | 1.71    | (mg/s) | 50.38   | (mg/s)   | 399.74 (m | ng/s) |
|                    |   |             | Low Flo | w      | Average | Flow     | High Flow | 1     |
| t mass<br>tration  | essentiation in time at DM 40                               | 0 - 12 -    | 0.012   | (mall) | 0.016   | (mg/l )  | 0.016 (m  | na/L) |
| to<br>to           |   | 6_112 -     | 0.012   | (mg/L) | 0.010   | (IIIg/L) |           | ·3·-/ |

Appendix F.6 Embarrass River Proposed Action Year 20

#### FLOWS

| Caso                 | Vear 20  |            |      |       |       |
|----------------------|--|------------|------|-------|-------|
| Case                 |  |            |      |       |       |
| FIOWS                | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| n<br>River           | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| ll flow ii<br>arrass | flow in river at PM-13                         | Q_r13_L =  | 6.29 | (cfs) | PM-13 |
| Tota<br>Emb          | flow check                                     | Q_ck_L =   | 6.29 | (cfs) | 4     |
|                      | surface water flow into PM-12                  | Q_s12_L =  | 0.00 | (cfs) | PM-12 |
|                      | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                      | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                      | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| ata                  | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.51 | (cfs) | PM-13 |
| v da                 | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.02 | (cfs) | PM-13 |
| low                  | seepage from cell 2W                           | Q_s2w_L =  | 0.69 | (cfs) | PM-13 |
| out                  | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| Ing                  | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case                  | Year 20  |            |       |       |       |
|-----------------------|--|------------|-------|-------|-------|
| Flow                  | Average Flow Conditions (mean annual)          |            |       |       |       |
| n<br>River            | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| l flow ir<br>arrass I | flow in river at PM-13                         | Q_r13_M =  | 95.48 | (cfs) | PM-13 |
| Tota<br>Emb           | flow check                                     | Q_ck_M =   | 95.48 | (cfs) | _     |
|                       | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|                       | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                       | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                       | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ta                    | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 5.97  | (cfs) | PM-13 |
| , da                  | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.02  | (cfs) | PM-13 |
| lov                   | seepage from cell 2W                           | Q_s2w_M =  | 7.96  | (cfs) | PM-13 |
| ut 1                  | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| aul                   | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case                   | Year 20   |            |        |       |       |
|------------------------|---|------------|--------|-------|-------|
| Flow                   | High Flow Conditions (avg. annual 1-day max flow) |            |        |       | _     |
| ו<br>River             | flow in river at PM-12                            | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow iı<br>arrass      | flow in river at PM-13                            | Q_r13_H =  | 867.03 | (cfs) | PM-13 |
| Total<br>Emb <b></b> ã | flow check  | Q_ck_H =   | 867.03 | (cfs) | _     |
|                        | surface water flow into PM-12                     | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                        | surface water flow into PM-13                     | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                        | Babbitt WWTP discharge                            | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                        | Area 5 Pit NW discharge                           | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta                     | seepage from Tailings Basin Cells 1E and 2E       | Q_fs_H =   | 5.97   | (cfs) | PM-13 |
| / da                   | hydrometallurgical residue cells liner leakage    | Q_rrs_H =  | 0.02   | (cfs) | PM-13 |
| low                    | seepage from cell 2W                              | Q_s2w_H =  | 7.96   | (cfs) | PM-13 |
| rt .                   | ground water flow into PM-12                      | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| Ľ Ľ                    | ground water flow into PM-13                      | Q a13 H =  | 4.21   | (cfs) | PM-13 |

| Case<br>Parameter | Year 20<br>Silver   |          |          |        |
|-------------------|---|----------|----------|--------|
|                   |   | 1        |          |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
| , då              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00124  | (mg/L) |
| cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| cou               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| t                 | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                               |   |          | Low Flo | w      | Averag | Flow     | High Fl | ow     |
|-------------------------------|---|----------|---------|--------|--------|----------|---------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04   | (mg/s)   | 0       | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00   | (mg/s)   | 0.00    | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00   | (mg/s)   | 0.00    | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.19   | (mg/s)   | 2       | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00   | (mg/s)   | 0.00    | (mg/s) |
| nos                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.0    | (mg/s)   | 0.01    | (mg/s) |
| ert o<br>Ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.2    | (mg/s)   | 0.21    | (mg/s) |
| mas                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00   | (mg/s)   | 0.00    | (mg/s) |
| ទ ប័                          | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.02   | (mg/s)   | 0.02    | (mg/s) |
|                               |   |          | Low Flo | W      | Averag | Flow     | High Fl | ow     |
| s balance<br>ch node          | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04   | · (mg/s) | 0.45    | (mg/s) |
| Mass<br>at ea                 | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.47   | ' (mg/s) | 2.88    | (mg/s) |
|                               |   | -        | Low Flo | W      | Averag | Flow     | High Fl | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000  | (mg/L)   | 0.000   | (mg/L) |
| Cor<br>flux<br>con            | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000  | (mg/L)   | 0.000   | (mg/L) |

| Case      | Year 20   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Aluminum  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| , pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325  | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 3.74E-01 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| du<br>du  | concentration of ground water into PM-13                        | C_g13 =  | 0.025    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) | 0.61    | (mg/s) | 0.61     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) | 2.98    | (mg/s) | 2.98     | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.75    | (mg/s) | 0.75     | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 5.44    | (mg/s) | 63.12   | (mg/s) | 63.12    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.10    | (mg/s) | 0.10    | (mg/s) | 0.10     | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 30.64   | (mg/s) | 355.65  | (mg/s) | 355.65   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) | 37.23   | (mg/s) | 406.69   | (mg/s) |
| Mass I<br>at eacl          | mass flux in river at PM-13                                 | M_r13 =  | 39.76   | (mg/s) | 633.96  | (mg/s) | 2,817.44 | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) | 0.095   | (mg/L) | 0.100    | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.223   | (mg/L) | 0.235   | (mg/L) | 0.115    | (mg/L) |

| Case       | Year 20   |          |             |        |
|------------|---|----------|-------------|--------|
| Parameter  | Arsenic   |          |             |        |
|            |   |          |             |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 0.00075     | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 0.00075     | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00075     | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.001325    | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.014389887 | (mg/L) |
| ICE        | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| co         | concentration in tailings basin cell 2W                         |          | 0.00291     | (mg/L) |
| nt         | concentration of ground water into PM-12                        | C_g12 =  | 0.00273     | (mg/L) |
| du         | concentration of ground water into PM-13                        | C_g13 =  | 0.00273     | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.27    | (mg/s) | 3        | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07     | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| Itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.31    | (mg/s) | 15       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) | 0.33    | (mg/s) | 0.33     | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.07    | (mg/s) | 0.07     | (mg/s) |
| ert o<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.21    | (mg/s) | 2.43    | (mg/s) | 2.43     | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| ទ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.06    | (mg/s) | 0.65    | (mg/s) | 0.65     | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.34    | (mg/s) | <br>3.11 | (mg/s) |
| Mass I<br>at eacl         | mass flux in river at PM-13                                 | M_r13 =  | 0.66    | (mg/s) | 5.14    | (mg/s) | 21.51    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| ert mass<br>h<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.001    | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.001    | (mg/L) |
| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Boron   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.174123916 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| ont       | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 4.28    | (mg/s) | 49      | (mg/s) |
| tion                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) | 0.52    | (mg/s) | 0.52    | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 20.90   | (mg/s) | 239     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) | 2.53    | (mg/s) | 2.53    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.41    | (mg/s) | 7.41    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.53    | (mg/s) | 29.42   | (mg/s) | 29.42   | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.06    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 6.40    | (mg/s) | 74.34   | (mg/s) | 74.34   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>n node          | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) | 4.91    | (mg/s) | 49.25   | (mg/s) |
| Mass t<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 12.04   | (mg/s) | 139.56  | (mg/s) | 401.58  | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| 't mass<br>htration        | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) | 0.013   | (mg/L) | 0.012   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.068   | (mg/L) | 0.052   | (mg/L) | 0.016   | (mg/L) |

| Case      | Year 20   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Barium  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.011    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| р с       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.60E-02 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

|                              |   |          | Low Flo  | w      | Average | Flow   | High Fl | ow     |
|------------------------------|---|----------|----------|--------|---------|--------|---------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3.93    | (mg/s) | 45      | (mg/s) |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 1.66     | (mg/s) | 1.66    | (mg/s) | 1.66    | (mg/s) |
| tion                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| ıtra                         | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 19.15   | (mg/s) | 219     | (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 8.11     | (mg/s) | 8.11    | (mg/s) | 8.11    | (mg/s) |
| uo:                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
| ert e<br>ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.96     | (mg/s) | 11.15   | (mg/s) | 11.15   | (mg/s) |
| mag                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                         | mass flux in seepage from cell 2W                           | M_s2w =  | 1.80     | (mg/s) | 20.95   | (mg/s) | 20.95   | (mg/s) |
|                              |   |          | Low Flow |        | Average | Flow   | High Fl | ow     |
| lance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 1.66     | (mg/s) | 5.69    | (mg/s) | 46.33   | (mg/s) |
| Mass ba<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 12.54    | (mg/s) | 65.30   | (mg/s) | 305.49  | (mg/s) |
|                              |   |          | Low Flo  | w      | Average | Flow   | High Fl | ow     |
| mass                         | concentration in river at PM-12                             | C_r12 =  | 0.068    | (mg/L) | 0.015   | (mg/L) | 0.011   | (mg/L) |
| Conver<br>flux to<br>conceni | concentration in river at PM-13                             | C_r13 =  | 0.070    | (mg/L) | 0.024   | (mg/L) | 0.012   | (mg/L) |

| Case      | Year 20   |          |            |              |
|-----------|---|----------|------------|--------------|
| Parameter | Beryllium   |          |            |              |
|           |   | 0        |            | <i>( n</i> ) |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0001     | (mg/L)       |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0001     | (mg/L)       |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001     | (mg/L)       |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001     | (mg/L)       |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00131326 | (mg/L)       |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0          | (mg/L)       |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075    | (mg/L)       |
| et        | concentration of ground water into PM-12                        |          | 0.000023   | (mg/L)       |
| u d       | concentration of ground water into PM-13                        | C_g13 =  | 0.000023   | (mg/L)       |

|                            |   |          | Low Flo  | w      | Average      | Flow   | High Fl | ow     |
|----------------------------|---|----------|----------|--------|--------------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.04         | (mg/s) | 0       | (mg/s) |
| tion                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.00     | (mg/s) | 0.00         | (mg/s) | 0.00    | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.00         | (mg/s) | 0.00    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 0.17         | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.00     | (mg/s) | 0.00         | (mg/s) | 0.00    | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.01         | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02     | (mg/s) | 0.22         | (mg/s) | 0.22    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -        | (mg/s) | -            | (mg/s) | -       | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01     | (mg/s) | 0.17         | (mg/s) | 0.17    | (mg/s) |
|                            |   |          | Low Flow |        | Average Flow |        | High Fl | ow     |
| balance<br>ch node         | mass flux in river at PM-12                                 | M_r12 =  | 0.00     | (mg/s) | <br>0.04     | (mg/s) | 0.41    | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 0.04     | (mg/s) | 0.61         | (mg/s) | 2.79    | (mg/s) |
|                            |   |          | LOW FIO  | w      | Average      | FIOW   | High Fi | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L) | 0.000        | (mg/L) | 0.000   | (mg/L) |
| Conv<br>filux ti<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.000    | (mg/L) | 0.000        | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Calcium   |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 13          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 13          | (mg/L) |
| р<br>р    | concentration in Babbitt WWTP discharge                         | C_sBab = | 13          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 95.35       | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 76.37590202 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 416         | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 59.78       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 19          | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 19          | (mg/L) |

|                                   |   |          | Low Flo  | W      | Average   | Flow   | High Fl    | ow     |
|-----------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4,639.22  | (mg/s) | 52,669     | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) | 462.42    | (mg/s) | 462.42     | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 121.41    | (mg/s) | 121.41     | (mg/s) |
| itrai                             | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 22,636.89 | (mg/s) | 258,461    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) | 2,263.72  | (mg/s) | 2,263.72   | (mg/s) |
| uo Xn                             | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 5,369.83  | (mg/s) | 5,369.83   | (mg/s) |
| ssfo                              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,111.71 | (mg/s) | 12,906.03 | (mg/s) | 12,906.03  | (mg/s) |
| mas                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 227.25   | (mg/s) | 227.25    | (mg/s) | 227.25     | (mg/s) |
| ទ ប្                              | mass flux in seepage from cell 2W                           | M_s2w =  | 1,159.99 | (mg/s) | 13,466.52 | (mg/s) | 32.66      | (mg/s) |
|                                   |   |          | Low Flo  | W      | Average   | Flow   | High Flo   | ow     |
| lance<br>node                     | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) | 5,223.05  | (mg/s) | 53,252.39  | (mg/s) |
| Mass ba<br>at each                | mass flux in river at PM-13                                 | M_r13 =  | 5,225.09 | (mg/s) | 62,093.28 | (mg/s) | 332,512.66 | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| nvert mass<br>k to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) | 13.374    | (mg/l) | 13.036     | (mg/l) |
| Co<br>Co<br>Co                    | concentration in river at PM-13                             | C_r13 =  | 29.357   | (mg/L) | 22.980    | (mg/l) | 13.552     | (mg/l) |

| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Cadmium   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00008     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00008     | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000534314 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004      | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188    | (mg/L) |
| or t      | concentration of ground water into PM-12                        | C_g12 =  | 0.0003      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0003      | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| tion                                 | mass flux of ground water into PM-12                        | M_g12 =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
|                                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.14    | (mg/s) | 2       | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| u Xn                                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> ک                           | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| iss balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 0.01    | (mg/s) | 0.04    | (mg/s) | 0.33    | (mg/s) |
| Ma<br>at                             | mass flux in river at PM-13                                 | M_r13 =  | 0.05    | (mg/s) | 0.35    | (mg/s) | 2.10    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| ບ∉ວ                                  | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 20<br>Chlorida   |          |          |        |
|-------------------|---|----------|----------|--------|
| rarameter         | oniorae   | 1        |          |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| р с<br>р с        | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 7.66E+00 | (mg/L) |
| cei               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| nt                | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|----------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3,568.63  | (mg/s) | 40,514     | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 43.81    | (mg/s) | 43.81     | (mg/s) | 43.81      | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 93.39     | (mg/s) | 93.39      | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 17,412.99 | (mg/s) | 198,816    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 214.46   | (mg/s) | 214.46    | (mg/s) | 214.46     | (mg/s) |
|                            | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 335.09    | (mg/s) | 335.09     | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 111.46   | (mg/s) | 1,293.94  | (mg/s) | 1,293.94   | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 961.45   | (mg/s) | 961.45    | (mg/s) | 961.45     | (mg/s) |
| ទ ប្                       | mass flux in seepage from cell 2W                           | M_s2w =  | 417.97   | (mg/s) | 4,852.27  | (mg/s) | 4,852.27   | (mg/s) |
|                            |   |          | Low Flo  | W      | Average   | Flow   | High Fl    | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 43.81    | (mg/s) | 3,705.83  | (mg/s) | 40,651.48  | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 1,749.14 | (mg/s) | 28,776.03 | (mg/s) | 247,124.68 | (mg/s) |
|                            |   | -        | LOW FIO  | w      | Average   | FIOW   | High Fi    | ow     |
| 't mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 1.800    | (mg/L) | 9.489     | (mg/L) | 9.951      | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 9.827    | (mg/L) | 10.650    | (mg/L) | 10.072     | (mg/L) |

| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Cobalt  |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0006      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| β<br>β    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.007940593 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| rt .      | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|                              |   |          | Low Flo | w      | Average | Flow   | High I | low      |
|------------------------------|---|----------|---------|--------|---------|--------|--------|----------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.21    | (mg/s) |        | 2 (mg/s) |
| itration                     | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03   | B (mg/s) |
|                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.0    | (mg/s)   |
|                              | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.04    | (mg/s) | 12     | 2 (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 0.13    | (mg/s) | 0.13    | (mg/s) | 0.13   | 8 (mg/s) |
| uo:                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03   | 8 (mg/s) |
| ert e<br>ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.12    | (mg/s) | 1.34    | (mg/s) | 1.34   | (mg/s)   |
| mag                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00   | ) (mg/s) |
| ទ ប័                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.35    | (mg/s) | 0.35   | 5 (mg/s) |
|                              |   |          | Low Flo | w      | Average | Flow   | High   | low      |
| alance<br>node               | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.25    | (mg/s) | 2.46   | 6 (mg/s) |
| Mass ba<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 0.31    | (mg/s) | 3.15    | (mg/s) | 16.25  | 5 (mg/s) |
|                              |   |          | Low Flo | w      | Average | Flow   | High I | low      |
| t mass<br>tration            | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.00*  | (mg/L)   |
| Conver<br>filux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.002   | (mg/L) | 0.001   | (mg/L) | 0.00   | (mg/L)   |

| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Copper  |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| , dâ      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.020208301 | (mg/L) |
| Icel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| t         | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.004       | (mg/L) |

|                                      |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|-----------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.54      | (mg/s) | 6       | (mg/s) |
| tion                                 | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s) | 0.10      | (mg/s) | 0.10    | (mg/s) |
|                                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01      | (mg/s) | 0.01    | (mg/s) |
| itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.61      | (mg/s) | 30      | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s) | 0.48      | (mg/s) | 0.48    | (mg/s) |
| uo Xn                                | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.19      | (mg/s) | 0.19    | (mg/s) |
| ert o<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.29    | (mg/s) | 3.41      | (mg/s) | 3.41    | (mg/s) |
| ma                                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> دُ                          | mass flux in seepage from cell 2W                           | M_s2w =  | 0.09    | (mg/s) | 1.03      | (mg/s) | 1.03    | (mg/s) |
|                                      |   |          | Low Flo | W      | Average   | Flow   | High Fl | ow     |
| iss balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s) | 0.65      | (mg/s) | 6.19    | (mg/s) |
| Ma<br>at                             | mass flux in river at PM-13                                 | M_r13 =  | 0.96    | (mg/s) | 8.37      | (mg/s) | 41.12   | (mg/s) |
|                                      |   | -        | Low Flo | w      | Average   | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L) | <br>0.002 | (mg/L) | 0.002   | (mg/L) |
| ర≓ర                                  | concentration in river at PM-13                             | C_r13 =  | 0.005   | (mg/L) | 0.003     | (mg/L) | 0.002   | (mg/L) |

| Case<br>Parameter | Year 20<br>Fluoride   |          |          |        |
|-------------------|---|----------|----------|--------|
|                   |   | -        | -        |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| р с<br>р с        | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 7.70E-01 | (mg/L) |
| Cel               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| t                 | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| itration                  | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s) | 9.37    | (mg/s) | 9.37     | (mg/s) |
|                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s) | 45.87   | (mg/s) | 45.87    | (mg/s) |
| u Xn                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.04    | (mg/s) | 7.04     | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 11.21   | (mg/s) | 130.19  | (mg/s) | 130.19   | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 1.56    | (mg/s) | 1.56    | (mg/s) | 1.56     | (mg/s) |
| ទ ប័ ខ                    | mass flux in seepage from cell 2W                           | M_s2w =  | 30.08   | (mg/s) | 349.17  | (mg/s) | 349.17   | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 9.37    | (mg/s) | 45.99   | (mg/s) | 415.45   | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 98.09   | (mg/s) | 753.94  | (mg/s) | 2,937.43 | (mg/s) |
|                           |   | -        | Low Flo | W      | Average | Flow   | High Fl  | ow     |
| ert mass<br>n<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L) | 0.118   | (mg/L) | 0.102    | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.551   | (mg/L) | 0.279   | (mg/L) | 0.120    | (mg/L) |

| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Iron  |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| tra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 8.72E-02    | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| rt .      | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
|----------------------------|---|----------|---------|--------|----------|--------|-----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90 | (mg/s) | 11,749    | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85     | (mg/s) | 0.85      | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08    | (mg/s) | 27.08     | (mg/s) |
| itraf                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77 | (mg/s) | 57,657    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17     | (mg/s) | 4.17      | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13     | (mg/s) | 2.13      | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.27    | (mg/s) | 14.74    | (mg/s) | 14.74     | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.22    | (mg/s) | 0.22     | (mg/s) | 0.22      | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 89.14   | (mg/s) | 1,034.88 | (mg/s) | 1,034.88  | (mg/s) |
|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| balance<br>th node         | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | 1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 95.65   | (mg/s) | 7,168.74 | (mg/s) | 70,489.85 | (mg/s) |
|                            |   | -        | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| rt mass                    | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | 2.721    | (mg/L) | <br>2.883 | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.537   | (mg/L) | 2.653    | (mg/L) | 2.873     | (mg/L) |

| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
|           |   | 1        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| р с<br>р  | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        |          | 942.7142857 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 2.71E+02    | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| ort       | concentration of ground water into PM-12                        |          | 87.5        | (mg/L) |
| <u>d</u>  | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|                               |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
|-------------------------------|---|----------|-----------|--------|------------|--------|--------------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,980.41  | (mg/s) | 283,600      | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,129.58   | (mg/s) | 2,129.58     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 653.73     | (mg/s) | 653.73       | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121,890.93 | (mg/s) | 1,391,712    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) | 10,425.01  | (mg/s) | 10,425.01    | (mg/s) |
|                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,090.84  | (mg/s) | 53,090.84    | (mg/s) |
| ert o<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,941.56  | (mg/s) | 45,758.38  | (mg/s) | 45,758.38    | (mg/s) |
| mag                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 4,703.46  | (mg/s) | 4,703.46   | (mg/s) | 4,703.46     | (mg/s) |
| <u>د</u> ې                    | mass flux in seepage from cell 2W                           | M_s2w =  | 8,471.90  | (mg/s) | 98,352.01  | (mg/s) | 98,352.01    | (mg/s) |
|                               |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
| alance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | 27,763.72  | (mg/s) | 286,383.27   | (mg/s) |
| Mass b<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 29,671.51 | (mg/s) | 361,984.35 | (mg/s) | 1,890,424.90 | (mg/s) |
|                               |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) | 71.091     | (mg/L) | 70.104       | (mg/L) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 166.706   | (mg/L) | 133.964    | (mg/L) | 77.044       | (mg/L) |

| Case      | Year 20   |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   |          |       |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 13.45 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| et        | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|   |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
|---|---|----------|---------|--------|-----------|--------|-----------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39  | (mg/s) | 14,990    | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94     | (mg/s) | 38.94     | (mg/s) |
| tion                                    | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.98    | (mg/s) | 0.98      | (mg/s) | 0.98      | (mg/s) |
| trat                                    | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81  | (mg/s) | 73,562    | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 190.63    | (mg/s) | 190.63    | (mg/s) |
| uo:                                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 34.55     | (mg/s) | 34.55     | (mg/s) |
| ert e<br>ss f                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,029.85  | (mg/s) | 3,029.85  | (mg/s) |
| mag                                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 195.74  | (mg/s) | 2,272.35  | (mg/s) | 2,272.35  | (mg/s) |
| ទ ប័                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 150.77  | (mg/s) | 1,750.33  | (mg/s) | 1,750.33  | (mg/s) |
|   |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| s balance<br>ach node                   | mass flux in river at PM-12                                 | M_r12 =  | 39.92   | (mg/s) | 1,360.32  | (mg/s) | 15,030.21 | (mg/s) |
| Mas<br>at ea                            | mass flux in river at PM-13                                 | M r13 =  | 577.06  | (ma/s) | 15.080.85 | (ma/s) | 95.869.85 | (ma/s) |
|   |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 1.640   | (mg/L) | 3.483     | (mg/L) | 3.679     | (mg/l) |
| o ≑ o                                   | concentration in river at Pivi-13                           | C_n3 =   | 3.242   | (mg/L) | 5.581     | (mg/L) | 3.907     | (mg/l) |

| Case      | Year 20   |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Magnesium   |          |        |        |
|           |   | -        | -      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| , pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 19.45  | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|                            |   |          | Low Flo  | w      | Average I | Flow   | High Fl    | ow     |
|----------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 2,141.18  | (mg/s) | 24,309     | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s) | 259.20    | (mg/s) | 259.20     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 56.03     | (mg/s) | 56.03      | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 10,447.79 | (mg/s) | 119,290    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s) | 1,268.87  | (mg/s) | 1,268.87   | (mg/s) |
|                            | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 15,261.91 | (mg/s) | 15,261.91  | (mg/s) |
| ert e<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 283.06   | (mg/s) | 3,286.07  | (mg/s) | 3,286.07   | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 116.36   | (mg/s) | 116.36    | (mg/s) | 116.36     | (mg/s) |
| ទ ប្                       | mass flux in seepage from cell 2W                           | M_s2w =  | 1,357.72 | (mg/s) | 15,762.00 | (mg/s) | 15,762.00  | (mg/s) |
|                            |   |          | Low Flo  | w      | Average I | Flow   | High Fl    | ow     |
| s balance<br>ch node       | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s) | 2,456.41  | (mg/s) | 24,623.80  | (mg/s) |
| Mass<br>at ea              | mass flux in river at PM-13                                 | M_r13 =  | 3,285.20 | (mg/s) | 48,599.41 | (mg/s) | 179,608.60 | (mg/s) |
|                            |   |          | LOW FIO  | w      | Average   | FIOW   | High Fi    | ow     |
| ert mass<br>o<br>Intration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L) | 6.290     | (mg/l) | 6.028      | (mg/l) |
| Conv<br>flux to<br>conce   | concentration in river at PM-13                             | C_r13 =  | 18.458   | (mg/L) | 17.986    | (mg/l) | 7.320      | (mg/l) |

| Case      | Year 20   |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
|           |   | -        |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| , p r     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.45 | (mg/L) |
| ICer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| qu        | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                           |   |          | Low Flo | w      | Average  | Flow   | High Fl  | ow     |
|---------------------------|---|----------|---------|--------|----------|--------|----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 107.06   | (mg/s) | 1,215    | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 4.58    | (mg/s) | 4.58     | (mg/s) | 4.58     | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 2.80     | (mg/s) | 2.80     | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 522.39   | (mg/s) | 5,964    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 22.40   | (mg/s) | 22.40    | (mg/s) | 22.40    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 27.31    | (mg/s) | 27.31    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 6.56    | (mg/s) | 76.11    | (mg/s) | 76.11    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00     | (mg/s) | 0.00     | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 22.96   | (mg/s) | 266.49   | (mg/s) | 266.49   | (mg/s) |
|                           |   |          | Low Flo | w      | Average  | Flow   | High Fl  | ow     |
| balance<br>node           | mass flux in river at PM-12                                 | M_r12 =  | 4.58    | (mg/s) | 114.44   | (mg/s) | 1,222.81 | (mg/s) |
| Mass t<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 56.49   | (mg/s) | 1,029.15 | (mg/s) | 7,579.60 | (mg/s) |
|                           |   |          | Low Flo | w      | Average  | Flow   | High Fl  | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.188   | (mg/L) | 0.293    | (mg/l) | 0.299    | (mg/l) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.317   | (mg/L) | 0.381    | (mg/l) | 0.309    | (mg/l) |

| Case      | Year 20   |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Sodium  |          |        |        |
|           |   |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| р<br>р    | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 19.36  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|                                |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|--------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180     | (mg/s) |
| _                              | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.26     | (mg/s) |
| tion                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69      | (mg/s) |
| trat                           | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,586     | (mg/s) |
| cen                            | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.80     | (mg/s) |
|                                | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.88   | (mg/s) |
| ert o<br>Ss f                  | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 281.86   | (mg/s) | 3,272.20  | (mg/s) | 3,272.20   | (mg/s) |
| n ve<br>ma:                    | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 139.30   | (mg/s) | 139.30    | (mg/s) | 139.30     | (mg/s) |
| ទ ប័                           | mass flux in seepage from cell 2W                           | M_s2w =  | 859.80   | (mg/s) | 9,981.63  | (mg/s) | 9,981.63   | (mg/s) |
|                                |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| alance<br>node                 | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94  | (mg/s) |
| Mass b<br>at each              | mass flux in river at PM-13                                 | M_r13 =  | 1,984.02 | (mg/s) | 28,202.32 | (mg/s) | 104,624.34 | (mg/s) |
|                                |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| nvert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.508      | (mg/l) |
| flux<br>con                    | concentration in river at PM-13                             | C_r13 =  | 11.147   | (mg/L) | 10.437    | (mg/l) | 4.264      | (mg/l) |

| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Nickel  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| tra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.141786777 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| ont       | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.43    | (mg/s) | 5       | (mg/s) |
|                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ltrat                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.09    | (mg/s) | 24      | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.83    | (mg/s) | 0.83    | (mg/s) | 0.83    | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.29    | (mg/s) | 0.29    | (mg/s) |
| ert o<br>Ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.06    | (mg/s) | 23.96   | (mg/s) | 23.96   | (mg/s) |
| ma                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.05    | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
| ទ ប័ ខ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.13    | (mg/s) | 1.55    | (mg/s) | 1.55    | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s) | 0.61    | (mg/s) | 5.04    | (mg/s) |
| Mass ba<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 3.26    | (mg/s) | 29.39   | (mg/s) | 55.59   | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| 't mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001   | (mg/L) |
| Conver<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.018   | (mg/L) | 0.011   | (mg/L) | 0.002   | (mg/L) |

| Case<br>Parameter | Year 20<br>Lead   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0           | (ma/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| b r               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001841737 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| ŭ L               | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                             |   | Low Flow |         | Average Flow |         | High Flow |  |         |        |
|-----------------------------|---|----------|---------|--------------|---------|-----------|--|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)       | -       | (mg/s)    |  | -       | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s)       | 0.03    | (mg/s)    |  | 0.03    | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)       | -       | (mg/s)    |  | -       | (mg/s) |
| itrai                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)       | -       | (mg/s)    |  | -       | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s)       | 0.14    | (mg/s)    |  | 0.14    | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)       | 0.02    | (mg/s)    |  | 0.02    | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.03    | (mg/s)       | 0.31    | (mg/s)    |  | 0.31    | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s)       | 0.00    | (mg/s)    |  | 0.00    | (mg/s) |
| ទ ប័                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s)       | 0.27    | (mg/s)    |  | 0.27    | (mg/s) |
|                             |   |          | Low Flo | w            | Average | Flow      |  | High Fl | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s)       | 0.03    | (mg/s)    |  | 0.03    | (mg/s) |
| Mass bê<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.22    | (mg/s)       | 0.77    | (mg/s)    |  | 0.77    | (mg/s) |
|                             |   |          | Low Flo | w            | Average | Flow      |  | High Fl | ow     |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L)       | 0.000   | (mg/L)    |  | 0.000   | (mg/L) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L)       | 0.000   | (mg/L)    |  | 0.000   | (mg/L) |

| Case      | Year 20   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  |          |          |        |
| -         |   | 1        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.02E-02 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| int       | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.01    | (mg/s) | 0       | (mg/s) |
| -                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| tior                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.18    | (mg/s) | 0.18    | (mg/s) | 0.18    | (mg/s) |
| u xn                                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.15    | (mg/s) | 1.73    | (mg/s) | 1.73    | (mg/s) |
| mas                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ass balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.12    | (mg/s) |
| Mi<br>at                             | mass flux in river at PM-13                                 | M_r13 =  | 0.37    | (mg/s) | 2.06    | (mg/s) | 2.50    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| 0 = 0                                | concentration in river at PM-13                             | C_r13 =  | 0.002   | (mg/L) | 0.001   | (mg/L) | 0.000   | (mg/L) |

| Case       | Year 20   |          |             |        |
|------------|---|----------|-------------|--------|
| Parameter  | Selenium  |          |             |        |
|            |   | -        |             |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| ρι<br>J dŝ | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.002326015 | (mg/L) |
| Cer        | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| con        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| ort        | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| du         | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.11    | (mg/s) | 1       | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.52    | (mg/s) | 6       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.35    | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.03    | (mg/s) | 0.39    | (mg/s) | 0.39    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>n node          | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.18    | (mg/s) | 1.29    | (mg/s) |
| Mass t<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.51    | (mg/s) | 1.81    | (mg/s) | 8.36    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 20<br>Sulfate  |          |         |        |
|-------------------|---|----------|---------|--------|
| , arameter        | Sanato  |          |         |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| ip u              | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 211.97  | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| out               | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                                   |   |          | Low Flo   | w                   | Average    | Flow   | High Fl    | ow     |
|-----------------------------------|---|----------|-----------|---------------------|------------|--------|------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s)              | 1,427.45   | (mg/s) | 16,206     | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 206.87    | (mg/s)              | 206.87     | (mg/s) | 206.87     | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s)              | 37.36      | (mg/s) | 37.36      | (mg/s) |
| trat                              | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s)              | 6,965.20   | (mg/s) | 79,526     | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72  | (mg/s)              | 1,012.72   | (mg/s) | 1,012.72   | (mg/s) |
| u xn                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s)              | 58,922.60  | (mg/s) | 58,922.60  | (mg/s) |
| ssfo                              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,085.44  | (mg/s)              | 35,819.52  | (mg/s) | 35,819.52  | (mg/s) |
| mas                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 4,013.51  | (mg/s)              | 4,013.51   | (mg/s) | 4,013.51   | (mg/s) |
| ទ ប្                              | mass flux in seepage from cell 2W                           | M_s2w =  | 2,957.21  | (mg/s)              | 34,330.84  | (mg/s) | 34,330.84  | (mg/s) |
|                                   |   |          | Low Flo   | ow Flow Average Flo |            | Flow   | High Fl    | ow     |
| alance<br>node                    | mass flux in river at PM-12                                 | M_r12 =  | 206.87    | (mg/s)              | 1,671.68   | (mg/s) | 16,449.94  | (mg/s) |
| Mass b<br>at each                 | mass flux in river at PM-13                                 | M_r13 =  | 11,275.75 | (mg/s)              | 142,736.07 | (mg/s) | 230,075.53 | (mg/s) |
|                                   |   |          | Low Flo   | w                   | Average    | Flow   | High Fl    | ow     |
| nvert mass<br>x to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 8.500     | (mg/L)              | 4.280      | (mg/l) | 4.027      | (mg/l) |
| co<br>Llu<br>CO                   | concentration in river at PM-13                             | C_r13 =  | 63.351    | (mg/L)              | 52.824     | (mg/l) | 9.377      | (mg/l) |

| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Thallium  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0002      | (mg/L) |
| n data    | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
|           | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006      | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001147722 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| int       | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.000004    | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.07    | (mg/s) | 1       | (mg/s) |
| -                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tio                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ntra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.35    | (mg/s) | 4       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.19    | (mg/s) | 0.19    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>n node         | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.07    | (mg/s) | 0.81    | (mg/s) |
| Mass                      | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.69    | (mg/s) | 5.06    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>itration       | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 20<br>Zinc   |          |             |        |
|-------------------|---|----------|-------------|--------|
| rurumotor         | 2   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| n data            | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
|                   | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.061124366 | (mg/L) |
| Icel              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| l log             | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| nt                | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.0115      | (mg/L) |

|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 5.71    | (mg/s) | 65      | (mg/s) |
| -                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28    | (mg/s) | 0.28    | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.15    | (mg/s) | 0.15    | (mg/s) |
| itrat                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 27.86   | (mg/s) | 318     | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.37    | (mg/s) | 1.37    | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.89    | (mg/s) | 10.33   | (mg/s) | 10.33   | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ទ ប័                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.28    | (mg/s) | 3.23    | (mg/s) | 3.23    | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14    | (mg/s) | 65.25   | (mg/s) |
| Mass ba<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 2.82    | (mg/s) | 49.11   | (mg/s) | 398.46  | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016   | (mg/L) | 0.016   | (mg/L) |
| Conver<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.016   | (mg/L) | 0.018   | (mg/L) | 0.016   | (mg/L) |

Appendix F.7 Embarrass River Proposed Action Closure

## FLOWS

| Case               | Closure  |            |      |       |       |
|--------------------|--|------------|------|-------|-------|
| Flows              | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| in<br>s River      | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| low<br>ras:        | flow in river at PM-13                         | Q_r13_L =  | 6.27 | (cfs) | PM-13 |
| Total fl<br>Embarı | flow check                                     | Q_ck_L =   | 6.27 | (cfs) |       |
|                    | surface water flow into PM-12                  | Q_s12_L =  | 0.00 | (cfs) | PM-12 |
|                    | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                    | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                    | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| Ita                | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.51 | (cfs) | PM-13 |
| v da               | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.00 | (cfs) | PM-13 |
| flov               | seepage from cell 2W                           | Q_s2w_L =  | 0.69 | (cfs) | PM-13 |
| out                | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| lnp                | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case               | Closure  |            |       |       |       |
|--------------------|--|------------|-------|-------|-------|
| Flow               | Average Flow Conditions (mean annual)          |            |       |       | _     |
| n<br>River         | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| l flow i<br>arrass | flow in river at PM-13                         | Q_r13_M =  | 87.35 | (cfs) | PM-13 |
| Total<br>Embi      | flow check                                     | Q_ck_M =   | 87.35 | (cfs) |       |
|                    | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|                    | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                    | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                    | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ą                  | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 2.45  | (cfs) | PM-13 |
| , da               | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.00  | (cfs) | PM-13 |
| <u>so</u>          | seepage from cell 2W                           | Q_s2w_M =  | 3.37  | (cfs) | PM-13 |
| rt 1               | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
|                    | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case             | Closure   |            |        |       |       |
|------------------|---|------------|--------|-------|-------|
| Flow             | High Flow Conditions (avg. annual 1-day max flow) |            |        |       |       |
| n<br>River       | flow in river at PM-12                            | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>Irrass | flow in river at PM-13                            | Q_r13_H =  | 858.90 | (cfs) | PM-13 |
| Total<br>Emba    | flow check  | Q_ck_H =   | 858.90 | (cfs) | _     |
|                  | surface water flow into PM-12                     | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                     | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                            | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                           | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta               | seepage from Tailings Basin Cells 1E and 2E       | Q_fs_H =   | 2.45   | (cfs) | PM-13 |
| / da             | hydrometallurgical residue cells liner leakage    | Q_rrs_H =  | 0.00   | (cfs) | PM-13 |
| oli<br>No        | seepage from cell 2W                              | Q_s2w_H =  | 3.37   | (cfs) | PM-13 |
| t T              | ground water flow into PM-12                      | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| dul              | ground water flow into PM-13                      | Q g13 H =  | 4.21   | (cfs) | PM-13 |

| Case      | Closure   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Silver  |          |          |        |
|           |   | -        |          | -      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| n data    | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
|           | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00097  | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| Lo Lo     | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                            |   |          | Low Flo | w      | Average     | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|-------------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04        | (mg/s) | 0       | (mg/s) |
|                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00        | (mg/s) | 0.00    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00        | (mg/s) | 0.00    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.19        | (mg/s) | 2       | (mg/s) |
| concen<br>lux              | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00        | (mg/s) | 0.00    | (mg/s) |
|                            | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01        | (mg/s) | 0.01    | (mg/s) |
| ssfe                       | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.07        | (mg/s) | 0.07    | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00        | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> ک                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.01        | (mg/s) | 0.01    | (mg/s) |
|                            |   |          | Low Flo | W      | Average     | Flow   | High Fl | ow     |
| balance<br>th node         | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04        | (mg/s) | 0.45    | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.32        | (mg/s) | 2.72    | (mg/s) |
|                            |   | -        | Low Flo | W      | <br>Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000       | (mg/L) | 0.000   | (mg/L) |
| Conv<br>flux to<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000       | (mg/L) | 0.000   | (mg/L) |

| Case      | Closure   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Aluminum  |          |          |        |
|           |   | -        | -        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325  | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.37E-01 | (mg/L) |
| Cet       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.025    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) | 0.61    | (mg/s) | 0.61     | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| Icen                       | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) | 2.98    | (mg/s) | 2.98     | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.75    | (mg/s) | 0.75     | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 9.11    | (mg/s) | 44.20   | (mg/s) | 44.20    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 31.04   | (mg/s) | 150.57  | (mg/s) | 150.57   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| alance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) | 37.23   | (mg/s) | 406.69   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 43.75   | (mg/s) | 409.87  | (mg/s) | 2,593.35 | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) | 0.095   | (mg/L) | 0.100    | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.246   | (mg/L) | 0.166   | (mg/L) | 0.107    | (mg/L) |

| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Arsenic   |          |             |        |
|           |   | -        | r           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00075     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00075     | (mg/L) |
| ů p c     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00075     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.001325    | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.012359831 | (mg/L) |
| Icel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| Cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00291     | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 0.00273     | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.00273     | (mg/L) |

|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.27    | (mg/s) | 3       | (mg/s) |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tion                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itra                         | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.31    | (mg/s) | 15      | (mg/s) |
| Icen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) | 0.33    | (mg/s) | 0.33    | (mg/s) |
|                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| ert o<br>ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.18    | (mg/s) | 0.86    | (mg/s) | 0.86    | (mg/s) |
| n ve<br>ma:                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប្                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.06    | (mg/s) | 0.28    | (mg/s) | 0.28    | (mg/s) |
|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node               | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.34    | (mg/s) | 3.11    | (mg/s) |
| Mass ba<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 0.63    | (mg/s) | 3.18    | (mg/s) | 19.56   | (mg/s) |
|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| t mass<br>tration            | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Conver<br>flux to<br>conceni | concentration in river at PM-13                             | C_r13 =  | 0.004   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |

| Case                                  | Closure   |          |             |        |
|---------------------------------------|---|----------|-------------|--------|
| Parameter                             | Boron   |          |             |        |
|                                       |   | -        |             |        |
|                                       | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata                                   | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| ů p c                                 | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| tio                                   | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ntra                                  | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.198832748 | (mg/L) |
| cer                                   | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| L L L L L L L L L L L L L L L L L L L | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| nt                                    | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| du du                                 | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 4.28    | (mg/s) | 49      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) | 0.52    | (mg/s) | 0.52    | (mg/s) |
| centration                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
|                            | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 20.90   | (mg/s) | 239     | (mg/s) |
|                            | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) | 2.53    | (mg/s) | 2.53    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.41    | (mg/s) | 7.41    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.84    | (mg/s) | 13.79   | (mg/s) | 13.79   | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 6.49    | (mg/s) | 31.47   | (mg/s) | 31.47   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) | 4.91    | (mg/s) | 49.25   | (mg/s) |
| Mass t<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 12.38   | (mg/s) | 81.01   | (mg/s) | 343.02  | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) | 0.013   | (mg/L) | 0.012   | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.070   | (mg/L) | 0.033   | (mg/L) | 0.014   | (mg/L) |

| Case<br>Parameter | Closure<br>Barium   |          |          |        |
|-------------------|---|----------|----------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0.011    | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| n de              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 4.81E-02 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| <u>du</u>         | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

|                            |   |          | Low Flo | W      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 3.93    | (mg/s) | 45      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 1.66    | (mg/s) | 1.66    | (mg/s) | 1.66    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| centra                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 19.15   | (mg/s) | 219     | (mg/s) |
|                            | mass flux of ground water into PM-13                        | M_g13 =  | 8.11    | (mg/s) | 8.11    | (mg/s) | 8.11    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.69    | (mg/s) | 3.34    | (mg/s) | 3.34    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 1.83    | (mg/s) | 8.87    | (mg/s) | 8.87    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 1.66    | (mg/s) | 5.69    | (mg/s) | 46.33   | (mg/s) |
| Mass k<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 12.29   | (mg/s) | 45.41   | (mg/s) | 285.59  | (mg/s) |
|                            |   |          | Low Flo | W      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.068   | (mg/L) | 0.015   | (mg/L) | 0.011   | (mg/L) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 0.069   | (mg/L) | 0.018   | (mg/L) | 0.012   | (mg/L) |

| Case<br>Parameter | Closure<br>Beryllium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0001      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0001      | (mg/L) |
| βρι               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000808254 | (mg/L) |
| ICer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0           | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075     | (mg/L) |
| ort .             | concentration of ground water into PM-12                        | C_g12 =  | 0.000023    | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 0.000023    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.17    | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.41    | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.03    | (mg/s) | 0.35    | (mg/s) | 2.53    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Calcium   |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 13          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 13          | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 13          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 95.35       | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 59.94387899 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 416         | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 59.78       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 19          | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 19          | (mg/L) |

|                                   |   |          | Low Flo  | W      | Average   | Flow   | High Fl    | low    |
|-----------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4,639.22  | (mg/s) | 52,669     | (mg/s) |
| -                                 | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) | 462.42    | (mg/s) | 462.42     | (mg/s) |
| tratior                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 121.41    | (mg/s) | 121.41     | (mg/s) |
|                                   | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 22,636.89 | (mg/s) | 258,461    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) | 2,263.72  | (mg/s) | 2,263.72   | (mg/s) |
|                                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 5,369.83  | (mg/s) | 5,369.83   | (mg/s) |
| ert o<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 857.11   | (mg/s) | 4,157.57  | (mg/s) | 4,157.57   | (mg/s) |
| n ve<br>ma:                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 19.51    | (mg/s) | 19.51     | (mg/s) | 19.51      | (mg/s) |
| ទ ប្                              | mass flux in seepage from cell 2W                           | M_s2w =  | 1,175.36 | (mg/s) | 5,701.28  | (mg/s) | 2.80       | (mg/s) |
|                                   |   |          | Low Flo  | W      | Average   | Flow   | High Fl    | low    |
| alance<br>node                    | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) | 5,223.05  | (mg/s) | 53,252.39  | (mg/s) |
| Mass b<br>at each                 | mass flux in river at PM-13                                 | M_r13 =  | 4,778.13 | (mg/s) | 45,371.84 | (mg/s) | 323,526.61 | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | low    |
| nvert mass<br>x to<br>1centration | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) | 13.374    | (mg/l) | 13.036     | (mg/l) |
| C LI C                            | concentration in river at PM-13                             | C_r13 =  | 26.921   | (mg/L) | 18.354    | (mg/l) | 13.310     | (mg/l) |

| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Cadmium   |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00008     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00008     | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000227872 | (mg/L) |
| cei       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004      | (mg/L) |
| l o       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188    | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 0.0003      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0003      | (mg/L) |

|                            |   |          | Low Flo | w      | Average     | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|-------------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.03        | (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.01    | (mg/s) | 0.01        | (mg/s) | 0.01    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00        | (mg/s) | 0.00    | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.14        | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.04    | (mg/s) | 0.04        | (mg/s) | 0.04    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01        | (mg/s) | 0.01    | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00    | (mg/s) | 0.02        | (mg/s) | 0.02    | (mg/s) |
| mas                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00        | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.02        | (mg/s) | 0.02    | (mg/s) |
|                            |   |          | Low Flo | w      | Average     | Flow   | High Fl | ow     |
| balance<br>ch node         | mass flux in river at PM-12                                 | M_r12 =  | 0.01    | (mg/s) | 0.04        | (mg/s) | 0.33    | (mg/s) |
| Mass<br>at ea              | mass flux in river at PM-13                                 | M_r13 =  | 0.05    | (mg/s) | 0.25        | (mg/s) | 2.00    | (mg/s) |
|                            |   |          | Low Flo | W      | <br>Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000       | (mg/L) | 0.000   | (mg/L) |
| Conv<br>filux t            | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000       | (mg/L) | 0.000   | (mg/L) |

| Case      | Closure   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Chloride  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| , di      | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.29E+00 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                            |   |          | Low Flo  | w      | Average      | Flow   | High Fl    | ow     |
|----------------------------|---|----------|----------|--------|--------------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3,568.63     | (mg/s) | 40,514     | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 43.81    | (mg/s) | 43.81        | (mg/s) | 43.81      | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 93.39        | (mg/s) | 93.39      | (mg/s) |
| Itrat                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 17,412.99    | (mg/s) | 198,816    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 214.46   | (mg/s) | 214.46       | (mg/s) | 214.46     | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 335.09       | (mg/s) | 335.09     | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 89.94    | (mg/s) | 436.24       | (mg/s) | 436.24     | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 82.56    | (mg/s) | 82.56        | (mg/s) | 82.56      | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 423.51   | (mg/s) | 2,054.29     | (mg/s) | 2,054.29   | (mg/s) |
|                            |   |          | Low Flow |        | Average Flow |        | High Fl    | ow     |
| balance<br>ch node         | mass flux in river at PM-12                                 | M_r12 =  | 43.81    | (mg/s) | 3,705.83     | (mg/s) | 40,651.48  | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 854.27   | (mg/s) | 24,241.46    | (mg/s) | 242,590.11 | (mg/s) |
|                            |   |          | Low Flo  | w      | Average      | Flow   | High Fl    | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 1.800    | (mg/L) | 9.489        | (mg/L) | 9.951      | (mg/L) |
| Conv<br>filux t<br>conc    | concentration in river at PM-13                             | C_r13 =  | 4.813    | (mg/L) | 9.806        | (mg/L) | 9.980      | (mg/L) |

| Case       | Closure   |          |             |        |
|------------|---|----------|-------------|--------|
| Parameter  | Cobalt  |          |             |        |
|            |   |          |             |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 0.0006      | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001356866 | (mg/L) |
| ICE        | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| l o        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| rt         | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| d L        | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.21    | (mg/s) | 2       | (mg/s) |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| tion                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ntra                         | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.04    | (mg/s) | 12      | (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 0.13    | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
| uo:                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert o<br>ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| mas                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> دُ                  | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.15    | (mg/s) | 0.15    | (mg/s) |
|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node               | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.25    | (mg/s) | 2.46    | (mg/s) |
| Mass b<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) | 1.70    | (mg/s) | 14.80   | (mg/s) |
|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| t mass<br>tration            | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Conver<br>filux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |

| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Copper  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.018240705 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| et        | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0.004       | (mg/L) |

|                            |   |          | Low Flo | w        |  | Average      | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|----------|--|--------------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)   |  | 0.54         | (mg/s) | 6       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s)   |  | 0.10         | (mg/s) | 0.10    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)   |  | 0.01         | (mg/s) | 0.01    | (mg/s) |
| itral                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)   |  | 2.61         | (mg/s) | 30      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s)   |  | 0.48         | (mg/s) | 0.48    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)   |  | 0.19         | (mg/s) | 0.19    | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.26    | (mg/s)   |  | 1.27         | (mg/s) | 1.27    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s)   |  | 0.00         | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.09    | (mg/s)   |  | 0.43         | (mg/s) | 0.43    | (mg/s) |
|                            |   |          | Low Flo | Low Flow |  | Average Flow |        | High Fl | ow     |
| balance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s)   |  | 0.65         | (mg/s) | 6.19    | (mg/s) |
| Mass k<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.92    | (mg/s)   |  | 5.63         | (mg/s) | 38.38   | (mg/s) |
|                            |   |          | Low Flo | w        |  | Average      | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L)   |  | 0.002        | (mg/L) | 0.002   | (mg/L) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 0.005   | (mg/L)   |  | 0.002        | (mg/L) | 0.002   | (mg/L) |

| Case      | Closure   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Fluoride  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.82E-02 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| cou       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|                           |   |          | Low Flo | w        |  | Average      | Flow   | High Fl  | ow     |
|---------------------------|---|----------|---------|----------|--|--------------|--------|----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)   |  | 35.69        | (mg/s) | 405      | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s)   |  | 9.37         | (mg/s) | 9.37     | (mg/s) |
| tior                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)   |  | 0.93         | (mg/s) | 0.93     | (mg/s) |
| ıtra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)   |  | 174.13       | (mg/s) | 1,988    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s)   |  | 45.87        | (mg/s) | 45.87    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)   |  | 7.04         | (mg/s) | 7.04     | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.26    | (mg/s)   |  | 1.27         | (mg/s) | 1.27     | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.13    | (mg/s)   |  | 0.13         | (mg/s) | 0.13     | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 30.48   | (mg/s)   |  | 147.83       | (mg/s) | 147.83   | (mg/s) |
|                           |   |          | Low Flo | Low Flow |  | Average Flow |        | High Fl  | ow     |
| lance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 9.37    | (mg/s)   |  | 45.99        | (mg/s) | 415.45   | (mg/s) |
| Mass ba<br>at each        | mass flux in river at PM-13                                 | M_r13 =  | 86.11   | (mg/s)   |  | 422.25       | (mg/s) | 2,605.74 | (mg/s) |
|                           |   |          | Low Flo | w        |  | Average      | Flow   | High Fl  | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L)   |  | 0.118        | (mg/L) | 0.102    | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.485   | (mg/L)   |  | 0.171        | (mg/L) | 0.107    | (mg/L) |
| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Iron  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| ů p r     | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.75E-01    | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                            |   |          | Low Flo  | W      | Average  | Flow   | High Flo  | w      |
|----------------------------|---|----------|----------|--------|----------|--------|-----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,034.90 | (mg/s) | 11,749    | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.85     | (mg/s) | 0.85     | (mg/s) | 0.85      | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 27.08    | (mg/s) | 27.08     | (mg/s) |
| Itral                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 5,049.77 | (mg/s) | 57,657    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 4.17     | (mg/s) | 4.17     | (mg/s) | 4.17      | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 2.13     | (mg/s) | 2.13      | (mg/s) |
| ert e<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 9.65     | (mg/s) | 46.80    | (mg/s) | 46.80     | (mg/s) |
| nve<br>mas                 | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.02     | (mg/s) | 0.02     | (mg/s) | 0.02      | (mg/s) |
| ទ បិ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 90.32    | (mg/s) | 438.13   | (mg/s) | 438.13    | (mg/s) |
|                            |   |          | Low Flow |        | Average  | Flow   | High Flo  | w      |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.85     | (mg/s) | 1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| Mass be<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 105.01   | (mg/s) | 6,603.85 | (mg/s) | 69,924.96 | (mg/s) |
|                            |   |          | Low Flo  | W      | Average  | Flow   | High Flo  | w      |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.035    | (mg/L) | 2.721    | (mg/L) | 2.883     | (mg/L) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 0.592    | (mg/L) | 2.671    | (mg/L) | 2.877     | (mg/L) |

| Case<br>Parameter | Closure<br>Hardness   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   | -        |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| , p d             | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 227         | (mg/L) |
| cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8610        | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|                               |   |          | Low Flo   | W      | Average    | Flow   | High Flo       | ow     |
|-------------------------------|---|----------|-----------|--------|------------|--------|----------------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,980.41  | (mg/s) | 283,600        | (mg/s) |
| -                             | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,129.58   | (mg/s) | 2,129.58       | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 653.73     | (mg/s) | 653.73         | (mg/s) |
| itrai                         | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121,890.93 | (mg/s) | 1,391,712      | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) | 10,425.01  | (mg/s) | 10,425.01      | (mg/s) |
| u xn                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,090.84  | (mg/s) | 53,090.84      | (mg/s) |
| ssfo                          | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,251.11  | (mg/s) | 15,770.06  | (mg/s) | 15,770.06      | (mg/s) |
| mas                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 403.90    | (mg/s) | 403.90     | (mg/s) | 403.90         | (mg/s) |
| ទ ប្                          | mass flux in seepage from cell 2W                           | M_s2w =  | 8,584.18  | (mg/s) | 41,638.98  | (mg/s) | 41,638.98      | (mg/s) |
|                               |   |          | Low Flow  |        | Average    | Flow   | High Fl        | ow     |
| alance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | 27,763.72  | (mg/s) | <br>286,383.27 | (mg/s) |
| Mass b<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 24,793.78 | (mg/s) | 270,983.44 | (mg/s) | 1,799,423.99   | (mg/s) |
|                               |   |          | Low Flo   | w      | Average    | Flow   | High Fl        | ow     |
| wert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) | 71.091     | (mg/L) | <br>70.104     | (mg/L) |
| Cor<br>flux<br>con            | concentration in river at PM-13                             | C_r13 =  | 139.693   | (mg/L) | 109.618    | (mg/L) | 74.029         | (mg/L) |

| Case      | Closure   |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   |          |       |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| рс<br>рс  | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 13.37 | (mg/L) |
| cei       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| l o       | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| qu        | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|                                |   |          | Low Flow |        | Average Flow |        | High Flow |        |
|--------------------------------|---|----------|----------|--------|--------------|--------|-----------|--------|
|                                | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,320.39     | (mg/s) | 14,990    | (mg/s) |
| _                              | mass flux of ground water into PM-12                        | M_g12 =  | 38.94    | (mg/s) | 38.94        | (mg/s) | 38.94     | (mg/s) |
| tratior                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.08     | (mg/s) | 0.08         | (mg/s) | 0.08      | (mg/s) |
|                                | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,442.81     | (mg/s) | 73,562    | (mg/s) |
| cen                            | mass flux of ground water into PM-13                        | M_g13 =  | 190.63   | (mg/s) | 190.63       | (mg/s) | 190.63    | (mg/s) |
| lo XI                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 34.55        | (mg/s) | 34.55     | (mg/s) |
| ert o<br>ss f                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 3,029.85     | (mg/s) | 3,029.85  | (mg/s) |
| n ve<br>ma:                    | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 191.19   | (mg/s) | 927.38       | (mg/s) | 927.38    | (mg/s) |
| ទ បំ                           | mass flux in seepage from cell 2W                           | M_s2w =  | 152.77   | (mg/s) | 741.03       | (mg/s) | 741.03    | (mg/s) |
|                                |   |          | Low Flow |        | Average      | Flow   | High Fl   | ow     |
| alance<br>node                 | mass flux in river at PM-12                                 | M_r12 =  | 39.03    | (mg/s) | 1,359.42     | (mg/s) | 15,029.31 | (mg/s) |
| Mass be<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 573.61   | (mg/s) | 12,725.67    | (mg/s) | 93,514.67 | (mg/s) |
|                                |   |          | Low Flo  | w      | Average      | Flow   | High Fl   | ow     |
| nvert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 1.603    | (mg/L) | 3.481        | (mg/L) | 3.679     | (mg/l) |
| Cor<br>flux<br>con             | concentration in river at PM-13                             | C_r13 =  | 3.232    | (mg/L) | 5.148        | (mg/L) | 3.847     | (mg/l) |

| Case      | Closure   |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Magnesium   |          |        |        |
|           |   |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 18.87  | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| l o       | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

| m                                      | nass flux of surface water into PM-12                       | M s12 =  |          |        |           |        |                      |          |
|--|---|----------|----------|--------|-----------|--------|----------------------|----------|
| m                                      |   |          | -        | (mg/s) | 2,141.18  | (mg/s) | 24,309               | ) (mg/s) |
|  | nass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s) | 259.20    | (mg/s) | 259.20               | ) (mg/s) |
| m tio                                  | nass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 56.03     | (mg/s) | 56.03                | B (mg/s) |
| m trai                                 | nass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 10,447.79 | (mg/s) | 119,290              | ) (mg/s) |
| m ce                                   | nass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s) | 1,268.87  | (mg/s) | 1,268.87             | (mg/s)   |
| u s n m                                | nass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 15,261.91 | (mg/s) | 15,261.91            | (mg/s)   |
| ert e                                  | nass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 269.77   | (mg/s) | 1,308.55  | (mg/s) | 1,308.55             | 5 (mg/s) |
| m ag m                                 | nass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 9.99     | (mg/s) | 9.99      | (mg/s) | 9.99                 | ) (mg/s) |
| ວິ ຊ m                                 | nass flux in seepage from cell 2W                           | M_s2w =  | 1,375.71 | (mg/s) | 6,673.11  | (mg/s) | 6,673.1 <sup>2</sup> | (mg/s)   |
|  |   |          | Low Flow |        | Average I | Flow   | High I               | low      |
| is balance<br>ach node<br>∣∃           | nass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s) | 2,456.41  | (mg/s) | 24,623.80            | ) (mg/s) |
| m as mas                               | nass flux in river at PM-13                                 | M r13 =  | 3,183.54 | (mq/s) | 37,426.64 | (mg/s) | 168,435.83           | 3 (mg/s) |
|  |   | _        | Low Flor | w      | Average I | Flow   | High                 | low      |
| convert mass<br>lux to<br>oncentration | oncentration in river at PM-12                              | C_r12 =  | 10.650   | (mg/L) | 6.290     | (mg/l) | 6.028                | 8 (mg/l) |

| Case      | Closure   |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
| -         |   | -        |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.28 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| l S       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                           |   |          | Low Flow |        | Average Flow |              |  | High Flow |        |
|---------------------------|---|----------|----------|--------|--------------|--------------|--|-----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 107.06       | (mg/s)       |  | 1,215     | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 4.58     | (mg/s) | 4.58         | (mg/s)       |  | 4.58      | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 2.80         | (mg/s)       |  | 2.80      | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 522.39       | (mg/s)       |  | 5,964     | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 22.40    | (mg/s) | 22.40        | (mg/s)       |  | 22.40     | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 27.31        | (mg/s)       |  | 27.31     | (mg/s) |
| ert o<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3.95     | (mg/s) | 19.17        | (mg/s)       |  | 19.17     | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00         | (mg/s)       |  | 0.00      | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 23.26    | (mg/s) | 112.82       | (mg/s)       |  | 112.82    | (mg/s) |
|                           |   |          | Low Flow |        | Average      | Average Flow |  | High Fl   | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 4.58     | (mg/s) | 114.44       | (mg/s)       |  | 1,222.81  | (mg/s) |
| Mass  <br>at eac          | mass flux in river at PM-13                                 | M_r13 =  | 54.19    | (mg/s) | 818.53       | (mg/s)       |  | 7,368.99  | (mg/s) |
|                           |   | _        | Low Flo  | w      | Average      | Flow         |  | High Fl   | ow     |
| ert mass<br>h<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.188    | (mg/L) | 0.293        | (mg/l)       |  | 0.299     | (mg/l) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.305    | (mg/L) | 0.331        | (mg/l)       |  | 0.303     | (mg/l) |

| Case      | Closure   |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Sodium  |          |        |        |
|           |   |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 12.15  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| - S       | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|  |   |          | Low Flo  | w      | Average   | Flow   | High      | Flow      |
|--|---|----------|----------|--------|-----------|--------|-----------|-----------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180    | 0 (mg/s)  |
| _                                      | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.20    | 6 (mg/s)  |
| tion                                   | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69     | 9 (mg/s)  |
| itrai                                  | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,58     | 6 (mg/s)  |
| cen                                    | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.8     | 0 (mg/s)  |
|  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.8   | 8 (mg/s)  |
| ert o<br>Ss f                          | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 173.73   | (mg/s) | 842.70    | (mg/s) | 842.7     | 0 (mg/s)  |
| nve<br>ma                              | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 11.96    | (mg/s) | 11.96     | (mg/s) | 11.90     | 6 (mg/s)  |
| <u>و</u> د د                           | mass flux in seepage from cell 2W                           | M_s2w =  | 871.20   | (mg/s) | 4,225.89  | (mg/s) | 4,225.8   | 9 (mg/s)  |
|  |   |          | Low Flow |        | Average   | Flow   | High      | Flow      |
| s balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94 | 4 (mg/s)  |
| Mas                                    | mass flux in river at PM-13                                 | M r13 =  | 1,759,95 | (ma/s) | 19.889.75 | (mg/s) | 96.311.7  | 7 (ma/s)  |
|  |   |          | Low Flo  | w      | Average   | Flow   | High      | Flow      |
| convert mass<br>lux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.50      | 3 (mg/l)  |
| 0000                                   | concentration in river at Pivi-13                           | C_F13 =  | 9.916    | (mg/∟) | 8.046     | (mg/i) | 3.96      | ∠ [(mg/l) |

| Case                                  | Closure   |          |             |        |
|---------------------------------------|---|----------|-------------|--------|
| Parameter                             | NICKEI  | 1        |             |        |
|                                       | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata                                   | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| ů pů                                  | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio                                   | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ntra                                  | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.015125217 | (mg/L) |
| cer                                   | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| L L L L L L L L L L L L L L L L L L L | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| t                                     | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| du du                                 | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.43    | (mg/s) | 5       | (mg/s) |
| itration                  | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
|                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.09    | (mg/s) | 24      | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.83    | (mg/s) | 0.83    | (mg/s) | 0.83    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.29    | (mg/s) | 0.29    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.22    | (mg/s) | 1.05    | (mg/s) | 1.05    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.14    | (mg/s) | 0.66    | (mg/s) | 0.66    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| oalance<br>1 node         | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s) | 0.61    | (mg/s) | 5.04    | (mg/s) |
| Mass b<br>at eacl         | mass flux in river at PM-13                                 | M_r13 =  | 1.36    | (mg/s) | 5.54    | (mg/s) | 31.74   | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.008   | (mg/L) | 0.002   | (mg/L) | 0.001   | (mg/L) |

| Case                                  | Closure   |          |             |        |
|---------------------------------------|---|----------|-------------|--------|
| Parameter                             | Lead  |          |             |        |
|                                       |   |          | -           |        |
|                                       | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| ata                                   | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| ů pů                                  | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio                                   | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| ntra                                  | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001097329 | (mg/L) |
| cer                                   | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| L L L L L L L L L L L L L L L L L L L | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| t                                     | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| du du                                 | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| tration                   | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
|                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s) | 0.14    | (mg/s) | 0.14    | (mg/s) |
| u xn                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.08    | (mg/s) | 0.08    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>n node          | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| Mass b<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) | 0.38    | (mg/s) | 0.38    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Closure   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.37E-03 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.01    | (mg/s) | 0       | (mg/s) |
| itration                  | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
|                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.18    | (mg/s) | 0.18    | (mg/s) | 0.18    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.08    | (mg/s) | 0.37    | (mg/s) | 0.37    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.12    | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 0.30    | (mg/s) | 0.67    | (mg/s) | 1.10    | (mg/s) |
|                           |   | -        | Low Flo | W      | Average | Flow   | High Fl | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter                     | Closure<br>Selenium   |          |             |        |
|---------------------------------------|---|----------|-------------|--------|
|                                       |   |          |             |        |
|                                       | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ata                                   | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| , di                                  | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio                                   | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| ntra                                  | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001503093 | (mg/L) |
| cer                                   | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| L L L L L L L L L L L L L L L L L L L | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| nt                                    | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| lnp                                   | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.11    | (mg/s) | 1       | (mg/s) |
| ıtration                   | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                            | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.52    | (mg/s) | 6       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.35    | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| ma                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance                     | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.18    | (mg/s) | 1.29    | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.47    | (mg/s) | 1.36    | (mg/s) | 7.91    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Closure<br>Sulfate  |          |         |        |
|-------------------|---|----------|---------|--------|
|                   |   | 4        |         |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| ip u              | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 110.25  | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| Lo Lo             | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| dul               | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|-------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,427.45  | (mg/s) | 16,206     | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 206.87   | (mg/s) | 206.87    | (mg/s) | 206.87     | (mg/s) |
| ation                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 37.36     | (mg/s) | 37.36      | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,965.20  | (mg/s) | 79,526     | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72 | (mg/s) | 1,012.72  | (mg/s) | 1,012.72   | (mg/s) |
|                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 58,922.60 | (mg/s) | 58,922.60  | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,576.45 | (mg/s) | 7,646.82  | (mg/s) | 7,646.82   | (mg/s) |
| mag                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 344.66   | (mg/s) | 344.66    | (mg/s) | 344.66     | (mg/s) |
| <u>د</u> ې                    | mass flux in seepage from cell 2W                           | M_s2w =  | 2,996.40 | (mg/s) | 14,534.54 | (mg/s) | 14,534.54  | (mg/s) |
|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| oalance<br>1 node             | mass flux in river at PM-12                                 | M_r12 =  | 206.87   | (mg/s) | 1,671.68  | (mg/s) | 16,449.94  | (mg/s) |
| Mass k<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 6,137.09 | (mg/s) | 91,098.21 | (mg/s) | 178,437.67 | (mg/s) |
|                               |   | -        | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 8.500    | (mg/L) | 4.280     | (mg/l) | <br>4.027  | (mg/l) |
| Con<br>flux<br>conc           | concentration in river at PM-13                             | C_r13 =  | 34.578   | (mg/L) | 36.851    | (mg/l) | 7.341      | (mg/l) |

| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Thallium  |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0002      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
| , di      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        |          | 0.0006      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000917488 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.000004    | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.07    | (mg/s) | 1       | (mg/s) |
| itration                  | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.35    | (mg/s) | 4       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.07    | (mg/s) | 0.81    | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.54    | (mg/s) | 4.91    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Zinc  |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.020231354 | (mg/L) |
| cei       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| LOS       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| t         | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0115      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 5.71    | (mg/s) | 65      | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28    | (mg/s) | 0.28    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.15    | (mg/s) | 0.15    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 27.86   | (mg/s) | 318     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.37    | (mg/s) | 1.37    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.29    | (mg/s) | 1.40    | (mg/s) | 1.40    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.28    | (mg/s) | 1.37    | (mg/s) | 1.37    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14    | (mg/s) | 65.25   | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 2.22    | (mg/s) | 38.31   | (mg/s) | 387.67  | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>or<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016   | (mg/L) | 0.016   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.013   | (mg/L) | 0.015   | (mg/L) | 0.016   | (mg/L) |

Appendix F.8 Embarrass River Proposed Action Post-Closure

#### **FLOWS**

| Case           | Post-Closure                                   |            |      |       |       |
|----------------|--|------------|------|-------|-------|
| Flows          | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| in<br>s River  | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| flow<br>arras: | flow in river at PM-13                         | Q_r13_L =  | 6.27 | (cfs) | PM-13 |
| Total<br>Embê  | flow check                                     | Q_ck_L =   | 6.27 | (cfs) | _     |
|                | surface water flow into PM-12                  | Q s12 L =  | 0.00 | (cfs) | PM-12 |
|                | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| Ita            | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.77 | (cfs) | PM-13 |
| v da           | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.00 | (cfs) | PM-13 |
| flow           | seepage from cell 2W                           | Q_s2w_L =  | 0.43 | (cfs) | PM-13 |
| out            | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| lnp            | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case          | Post-Closure                                   |            |       |       |       |
|---------------|--|------------|-------|-------|-------|
| Flow          | Average Flow Conditions (mean annual)          |            |       |       |       |
| in<br>River   | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| l flow arrass | flow in river at PM-13                         | Q_r13_M =  | 85.33 | (cfs) | PM-13 |
| Tota<br>Emb   | flow check                                     | Q_ck_M =   | 85.33 | (cfs) |       |
|               | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|               | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|               | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|               | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ta            | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 2.45  | (cfs) | PM-13 |
| / da          | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.00  | (cfs) | PM-13 |
| lo v          | seepage from cell 2W                           | Q_s2w_M =  | 1.35  | (cfs) | PM-13 |
| nt            | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| dul           | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case             | Post-Closure                                   |            |        |       |       |
|------------------|--|------------|--------|-------|-------|
| Flow             | High Flow Conditions (avg. annual 1-day ma     | ax flow)   |        |       |       |
| n<br>River       | flow in river at PM-12                         | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>arrass | flow in river at PM-13                         | Q_r13_H =  | 856.88 | (cfs) | PM-13 |
| Total<br>Emba    | flow check                                     | Q_ck_H =   | 856.88 | (cfs) | 4     |
|                  | surface water flow into PM-12                  | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta               | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_H =   | 2.45   | (cfs) | PM-13 |
| / da             | hydrometallurgical residue cells liner leakage | Q_rrs_H =  | 0.00   | (cfs) | PM-13 |
| lo<br>No         | seepage from cell 2W                           | Q_s2w_H =  | 1.35   | (cfs) | PM-13 |
| t t              | ground water flow into PM-12                   | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| dul              | ground water flow into PM-13                   | Q g13 H =  | 4.21   | (cfs) | PM-13 |

| Case       | Post-Closure  |          |          |        |
|------------|---|----------|----------|--------|
| Parameter  | Silver  |          |          |        |
|            |   | -        | -        |        |
|            | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| ata        | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
| р с<br>р с | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ntra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00097  | (mg/L) |
| cer        | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| l o        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| nt         | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| du         | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                                      |   |          | Low Flo | w      | Average I | Flow   | High Flo | ow            |
|--------------------------------------|---|----------|---------|--------|-----------|--------|----------|---------------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04      | (mg/s) | 0        | (mg/s)        |
| -                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00     | (mg/s)        |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00      | (mg/s) | 0.00     | (mg/s)        |
| Itra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.19      | (mg/s) | 2        | (mg/s)        |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00     | (mg/s)        |
|                                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01      | (mg/s) | 0.01     | (mg/s)        |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.07      | (mg/s) | 0.07     | (mg/s)        |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00     | (mg/s)        |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00     | (mg/s)        |
|                                      |   |          | Low Flo | w      | Average I | Flow   | High Flo | ow            |
| ss balance<br>each node              | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04      | (mg/s) | 0.45     | <u>(mg/s)</u> |
| Ma<br>at c                           | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.31      | (mg/s) | 2.71     | (mg/s)        |
|                                      |   |          | Low Flo | w      | Average I | Flow   | High Flo | ow            |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000     | (mg/L) | 0.000    | (mg/L)        |
| ర≓ర                                  | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000     | (mg/L) | 0.000    | (mg/L)        |

| Case      | Post-Closure  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Aluminum  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| , p d     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325  | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.37E-01 | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.025    | (mg/L) |

|                                    |   |          | Low Flo  | w      | Averag | e Flow       |  | High Fl  | ow     |
|------------------------------------|---|----------|----------|--------|--------|--------------|--|----------|--------|
|                                    | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 35.6   | (mg/s)       |  | 405      | (mg/s) |
| _                                  | mass flux of ground water into PM-12                        | M_g12 =  | 0.61     | (mg/s) | 0.6    | (mg/s)       |  | 0.61     | (mg/s) |
| tion                               | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.9    | (mg/s)       |  | 0.93     | (mg/s) |
| Itra                               | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 174.1  | 8 (mg/s)     |  | 1,988    | (mg/s) |
| cen                                | mass flux of ground water into PM-13                        | M_g13 =  | 2.98     | (mg/s) | 2.9    | (mg/s)       |  | 2.98     | (mg/s) |
| u Xn                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.7    | i (mg/s)     |  | 0.75     | (mg/s) |
| ert e<br>Ss f                      | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 13.96    | (mg/s) | 44.2   | ) (mg/s)     |  | 44.20    | (mg/s) |
| n ve<br>mas                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01     | (mg/s) | 0.0    | (mg/s)       |  | 0.01     | (mg/s) |
| ទ បំ                               | mass flux in seepage from cell 2W                           | M_s2w =  | 19.04    | (mg/s) | 60.3   | ? (mg/s)     |  | 60.32    | (mg/s) |
|                                    |   |          | Low Flow |        | Averag | Average Flow |  | High Fl  | ow     |
| s balance<br>ich node              | mass flux in river at PM-12                                 | M_r12 =  | 0.61     | (mg/s) | 37.2   | 8 (mg/s)     |  | 406.69   | (mg/s) |
| Mas:<br>at ea                      | mass flux in river at PM-13                                 | M_r13 =  | 36.59    | (mg/s) | 319.6  | (mg/s)       |  | 2,503.10 | (mg/s) |
|                                    |   | -        | Low Flo  | w      | Averag | Flow         |  | High Fl  | ow     |
| invert mass<br>x to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 0.025    | (mg/L) | 0.09   | 5 (mg/L)     |  | 0.100    | (mg/L) |
| col Co<br>col co                   | concentration in river at PM-13                             | C_r13 =  | 0.206    | (mg/L) | 0.13   | (mg/L)       |  | 0.103    | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Arsenic   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.00075     | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.00075     | (mg/L) |
| p c               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00075     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.001325    | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.012359831 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| CO                | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00291     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.00273     | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.00273     | (mg/L) |

|                               |   |          | Low Flo | w      | Average | Flow   | High Fl   | ow     |
|-------------------------------|---|----------|---------|--------|---------|--------|-----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.27    | (mg/s) | 3         | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07      | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01      | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.31    | (mg/s) | 15        | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) | 0.33    | (mg/s) | 0.33      | (mg/s) |
|                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.07    | (mg/s) | 0.07      | (mg/s) |
| ert o<br>Ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.27    | (mg/s) | 0.86    | (mg/s) | 0.86      | (mg/s) |
| mas                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00      | (mg/s) |
| ទ ប្                          | mass flux in seepage from cell 2W                           | M_s2w =  | 0.04    | (mg/s) | 0.11    | (mg/s) | 0.11      | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl   | ow     |
| balance<br>th node            | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.34    | (mg/s) | 3.11      | (mg/s) |
| Mass<br>at eac                | mass flux in river at PM-13                                 | M_r13 =  | 0.70    | (mg/s) | 3.02    | (mg/s) | 19.39     | (mg/s) |
|                               |   |          | LOWIN   | ~~     | Average | 100    | Ingitte   | 0      |
| vert mass<br>to<br>:entration | concentration in river at PM-12                             | C_r12 =  | 0.0027  | (mg/L) | 0.001   | (mg/L) | <br>0.001 | (mg/L) |
| Con                           | concentration in river at PM-13                             | C_r13 =  | 0.0039  | (mg/L) | 0.001   | (mg/L) | 0.001     | (mg/L) |

| Case      | Post-Closure  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Boron   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.198832748 | (mg/L) |
| Cet       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| Lo Lo     | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| int       | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 4.28    | (mg/s) | 49      | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) | 0.52    | (mg/s) | 0.52    | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
| trat                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 20.90   | (mg/s) | 239     | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) | 2.53    | (mg/s) | 2.53    | (mg/s) |
| uo Xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.41    | (mg/s) | 7.41    | (mg/s) |
| ert o<br>Ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 4.35    | (mg/s) | 13.79   | (mg/s) | 13.79   | (mg/s) |
| n ve<br>ma:                 | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ទ ប្                        | mass flux in seepage from cell 2W                           | M_s2w =  | 3.98    | (mg/s) | 12.61   | (mg/s) | 12.61   | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) | 4.91    | (mg/s) | 49.25   | (mg/s) |
| Mass bé<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 11.38   | (mg/s) | 62.14   | (mg/s) | 324.16  | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) | 0.013   | (mg/L) | 0.012   | (mg/L) |
| Convel<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.064   | (mg/L) | 0.026   | (mg/L) | 0.013   | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Barium  |          |          |        |
|-------------------|---|----------|----------|--------|
|                   |   | 010      | 0.014    | (      |
| _                 | concentration of surface water into PM-12                       | C_s12 =  | 0.011    | (mg/L) |
| ate               | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| pu                | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 4.81E-02 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| ln                | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 3.93    | (mg/s) | 45      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 1.66    | (mg/s) | 1.66    | (mg/s) | 1.66    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| ntrat                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 19.15   | (mg/s) | 219     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 8.11    | (mg/s) | 8.11    | (mg/s) | 8.11    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.05    | (mg/s) | 3.34    | (mg/s) | 3.34    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 1.12    | (mg/s) | 3.55    | (mg/s) | 3.55    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 1.66    | (mg/s) | 5.69    | (mg/s) | 46.33   | (mg/s) |
| Mass t<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 11.95   | (mg/s) | 40.09   | (mg/s) | 280.28  | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.068   | (mg/L) | 0.015   | (mg/L) | 0.011   | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.067   | (mg/L) | 0.017   | (mg/L) | 0.012   | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Beryllium                                       |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0001      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0001      | (mg/L) |
| p c               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000808254 | (mg/L) |
| ICel              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0           | (mg/L) |
| Ō                 | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.000023    | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.000023    | (mg/L) |

|                            |   |          | Low Flo | W      | Average | Flow   | High Flow    |
|----------------------------|---|----------|---------|--------|---------|--------|--------------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0 (mg/s)     |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00 (mg/s)  |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00 (mg/s)  |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.17    | (mg/s) | 2 (mg/s)     |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00 (mg/s)  |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01 (mg/s)  |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.06    | (mg/s) | 0.06 (mg/s)  |
| mas                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -       | (mg/s) | -       | (mg/s) | - (mg/s)     |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s) | 0.03    | (mg/s) | 0.03 (mg/s)  |
|                            |   |          | Low Flo | W      | Average | Flow   | High Flow    |
| balance<br>ch node         | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.41 (mg/s)  |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 0.03    | (mg/s) | 0.30    | (mg/s) | 2.49 (mg/s)  |
|                            |   |          | LOWIN   | W      | Average | 100    | Tigh Tiow    |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000 (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000 (mg/L) |

| Case<br>Parameter | Post-Closure<br>Calcium   |                    |             |                  |
|-------------------|---|--------------------|-------------|------------------|
|                   | concentration of ourface water into DM 12                       | C a12 -            | 12          | (ma/l)           |
| ta                | concentration of surface water into PM-12                       | C_s12 =<br>C_s13 = | 13          | (mg/L)<br>(mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab =           | 13          | (mg/L)           |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =           | 95.35       | (mg/L)           |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =             | 59.94387899 | (mg/L)           |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =            | 416         | (mg/L)           |
| L S               | concentration in tailings basin cell 2W                         | C_s2w =            | 59.78       | (mg/L)           |
| out               | concentration of ground water into PM-12                        | C_g12 =            | 19          | (mg/L)           |
| u<br>u            | concentration of ground water into PM-13                        | C_g13 =            | 19          | (mg/L)           |

|                                    |   |          | Low Flo  | w      | Average          | Flow   | High Fl    | low    |
|------------------------------------|---|----------|----------|--------|------------------|--------|------------|--------|
|                                    | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4,639.22         | (mg/s) | 52,669     | (mg/s) |
| _                                  | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) | 462.42           | (mg/s) | 462.42     | (mg/s) |
| tion                               | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 121.41           | (mg/s) | 121.41     | (mg/s) |
| Itra                               | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 22,636.89        | (mg/s) | 258,461    | (mg/s) |
| cen                                | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) | 2,263.72         | (mg/s) | 2,263.72   | (mg/s) |
| nos                                | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 5,369.83         | (mg/s) | 5,369.83   | (mg/s) |
| ert e<br>ss f                      | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,312.64 | (mg/s) | 4,157.57         | (mg/s) | 4,157.57   | (mg/s) |
| mag                                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 19.51    | (mg/s) | 19.51            | (mg/s) | 19.51      | (mg/s) |
| ទ ប្                               | mass flux in seepage from cell 2W                           | M_s2w =  | 721.08   | (mg/s) | 2,283.89         | (mg/s) | 2.80       | (mg/s) |
|                                    |   |          | Low Flow |        | <br>Average Flow |        | High Fl    | ow     |
| ass balance<br>each node           | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) | 5,223.05         | (mg/s) | 53,252.39  | (mg/s) |
| Mi<br>at                           | mass flux in river at PM-13                                 | M_r13 =  | 4,779.37 | (mg/s) | 41,954.45        | (mg/s) | 323,526.61 | (mg/s) |
|                                    |   |          | Low Flo  | w      | <br>Average      | Flow   | High Fl    | low    |
| invert mass<br>x to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) | 13.374           | (mg/l) | 13.036     | (mg/l) |
| S ≣ S                              | concentration in river at PM-13                             | C_r13 =  | 26.928   | (mg/L) | 17.373           | (mg/l) | 13.341     | (mg/l) |

| Case<br>Parameter | Post-Closure<br>Cadmium   |               |             |        |
|-------------------|---|---------------|-------------|--------|
|                   | anne tratice of curfere under inte DM 40                        | 0 - 10 -      | 0.00000     | (      |
| a.                | concentration of surface water into PM-12                       | $C_{s12} =$   | 0.0008      | (mg/L) |
| n dat             | concentration in Babbitt WWTP discharge                         | C sBab =      | 0.00008     | (mg/L) |
| tion              | concentration in Area 5 Pit NW discharge                        | _<br>C_spit = | 0.0001      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =        | 0.000227872 | (mg/L) |
| Cel               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =       | 0.0004      | (mg/L) |
| - S               | concentration in tailings basin cell 2W                         | C_s2w =       | 0.000188    | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =       | 0.0003      | (mg/L) |
| <u> </u>          | concentration of ground water into PM-13                        | C_g13 =       | 0.0003      | (mg/L) |

|                            |   |          | Low Flor | w      | Average  | Flow   | High Fl | ow     |
|----------------------------|---|----------|----------|--------|----------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.03     | (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.01     | (mg/s) | 0.01     | (mg/s) | 0.01    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.00     | (mg/s) | 0.00    | (mg/s) |
| ntrat                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 0.14     | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.04     | (mg/s) | 0.04     | (mg/s) | 0.04    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.01     | (mg/s) | 0.01    | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00     | (mg/s) | 0.02     | (mg/s) | 0.02    | (mg/s) |
| mas                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00     | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00     | (mg/s) | 0.01     | (mg/s) | 0.01    | (mg/s) |
|                            |   |          | Low Flor | w      | Average  | Flow   | High Fl | ow     |
| s balance<br>ch node       | mass flux in river at PM-12                                 | M_r12 =  | 0.01     | (mg/s) | <br>0.04 | (mg/s) | 0.33    | (mg/s) |
| Mass<br>at ea              | mass flux in river at PM-13                                 | M_r13 =  | 0.05     | (mg/s) | 0.24     | (mg/s) | 1.99    | (mg/s) |
|                            |   |          | Low Flor | W      | Average  | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L) | 0.000    | (mg/L) | 0.000   | (mg/L) |
| Conv<br>flux t<br>conc     | concentration in river at PM-13                             | C_r13 =  | 0.000    | (mg/L) | 0.000    | (mg/L) | 0.000   | (mg/L) |

| Case      | Post-Closure  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Chloride  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.29E+00 | (mg/L) |
| Icel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| COL       | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|   |   |          | Low Flo  | w      | Average   | Flow   | High F    | low    |
|---|---|----------|----------|--------|-----------|--------|-----------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3,568.63  | (mg/s) | 40,514    | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 43.81    | (mg/s) | 43.81     | (mg/s) | 43.81     | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 93.39     | (mg/s) | 93.39     | (mg/s) |
| ıtra                                    | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 17,412.99 | (mg/s) | 198,816   | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 214.46   | (mg/s) | 214.46    | (mg/s) | 214.46    | (mg/s) |
| uo:                                     | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 335.09    | (mg/s) | 335.09    | (mg/s) |
| ert o<br>Ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 137.73   | (mg/s) | 436.24    | (mg/s) | 436.24    | (mg/s) |
| mag                                     | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 82.56    | (mg/s) | 82.56     | (mg/s) | 82.56     | (mg/s) |
| ទ ប័                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 259.82   | (mg/s) | 822.94    | (mg/s) | 822.94    | (mg/s) |
|   |   |          | Low Flow |        | Average   | Flow   | High F    | low    |
| Aass balance<br>tt each node            | mass flux in river at PM-12                                 | M_r12 =  | 43.81    | (mg/s) | 3,705.83  | (mg/s) | 40,651.48 | (mg/s) |
| ~ ~ ~                                   |   | M_110 -  | Low Flo  | w      | Average   | Flow   | High F    | low    |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 1.800    | (mg/L) | 9.489     | (mg/L) | 9.951     | (mg/L) |

| Case                                  | Post-Closure  |          |             |        |
|---------------------------------------|---|----------|-------------|--------|
| Parameter                             | Cobait  | ]        |             |        |
|                                       | concentration of surface water into PM-12                       | C_s12 =  | 0.0006      | (mg/L) |
| ata                                   | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| р<br>с                                | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tio                                   | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| ntra                                  | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001356866 | (mg/L) |
| cer                                   | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| L L L L L L L L L L L L L L L L L L L | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| at .                                  | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| <u>u</u>                              | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.21    | (mg/s) | 2       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| trat                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.04    | (mg/s) | 12      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.13    | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
|                            | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.03    | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| lance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.25    | (mg/s) | 2.46    | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) | 1.61    | (mg/s) | 14.71   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>or<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Copper  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | ••  |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| , di              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.018240705 | (mg/L) |
| Icer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| dul               | concentration of ground water into PM-13                        | C_g13 =  | 0.004       | (mg/L) |

|                             |   |          | Low Flo | w      | Average | Flow   | High Flow    |
|-----------------------------|---|----------|---------|--------|---------|--------|--------------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.54    | (mg/s) | 6 (mg/s)     |
|                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s) | 0.10    | (mg/s) | 0.10 (mg/s)  |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01 (mg/s)  |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.61    | (mg/s) | 30 (mg/s)    |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s) | 0.48    | (mg/s) | 0.48 (mg/s)  |
| u xn                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.19    | (mg/s) | 0.19 (mg/s)  |
| ert e<br>Ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.40    | (mg/s) | 1.27    | (mg/s) | 1.27 (mg/s)  |
| n ve<br>ma:                 | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00 (mg/s)  |
| ទ បំ                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.05    | (mg/s) | 0.17    | (mg/s) | 0.17 (mg/s)  |
|                             |   |          | Low Flo | w      | Average | Flow   | High Flow    |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s) | 0.65    | (mg/s) | 6.19 (mg/s)  |
| Mass b<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 1.03    | (mg/s) | 5.37    | (mg/s) | 38.12 (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Flow    |
| rt mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 0.00400 | (mg/L) | 0.002   | (mg/L) | 0.002 (mg/L) |
| Convel<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.00579 | (mg/L) | 0.002   | (mg/L) | 0.002 (mg/L) |

| Case      | Post-Closure  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Fluoride  |          |          |        |
|           |   | 1        | 1        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.82E-02 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| l S       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|  |   |          | Low Flo | w           | Average | Flow   | High Fl | ow     |
|--|---|----------|---------|-------------|---------|--------|---------|--------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)      | 35.69   | (mg/s) | 405     | (mg/s) |
| _  | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s)      | 9.37    | (mg/s) | 9.37    | (mg/s) |
| tion                                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)      | 0.93    | (mg/s) | 0.93    | (mg/s) |
| Itra                                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)      | 174.13  | (mg/s) | 1,988   | (mg/s) |
| cen                                      | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s)      | 45.87   | (mg/s) | 45.87   | (mg/s) |
| u xn                                     | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)      | 7.04    | (mg/s) | 7.04    | (mg/s) |
| ert e<br>ss f                            | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.40    | (mg/s)      | 1.27    | (mg/s) | 1.27    | (mg/s) |
| mag                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.13    | (mg/s)      | 0.13    | (mg/s) | 0.13    | (mg/s) |
| ទ បំ                                     | mass flux in seepage from cell 2W                           | M_s2w =  | 18.70   | (mg/s)      | 59.22   | (mg/s) | 59.22   | (mg/s) |
|  |   |          | Low Flo | w           | Average | Flow   | High Fl | ow     |
| Mass balance<br>t each node              | mass flux in river at PM-12                                 | M_r12 =  | 9.37    | (mg/s)      | 45.99   | (mg/s) | 415.45  | (mg/s) |
|  |   | M_110    | Low Flo | (mg/0)<br>w | Average | Flow   | High Fl | ow     |
| Convert mass<br>flux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L)      | 0.118   | (mg/L) | 0.102   | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Iron  |          |             |        |
|-------------------|---|----------|-------------|--------|
| i aranieter       |   | 1        |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.75E-01    | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| ŭ L               | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
|-----------------------------|---|----------|---------|--------|----------|--------|-----------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90 | (mg/s) | 11,749    | (mg/s) |
|                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85     | (mg/s) | 0.85      | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08    | (mg/s) | 27.08     | (mg/s) |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77 | (mg/s) | 57,657    | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17     | (mg/s) | 4.17      | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13     | (mg/s) | 2.13      | (mg/s) |
| ert o<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 14.78   | (mg/s) | 46.80    | (mg/s) | 46.80     | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.02    | (mg/s) | 0.02     | (mg/s) | 0.02      | (mg/s) |
| <u>۽</u> ک                  | mass flux in seepage from cell 2W                           | M_s2w =  | 55.41   | (mg/s) | 175.51   | (mg/s) | 175.51    | (mg/s) |
|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| oalance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | 1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| Mass k<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 75.23   | (mg/s) | 6,341.23 | (mg/s) | 69,662.34 | (mg/s) |
|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| 't mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | 2.721    | (mg/L) | 2.883     | (mg/L) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.424   | (mg/L) | 2.626    | (mg/L) | 2.873     | (mg/L) |

| Case      | Post-Closure  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 2.27E+02    | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|                           |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | low    |
|---------------------------|---|----------|-----------|--------|------------|--------|--------------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,980.41  | (mg/s) | 283,600      | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,129.58   | (mg/s) | 2,129.58     | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 653.73     | (mg/s) | 653.73       | (mg/s) |
| Itral                     | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121,890.93 | (mg/s) | 1,391,712    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) | 10,425.01  | (mg/s) | 10,425.01    | (mg/s) |
| uo Xn                     | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,090.84  | (mg/s) | 53,090.84    | (mg/s) |
| ssfo                      | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 4,978.97  | (mg/s) | 15,770.06  | (mg/s) | 15,770.06    | (mg/s) |
| n ve<br>ma:               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 403.90    | (mg/s) | 403.90     | (mg/s) | 403.90       | (mg/s) |
| <u>۽</u> ک                | mass flux in seepage from cell 2W                           | M_s2w =  | 5,266.36  | (mg/s) | 16,680.30  | (mg/s) | 16,680.30    | (mg/s) |
|                           |   |          | Low Flo   | W      | Average    | Flow   | High Fl      | low    |
| lance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | 27,763.72  | (mg/s) | 286,383.27   | (mg/s) |
| Mass ba<br>at each        | mass flux in river at PM-13                                 | M_r13 =  | 23,203.82 | (mg/s) | 246,024.76 | (mg/s) | 1,774,465.31 | (mg/s) |
|                           |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | low    |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) | 71.091     | (mg/L) | 70.104       | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 130.735   | (mg/L) | 101.877    | (mg/L) | 73.175       | (mg/L) |

| Case      | Post-Closure  |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   | -        | -     |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 13.37 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| Con       | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
|----------------------------|---|----------|---------|--------|-----------|--------|-----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39  | (mg/s) | 14,990    | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94     | (mg/s) | 38.94     | (mg/s) |
| tion                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.08    | (mg/s) | 0.08      | (mg/s) | 0.08      | (mg/s) |
| itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81  | (mg/s) | 73,562    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 190.63    | (mg/s) | 190.63    | (mg/s) |
| uo:                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 34.55     | (mg/s) | 34.55     | (mg/s) |
| ert e<br>ss f              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,029.85  | (mg/s) | 3,029.85  | (mg/s) |
| ma                         | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 292.79  | (mg/s) | 927.38    | (mg/s) | 927.38    | (mg/s) |
| ទ ប្                       | mass flux in seepage from cell 2W                           | M_s2w =  | 93.72   | (mg/s) | 296.85    | (mg/s) | 296.85    | (mg/s) |
|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 39.03   | (mg/s) | 1,359.42  | (mg/s) | 15,029.31 | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 616.17  | (mg/s) | 12,281.49 | (mg/s) | 93,070.49 | (mg/s) |
|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 1.603   | (mg/L) | 3.481     | (mg/L) | 3.679     | (mg/l) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 3.472   | (mg/L) | 5.086     | (mg/L) | 3.838     | (mg/l) |

| Case      | Post-Closure  |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Magnesium   |          |        |        |
|           |   | -        |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 18.87  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| l o       | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|                                      |   |          | Low Flor | w      | Average   | Flow   | High Fl    | ow     |
|--------------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 2,141.18  | (mg/s) | 24,309     | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s) | 259.20    | (mg/s) | 259.20     | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 56.03     | (mg/s) | 56.03      | (mg/s) |
| itral                                | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 10,447.79 | (mg/s) | 119,290    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s) | 1,268.87  | (mg/s) | 1,268.87   | (mg/s) |
| li s                                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 15,261.91 | (mg/s) | 15,261.91  | (mg/s) |
| ssfo                                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 413.14   | (mg/s) | 1,308.55  | (mg/s) | 1,308.55   | (mg/s) |
| n ve<br>ma:                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 9.99     | (mg/s) | 9.99      | (mg/s) | 9.99       | (mg/s) |
| ទ បំ                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 843.99   | (mg/s) | 2,673.20  | (mg/s) | 2,673.20   | (mg/s) |
|                                      |   |          | Low Flor | W      | Average   | Flow   | High Fl    | ow     |
| lass balance<br>t each node          | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s) | 2,456.41  | (mg/s) | 24,623.80  | (mg/s) |
| ë ≤                                  | mass flux in river at PM-13                                 | M_r13 =  | 2,795.20 | (mg/s) | 33,426.73 | (mg/s) | 164,435.92 | (mg/s) |
|                                      |   |          | LOW FIO  | W      | Average   | FIOW   | High FI    | ow     |
| onvert mass<br>ix to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L) | 6.290     | (mg/l) | 6.028      | (mg/l) |
| ວິ≓ິວ                                | concentration in river at PM-13                             | C_r13 =  | 15.749   | (mg/L) | 13.842    | (mg/l) | 6.781      | (mg/l) |

| Case      | Post-Closure  |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
| -         |   | -        |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| , p d     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.28 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                           |   |          | Low Flor | Low Flow |  | Average Flow |        | High Flow |          | ow     |
|---------------------------|---|----------|----------|----------|--|--------------|--------|-----------|----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s)   |  | 107.06       | (mg/s) |           | 1,215    | (mg/s) |
|                           | mass flux of ground water into PM-12                        | M_g12 =  | 4.58     | (mg/s)   |  | 4.58         | (mg/s) |           | 4.58     | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s)   |  | 2.80         | (mg/s) |           | 2.80     | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s)   |  | 522.39       | (mg/s) |           | 5,964    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 22.40    | (mg/s)   |  | 22.40        | (mg/s) |           | 22.40    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s)   |  | 27.31        | (mg/s) |           | 27.31    | (mg/s) |
| ert o<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 6.05     | (mg/s)   |  | 19.17        | (mg/s) |           | 19.17    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s)   |  | 0.00         | (mg/s) |           | 0.00     | (mg/s) |
| <u>۽</u> ڳ                | mass flux in seepage from cell 2W                           | M_s2w =  | 14.27    | (mg/s)   |  | 45.20        | (mg/s) |           | 45.20    | (mg/s) |
|                           |   |          | Low Flor | w        |  | Average      | Flow   |           | High Fl  | ow     |
| balance<br>node           | mass flux in river at PM-12                                 | M_r12 =  | 4.58     | (mg/s)   |  | 114.44       | (mg/s) |           | 1,222.81 | (mg/s) |
| Mass k<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 47.30    | (mg/s)   |  | 750.91       | (mg/s) |           | 7,301.36 | (mg/s) |
|                           |   |          | Low Flor | w        |  | Average      | Flow   |           | High Fl  | ow     |
| ert mass<br>n<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.188    | (mg/L)   |  | 0.293        | (mg/l) |           | 0.299    | (mg/l) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.266    | (mg/L)   |  | 0.311        | (mg/l) |           | 0.301    | (mg/l) |

| Case<br>Parameter | Post-Closure<br>Sodium  |                    |        |        |
|-------------------|---|--------------------|--------|--------|
|                   | concentration of ourface water into PM 12                       | C a12 -            | 2.50   | (mg/L) |
| ta                | concentration of surface water into PM-12                       | C_s12 =<br>C_s13 = | 3.50   | (mg/L) |
| u da              | concentration in Babbitt WWTP discharge                         | C_sBab =           | 3.50   | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =           | 119.50 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =             | 12.15  | (mg/L) |
| Cel               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =            | 255.00 | (mg/L) |
| - Do              | concentration in tailings basin cell 2W                         | C_s2w =            | 44.31  | (mg/L) |
| ğ                 | concentration of ground water into PM-12                        | C_g12 =            | 4.90   | (mg/L) |
| u u               | concentration of ground water into PM-13                        | C_g13 =            | 4.90   | (mg/L) |

|                                      |   |          | Low Flo  | w      | Average   | Flow   | High Fl   | ow     |
|--------------------------------------|---|----------|----------|--------|-----------|--------|-----------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180    | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.26    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69     | (mg/s) |
| ıtrat                                | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,586    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.80    | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.88  | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 266.06   | (mg/s) | 842.70    | (mg/s) | 842.70    | (mg/s) |
| mas                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 11.96    | (mg/s) | 11.96     | (mg/s) | 11.96     | (mg/s) |
| <u>د</u> د م                         | mass flux in seepage from cell 2W                           | M_s2w =  | 534.48   | (mg/s) | 1,692.86  | (mg/s) | 1,692.86  | (mg/s) |
|                                      |   |          | Low Flo  | w      | Average   | Flow   | High Fl   | ow     |
| ass balance<br>teach node            | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94 | (mg/s) |
| at                                   | mass flux in river at PM-13                                 | M_r13 =  | 1,515.56 | (mg/s) | 17,356.72 | (mg/s) | 93,778.75 | (mg/s) |
|                                      |   |          | Low Flo  | w      | Average   | Flow   | High Fl   | ow     |
| onvert mass<br>ix to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.508     | (mg/l) |
| S ≓ S                                | concentration in river at PM-13                             | C_r13 =  | 8.539    | (mg/L) | 7.187     | (mg/l) | 3.867     | (mg/l) |

| Case<br>Parameter | Post-Closure<br>Nickel  |                    |             |        |
|-------------------|---|--------------------|-------------|--------|
|                   | concentration of surface water into PM 12                       | C s12 -            | 0.0012      | (mg/L) |
| ta                | concentration of surface water into PM-13                       | C_s12 =<br>C_s13 = | 0.0012      | (mg/L) |
| da<br>da          | concentration in Babbitt WWTP discharge                         | C_sBab =           | 0.0012      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =           | 0.0052      | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =             | 0.015125217 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =            | 0.098       | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =            | 0.00688     | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =            | 0.007       | (mg/L) |
| <u> </u>          | concentration of ground water into PM-13                        | C_g13 =            | 0.007       | (mg/L) |

|                                   |   | Low Flow |         | Average Fl |   | low    |        | High Flow |          |        |
|-----------------------------------|---|----------|---------|------------|---|--------|--------|-----------|----------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)     |   | 0.43   | (mg/s) |           | 5        | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s)     |   | 0.17   | (mg/s) |           | 0.17     | (mg/s) |
| tio                               | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)     |   | 0.01   | (mg/s) |           | 0.01     | (mg/s) |
| Itra                              | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)     |   | 2.09   | (mg/s) |           | 24       | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 0.83    | (mg/s)     |   | 0.83   | (mg/s) |           | 0.83     | (mg/s) |
| con                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)     |   | 0.29   | (mg/s) |           | 0.29     | (mg/s) |
| ert e<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.33    | (mg/s)     |   | 1.05   | (mg/s) |           | 1.05     | (mg/s) |
| ma                                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s)     |   | 0.00   | (mg/s) |           | 0.00     | (mg/s) |
| ទ ប័                              | mass flux in seepage from cell 2W                           | M_s2w =  | 0.08    | (mg/s)     |   | 0.26   | (mg/s) |           | 0.26     | (mg/s) |
|                                   |   |          | Low Flo | w          | A | verage | Flow   |           | High Fl  | ow     |
| lass balance<br>t each node       | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s)     |   | 0.61   | (mg/s) |           | 5.04     | (mg/s) |
| <b>ö</b> ≤                        | mass flux in river at PM-13                                 | M_r13 =  | 1.42    | (mg/s)     | • | 5.14   | (mg/s) |           | 31.34    | (mg/s) |
|                                   |   |          | LOW FIU | vv         | ^ | verage |        |           | nigii ri | 0      |
| nvert mass<br>x to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L)     |   | 0.002  | (mg/L) |           | 0.001    | (mg/L) |
| flu:<br>col                       | concentration in river at PM-13                             | C_r13 =  | 0.008   | (mg/L)     |   | 0.002  | (mg/L) |           | 0.001    | (mg/L) |

| Case      | Post-Closure  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Lead  |          |             |        |
| -         |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001097329 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| l S       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                           |   | Low Flow |         |          | Average Flow |         | High Flow |         |        |
|---------------------------|---|----------|---------|----------|--------------|---------|-----------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)   |              | -       | (mg/s)    | -       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s)   |              | 0.03    | (mg/s)    | 0.03    | (mg/s) |
| tior                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)   |              | -       | (mg/s)    | -       | (mg/s) |
| Itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)   |              | -       | (mg/s)    | -       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s)   |              | 0.14    | (mg/s)    | 0.14    | (mg/s) |
| nos                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)   |              | 0.02    | (mg/s)    | 0.02    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s)   |              | 0.08    | (mg/s)    | 0.08    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s)   |              | 0.00    | (mg/s)    | 0.00    | (mg/s) |
| ទ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s)   |              | 0.05    | (mg/s)    | 0.05    | (mg/s) |
|                           | -   |          | Low Flo | Low Flow |              | Average | Flow      | High Fl | low    |
| balance<br>node           | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s)   |              | 0.03    | (mg/s)    | 0.03    | (mg/s) |
| Mass                      | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s)   |              | 0.31    | (mg/s)    | 0.31    | (mg/s) |
|                           |   | -        | LOW FIO | w        |              | Average | riow      | підп гі | low    |
| ert mass<br>ortration     | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L)   |              | 0.000   | (mg/L)    | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L)   |              | 0.000   | (mg/L)    | 0.000   | (mg/L) |

| Case      | Post-Closure  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| р<br>р    | concentration in Babbitt WWTP discharge                         |          | 2.00E-05 | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.37E-03 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| COL       | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| <u>d</u>  | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                           |   |          | Low Flo | Low Flow |         | Average Flow |  | High Flow |        |
|---------------------------|---|----------|---------|----------|---------|--------------|--|-----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)   | 0.01    | (mg/s)       |  | 0         | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s)   | 0.04    | (mg/s)       |  | 0.04      | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)   | 0.00    | (mg/s)       |  | 0.00      | (mg/s) |
| trat                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)   | 0.03    | (mg/s)       |  | 0         | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.18    | (mg/s)   | 0.18    | (mg/s)       |  | 0.18      | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)   | 0.01    | (mg/s)       |  | 0.01      | (mg/s) |
| ert o<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.12    | (mg/s)   | 0.37    | (mg/s)       |  | 0.37      | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s)   | 0.00    | (mg/s)       |  | 0.00      | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s)   | 0.01    | (mg/s)       |  | 0.01      | (mg/s) |
|                           |   |          | Low Flo | w        | Average | Flow         |  | High Fl   | ow     |
| balance<br>ch node        | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s)   | 0.04    | (mg/s)       |  | 0.12      | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 0.34    | (mg/s)   | 0.65    | (mg/s)       |  | 1.09      | (mg/s) |
|                           | 1   | -        | Low Flo | w        | Average | Flow         |  | High Fl   | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L)   | 0.000   | (mg/L)       |  | 0.000     | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.002   | (mg/L)   | 0.000   | (mg/L)       |  | 0.000     | (mg/L) |
| Case<br>Paramotor                        | Post-Closure  |          |             |        |
|--|---|----------|-------------|--------|
| Falameter                                | Selenium  | 1        |             |        |
|  | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ata                                      | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| p u                                      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio                                      | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| ntra                                     | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001503093 | (mg/L) |
| Cel                                      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| Lo L | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| ort .                                    | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| du du                                    | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                                      |   |            | Low Flo | w      | Aver | ige Flow  | High Fl | ow     |
|--------------------------------------|---|------------|---------|--------|------|-----------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =    | -       | (mg/s) | (    | 11 (mg/s) | 1       | (mg/s) |
| -                                    | mass flux of ground water into PM-12                        | M_g12 =    | 0.07    | (mg/s) | (    | 07 (mg/s) | 0.07    | (mg/s) |
| tior                                 | mass flux in Babbitt WWTP discharge                         | M_sBab =   | -       | (mg/s) | (    | 00 (mg/s) | 0.00    | (mg/s) |
| itra                                 | mass flux of surface water into PM-13                       | M_s13 =    | -       | (mg/s) | (    | 52 (mg/s) | 6       | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =    | 0.35    | (mg/s) | (    | 35 (mg/s) | 0.35    | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit =   | -       | (mg/s) | (    | 09 (mg/s) | 0.09    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =     | 0.03    | (mg/s) | (    | 10 (mg/s) | 0.10    | (mg/s) |
| ma                                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =    | 0.00    | (mg/s) | (    | 00 (mg/s) | 0.00    | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =    | 0.01    | (mg/s) | (    | 04 (mg/s) | 0.04    | (mg/s) |
|                                      |   |            | Low Flo | w      | Aver | ige Flow  | High Fl | ow     |
| s balance<br>ach node                | mass flux in river at PM-12                                 | M_r12 =    | 0.07    | (mg/s) |      | 18 (mg/s) | 1.29    | (mg/s) |
| Mas<br>at ea                         | mass flux in river at PM-13                                 | M r13 =    | 0 47    | (ma/s) | 1    | 29 (ma/s) | 7 84    | (mg/s) |
|                                      |   | <u>_</u> t | Low Flo | w      | Aver | ge Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =    | 0.003   | (mg/L) | 0.   | 00 (mg/L) | 0.000   | (mg/L) |
| ర≓ర                                  | concentration in river at PM-13                             | C_r13 =    | 0.003   | (mg/L) | 0.   | 01 (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Sulfate   |          |         |        |
|-------------------|---|----------|---------|--------|
|                   |   | 010      | 4.00    | (      |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| р ц               | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 110.25  | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| Co Co             | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                            |   |          | Low Flo  | W      | Average   | Flow   | High F     | low    |
|----------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,427.45  | (mg/s) | 16,206     | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 206.87   | (mg/s) | 206.87    | (mg/s) | 206.87     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 37.36     | (mg/s) | 37.36      | (mg/s) |
| itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,965.20  | (mg/s) | 79,526     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72 | (mg/s) | 1,012.72  | (mg/s) | 1,012.72   | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 58,922.60 | (mg/s) | 58,922.60  | (mg/s) |
| ssfo                       | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2,414.28 | (mg/s) | 7,646.82  | (mg/s) | 7,646.82   | (mg/s) |
| mas                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 344.66   | (mg/s) | 344.66    | (mg/s) | 344.66     | (mg/s) |
| ទ ប្                       | mass flux in seepage from cell 2W                           | M_s2w =  | 1,838.28 | (mg/s) | 5,822.44  | (mg/s) | 5,822.44   | (mg/s) |
|                            |   |          | Low Flo  | W      | Average   | Flow   | High F     | low    |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 206.87   | (mg/s) | 1,671.68  | (mg/s) | 16,449.94  | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 5,816.80 | (mg/s) | 82,386.11 | (mg/s) | 169,725.57 | (mg/s) |
|                            |   |          | Low Flo  | w      | Average   | Flow   | High F     | low    |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 8.500    | (mg/L) | 4.280     | (mg/l) | 4.027      | (mg/l) |
| Conv<br>filux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 32.773   | (mg/L) | 34.116    | (mg/l) | 6.999      | (mg/l) |

| Case<br>Parameter | Post-Closure<br>Thallium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   | -        |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0002      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
| p r               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000917488 | (mg/L) |
| cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| nt                | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| d d               | concentration of ground water into PM-13                        | C_g13 =  | 0.000004    | (mg/L) |

|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl | low    |
|----------------------------|---|----------|---------|--------|-----------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.07      | (mg/s) | 1       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.35      | (mg/s) | 4       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| nos                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03      | (mg/s) | 0.03    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.06      | (mg/s) | 0.06    | (mg/s) |
| ma                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.01      | (mg/s) | 0.01    | (mg/s) |
|                            | -   |          | Low Flo | w      | Average   | Flow   | High Fl | low    |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.07      | (mg/s) | 0.81    | (mg/s) |
| Mass I<br>at eacl          | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.53      | (mg/s) | 4.89    | (mg/s) |
|                            |   |          | LOWIN   | **     | Average   | 10 W   | Tigitti |        |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | <br>0.000 | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000     | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Zinc  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   | -        |             | 1      |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.020231354 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| ot                | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.0115      | (mg/L) |

|                            |   |          | Low Flo | w      | Average I | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|-----------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 5.71      | (mg/s) | 65      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28      | (mg/s) | 0.28    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.15      | (mg/s) | 0.15    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 27.86     | (mg/s) | 318     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.37      | (mg/s) | 1.37    | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.17      | (mg/s) | 0.17    | (mg/s) |
| ert e<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.44    | (mg/s) | 1.40      | (mg/s) | 1.40    | (mg/s) |
| n ve<br>mas                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.17    | (mg/s) | 0.55      | (mg/s) | 0.55    | (mg/s) |
|                            |   |          | Low Flo | w      | Average I | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14      | (mg/s) | 65.25   | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 2.27    | (mg/s) | 37.49     | (mg/s) | 386.85  | (mg/s) |
|                            |   |          | Low Flo | w      | Average I | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016     | (mg/L) | 0.016   | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.013   | (mg/L) | 0.016     | (mg/L) | 0.016   | (mg/L) |

Appendix F.9 Embarrass River Geotechnical Mitigation Year 1

#### FLOWS

| Case               | Year 1   |            |      |       |       |
|--------------------|--|------------|------|-------|-------|
| Flows              | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| in<br>River        | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| ll flow<br>barrass | flow in river at PM-13                         | Q_r13_L =  | 6.27 | (cfs) | PM-13 |
| Tota<br>Emb        | flow check                                     | Q_ck_L =   | 6.27 | (cfs) | 4     |
|                    | surface water flow into PM-12                  | Q_s12_L =  | 0.00 | (cfs) | PM-12 |
|                    | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                    | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                    | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| Ita                | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.37 | (cfs) | PM-13 |
| v da               | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.00 | (cfs) | PM-13 |
| flov               | seepage from cell 2W                           | Q_s2w_L =  | 0.83 | (cfs) | PM-13 |
| out                | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| Ing                | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case             | Year 1   |            |       |       |       |
|------------------|--|------------|-------|-------|-------|
| Flow             | Average Flow Conditions (mean annual)          |            |       |       |       |
| w in<br>ss River | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| flo              | flow in river at PM-13                         | Q_r13_M =  | 93.06 | (cfs) | PM-13 |
| Total<br>Emba    | flow check                                     | Q_ck_M =   | 93.06 | (cfs) |       |
|                  | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| Ita              | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 3.56  | (cfs) | PM-13 |
| / da             | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.00  | (cfs) | PM-13 |
| llow             | seepage from cell 2W                           | Q_s2w_M =  | 7.96  | (cfs) | PM-13 |
| out1             | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| dul              | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case             | Year 1   |            |        |       |       |
|------------------|--|------------|--------|-------|-------|
| Flow             | High Flow Conditions (avg. annual 1-day ma     | ax flow)   |        |       |       |
| n<br>River       | flow in river at PM-12                         | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>ırrass | flow in river at PM-13                         | Q_r13_H =  | 864.61 | (cfs) | PM-13 |
| Total<br>Emba    | flow check                                     | Q_ck_H =   | 864.61 | (cfs) |       |
|                  | surface water flow into PM-12                  | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta               | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_H =   | 3.56   | (cfs) | PM-13 |
| / da             | hydrometallurgical residue cells liner leakage | Q_rrs_H =  | 0.00   | (cfs) | PM-13 |
| lo v             | seepage from cell 2W                           | Q_s2w_H =  | 7.96   | (cfs) | PM-13 |
| nt -             | ground water flow into PM-12                   | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| aul              | ground water flow into PM-13                   | Q g13 H =  | 4.21   | (cfs) | PM-13 |

| Case      | Year 1  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Silver  |          |          |        |
|           |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00086  | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| centration                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                            | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.19    | (mg/s) | 2       | (mg/s) |
|                            | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| con con                    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| ma                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.45    | (mg/s) |
| Mass  <br>at eac           | mass flux in river at PM-13                                 | M_r13 =  | 0.01    | (mg/s) | 0.35    | (mg/s) | 2.75    | (mg/s) |
|                            | 1   | -        | LOW FIO | w      | Average | FIOW   | Figh Fi | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 1<br>Aluminum  |          |         |        |
|-------------------|---|----------|---------|--------|
|                   |   |          |         |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.1     | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.1     | (mg/L) |
| i p u             | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.01    | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.18    | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788  | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =  | 0.025   | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 0.025   | (mg/L) |

|                                |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|--------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                                | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
|                                | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) | 0.61    | (mg/s) | 0.61     | (mg/s) |
| centration                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
|                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
|                                | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) | 2.98    | (mg/s) | 2.98     | (mg/s) |
| u Xn                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.75    | (mg/s) | 0.75     | (mg/s) |
| ssf                            | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.11    | (mg/s) | 1.01    | (mg/s) | 1.01     | (mg/s) |
| mag                            | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| <u>۹</u> گ                     | mass flux in seepage from cell 2W                           | M_s2w =  | 37.03   | (mg/s) | 355.65  | (mg/s) | 355.65   | (mg/s) |
|                                |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| balance<br>ch node             | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) | 37.23   | (mg/s) | 406.69   | (mg/s) |
| Mass<br>at ea                  | mass flux in river at PM-13                                 | M_r13 =  | 40.73   | (mg/s) | 571.75  | (mg/s) | 2,755.24 | (mg/s) |
|                                |   |          | LOW FIU | vv     | Average | FIOW   | піун гі  | 0₩     |
| nvert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) | 0.095   | (mg/L) | 0.100    | (mg/L) |
| Cor<br>flux<br>con             | concentration in river at PM-13                             | C_r13 =  | 0.229   | (mg/L) | 0.217   | (mg/L) | 0.113    | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Arsenic   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00075     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00075     | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00075     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.001325    | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.006769615 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00291     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.00273     | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.00273     | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.27    | (mg/s) | 3       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| trati                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.31    | (mg/s) | 15      | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) | 0.33    | (mg/s) | 0.33    | (mg/s) |
| uo Xn                     | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| ert o<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.07    | (mg/s) | 0.68    | (mg/s) | 0.68    | (mg/s) |
| n ve<br>ma:               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.07    | (mg/s) | 0.65    | (mg/s) | 0.65    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| lance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.34    | (mg/s) | 3.11    | (mg/s) |
| Mass ba<br>at each        | mass flux in river at PM-13                                 | M_r13 =  | 0.53    | (mg/s) | 3.38    | (mg/s) | 19.76   | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |

| Case<br>Parameter | Year 1<br>Boron   |             |             |        |
|-------------------|---|-------------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =     | 0.012       | (mg/L) |
| Ita               | concentration of surface water into PM-13                       | <br>C_s13 = | 0.012       | (mg/L) |
| n ds              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.012       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.1315      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 0.137838474 | (mg/L) |
| Cel               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 0.11        | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =     | 0.33        | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =     | 0.0212      | (mg/L) |
| L<br>L            | concentration of ground water into PM-13                        | C_g13 =     | 0.0212      | (mg/L) |

|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---|---|----------|---------|--------|---------|--------|---------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 4.28    | (mg/s) | 49      | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) | 0.52    | (mg/s) | 0.52    | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
| ncentrat<br>ć                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 20.90   | (mg/s) | 239     | (mg/s) |
|   | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) | 2.53    | (mg/s) | 2.53    | (mg/s) |
| u Xn                                    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.41    | (mg/s) | 7.41    | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.45    | (mg/s) | 13.91   | (mg/s) | 13.91   | (mg/s) |
| mag                                     | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| <u>۹</u> گ                              | mass flux in seepage from cell 2W                           | M_s2w =  | 7.74    | (mg/s) | 74.34   | (mg/s) | 74.34   | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| s balance<br>ach node                   | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) | 4.91    | (mg/s) | 49.25   | (mg/s) |
| Mas<br>at e                             | mass flux in river at PM-13                                 | M r13 =  | 12.23   | (ma/s) | 123.98  | (ma/s) | 386.00  | (ma/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) | 0.013   | (mg/L) | 0.012   | (mg/L) |

| Case<br>Parameter | Year 1<br>Barium  |             |          |        |
|-------------------|---|-------------|----------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =     | 0.011    | (mg/L) |
| ata               | concentration of surface water into PM-13                       | <br>C_s13 = | 0.011    | (mg/L) |
| n de              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.011    | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.0044   | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 5.05E-02 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 5.00E-03 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =     | 0.09298  | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =     | 0.0681   | (mg/L) |
| u du              | concentration of ground water into PM-13                        | C_g13 =     | 0.0681   | (mg/L) |

|                            |   |          | Low Flo | w      | Averaç | e Flow   | High Fl     | ow     |
|----------------------------|---|----------|---------|--------|--------|----------|-------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 3.9    | 3 (mg/s) | 45          | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 1.66    | (mg/s) | 1.6    | 6 (mg/s) | 1.66        | (mg/s) |
| centration                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.1    | ) (mg/s) | 0.10        | (mg/s) |
|                            | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 19.1   | ō (mg/s) | 219         | (mg/s) |
|                            | mass flux of ground water into PM-13                        | M_g13 =  | 8.11    | (mg/s) | 8.1    | 1 (mg/s) | 8.11        | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.2    | ō (mg/s) | 0.25        | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.53    | (mg/s) | 5.0    | ) (mg/s) | 5.09        | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.0    | ) (mg/s) | 0.00        | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 2.18    | (mg/s) | 20.9   | 5 (mg/s) | 20.95       | (mg/s) |
|                            |   |          | Low Flo | w      | Averag | e Flow   | High Fl     | ow     |
| balance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 1.66    | (mg/s) | 5.6    | 9 (mg/s) | 46.33       | (mg/s) |
| Mass                       | mass flux in river at PM-13                                 | M_r13 =  | 12.48   | (mg/s) | 59.2   | 4 (mg/s) | 299.42      | (mg/s) |
|                            |   |          | Low Flo | w      | Averag | e Flow   | <br>High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.068   | (mg/L) | 0.01   | 5 (mg/L) | 0.011       | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.070   | (mg/L) | 0.02   | 2 (mg/L) | 0.012       | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Beryllium   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0001      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0001      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000376001 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0           | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.000023    | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 0.000023    | (mg/L) |

|                            |   |          | Low Flo | w      | Aver | ige Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|------|------------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | C    | .04 (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | C    | .00 (mg/s) | 0.00    | (mg/s) |
| centration                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | C    | .00 (mg/s) | 0.00    | (mg/s) |
|                            | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | C    | .17 (mg/s) | 2       | (mg/s) |
|                            | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | C    | .00 (mg/s) | 0.00    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | C    | .01 (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00    | (mg/s) | C    | .04 (mg/s) | 0.04    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -       | (mg/s) |      | (mg/s)     | -       | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | C    | .17 (mg/s) | 0.17    | (mg/s) |
|                            |   |          | Low Flo | w      | Aver | ige Flow   | High Fl | ow     |
| lance<br>node              | mass flux in river at PM-12                                 | M r12 =  | 0.00    | (mg/s) | c    | .04 (mg/s) | 0.41    | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | C    | .43 (mg/s) | 2.61    | (mg/s) |
|                            |   |          | Low Flo | w      | Aver | ige Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.   | 000 (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.   | 000 (mg/L) | 0.000   | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Calcium   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 13          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 13          | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 13          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 95.35       | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 77.28097689 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 416         | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 59.78       | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 19          | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 19          | (mg/L) |

|  |   |          | Low Flo  | w           | Average   | Flow   | High F     | low    |
|--|---|----------|----------|-------------|-----------|--------|------------|--------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s)      | 4,639.22  | (mg/s) | 52,669     | (mg/s) |
| _  | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s)      | 462.42    | (mg/s) | 462.42     | (mg/s) |
| tion                                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s)      | 121.41    | (mg/s) | 121.41     | (mg/s) |
| itrai                                    | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s)      | 22,636.89 | (mg/s) | 258,461    | (mg/s) |
| cen                                      | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s)      | 2,263.72  | (mg/s) | 2,263.72   | (mg/s) |
| uo:                                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s)      | 5,369.83  | (mg/s) | 5,369.83   | (mg/s) |
| ssfo                                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 811.79   | (mg/s)      | 7,796.40  | (mg/s) | 7,796.40   | (mg/s) |
| ma                                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 12.28    | (mg/s)      | 12.28     | (mg/s) | 12.28      | (mg/s) |
| <u>د</u> ې                               | mass flux in seepage from cell 2W                           | M_s2w =  | 1,402.18 | (mg/s)      | 13,466.52 | (mg/s) | 1.77       | (mg/s) |
|  |   |          | Low Flo  | w           | Average   | Flow   | High F     | low    |
| Mass balance<br>at each node             | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s)      | 5,223.05  | (mg/s) | 327 157 17 | (mg/s) |
|  |   | W_110 -  | Low Flo  | (mg/3)<br>w | Average   | Flow   | High F     | low    |
| Convert mass<br>flux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L)      | 13.374    | (mg/l) | 13.036     | (mg/l) |

| Case      | Year 1  |          |            |        |
|-----------|---|----------|------------|--------|
| Parameter | Cadmium   |          |            |        |
|           |   |          |            |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00008    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00008    | (mg/L) |
| р<br>р    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00032784 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004     | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188   | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0003     | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0003     | (mg/L) |

|                                   |   |          | Low Flo | W      | Average | Flow   | High Fl | ow     |
|-----------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ntra                              | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.14    | (mg/s) | 2       | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| u Xn                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| mag                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                              | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node                    | mass flux in river at PM-12                                 | M_r12 =  | 0.01    | (mg/s) | 0.04    | (mg/s) | 0.33    | (mg/s) |
| Mass be<br>at each                | mass flux in river at PM-13                                 | M_r13 =  | 0.05    | (mg/s) | 0.29    | (mg/s) | 2.04    | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| nvert mass<br>x to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| flu:<br>cor                       | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 1  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Chloride  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.52E+01 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl    | ow     |
|----------------------------|---|----------|---------|--------|-----------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 3,568.63  | (mg/s) | 40,514     | (mg/s) |
|                            | mass flux of ground water into PM-12                        | M_g12 =  | 43.81   | (mg/s) | 43.81     | (mg/s) | 43.81      | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 93.39     | (mg/s) | 93.39      | (mg/s) |
| Itral                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 17,412.99 | (mg/s) | 198,816    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 214.46  | (mg/s) | 214.46    | (mg/s) | 214.46     | (mg/s) |
| u Xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 335.09    | (mg/s) | 335.09     | (mg/s) |
| ert e<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 160.16  | (mg/s) | 1,538.17  | (mg/s) | 1,538.17   | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 51.97   | (mg/s) | 51.97     | (mg/s) | 51.97      | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 505.23  | (mg/s) | 4,852.27  | (mg/s) | 4,852.27   | (mg/s) |
|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl    | ow     |
| oalance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 43.81   | (mg/s) | 3,705.83  | (mg/s) | 40,651.48  | (mg/s) |
| Mass b<br>at eacl          | mass flux in river at PM-13                                 | M_r13 =  | 975.63  | (mg/s) | 28,110.78 | (mg/s) | 246,459.43 | (mg/s) |
|                            |   |          | LOW FIO | w      | Average   | Flow   | High Fi    | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 1.800   | (mg/L) | 9.489     | (mg/L) | 9.951      | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 5.497   | (mg/L) | 10.674    | (mg/L) | 10.073     | (mg/L) |

| Case<br>Parameter | Year 1<br>Cobalt  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0006      | (mg/L) |
| tta               | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| a de              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tior              | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001495727 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| d L               | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.21    | (mg/s) | 2       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.04    | (mg/s) | 12      | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.13    | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
| u su l                    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert o<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.15    | (mg/s) | 0.15    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> ک                | mass flux in seepage from cell 2W                           | M_s2w =  | 0.04    | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>n node          | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.25    | (mg/s) | 2.46    | (mg/s) |
| Mass b<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) | 1.96    | (mg/s) | 15.06   | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass                  | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |

| Case      | Year 1  |          |           |        |
|-----------|---|----------|-----------|--------|
| Parameter | Copper  |          |           |        |
|           |   |          |           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0015    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0015    | (mg/L) |
| i p u     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345   | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.0068095 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015    | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555  | (mg/L) |
| Ĕ         | concentration of ground water into PM-12                        | C_g12 =  | 0.004     | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.004     | (mg/L) |

|                           |   |          | Low Flo | w      | Ave | age Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|-----|------------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | (   | .54 (mg/s) | 6       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s) |     | .10 (mg/s) | 0.10    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |     | .01 (mg/s) | 0.01    | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | :   | .61 (mg/s) | 30      | (mg/s) |
| concen<br>flux            | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s) |     | .48 (mg/s) | 0.48    | (mg/s) |
|                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |     | .19 (mg/s) | 0.19    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.07    | (mg/s) |     | .69 (mg/s) | 0.69    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) |     | .00 (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.11    | (mg/s) |     | .03 (mg/s) | 1.03    | (mg/s) |
|                           |   |          | Low Flo | w      | Ave | age Flow   | High Fl | ow     |
| balance<br>ch node        | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s) |     | .65 (mg/s) | 6.19    | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 0.75    | (mg/s) |     | .64 (mg/s) | 38.39   | (mg/s) |
|                           |   | -        | LOW FIO | w      | Ave | age Flow   | Figh Fi | ow     |
| rt mass<br>itration       | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L) | 0.  | )02 (mg/L) | 0.002   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.004   | (mg/L) | 0.  | 002 (mg/L) | 0.002   | (mg/L) |

| Case<br>Parameter | Year 1<br>Fluoride  |          |          |        |
|-------------------|---|----------|----------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| ן ds              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 2.90E+00 | (mg/L) |
| ICer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s) | 9.37    | (mg/s) | 9.37     | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s) | 45.87   | (mg/s) | 45.87    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.04    | (mg/s) | 7.04     | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 30.50   | (mg/s) | 292.90  | (mg/s) | 292.90   | (mg/s) |
| ma                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.08    | (mg/s) | 0.08    | (mg/s) | 0.08     | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 36.36   | (mg/s) | 349.17  | (mg/s) | 349.17   | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| lance<br>node             | mass flux in river at PM-12                                 | M r12 =  | 9.37    | (mg/s) | 45.99   | (mg/s) | 415.45   | (mg/s) |
| Mass ba<br>at each        | mass flux in river at PM-13                                 | M_r13 =  | 122.18  | (mg/s) | 915.18  | (mg/s) | 3,098.67 | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| ert mass<br>o<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L) | 0.118   | (mg/L) | 0.102    | (mg/L) |
| Conve<br>flux tc<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.688   | (mg/L) | 0.348   | (mg/L) | 0.127    | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Iron  |          |             |        |
|           |   | 1        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| p c       | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 4.00E-03    | (mg/L) |
| Cei       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| ot        | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
|----------------------------|---|----------|---------|--------|----------|--------|-----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90 | (mg/s) | 11,749    | (mg/s) |
|                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85     | (mg/s) | 0.85      | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08    | (mg/s) | 27.08     | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77 | (mg/s) | 57,657    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17     | (mg/s) | 4.17      | (mg/s) |
| u Xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13     | (mg/s) | 2.13      | (mg/s) |
| ert e<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.04    | (mg/s) | 0.40     | (mg/s) | 0.40      | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01     | (mg/s) | 0.01      | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 107.76  | (mg/s) | 1,034.88 | (mg/s) | 1,034.88  | (mg/s) |
|                            |   |          | Low Flo | W      | Average  | Flow   | High Fl   | ow     |
| balance<br>th node         | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | 1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 112.83  | (mg/s) | 7,154.20 | (mg/s) | 70,475.31 | (mg/s) |
|                            |   | -        | Low Flo | W      | Average  | Flow   | High Fl   | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | 2.721    | (mg/L) | 2.883     | (mg/L) |
| Conv<br>flux te<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.636   | (mg/L) | 2.717    | (mg/L) | 2.880     | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| , di      | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 3.74E+02    | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|                                   |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
|-----------------------------------|---|----------|-----------|--------|------------|--------|--------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,980.41  | (mg/s) | 283,600      | (mg/s) |
|                                   | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,129.58   | (mg/s) | 2,129.58     | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 653.73     | (mg/s) | 653.73       | (mg/s) |
| Itra                              | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121,890.93 | (mg/s) | 1,391,712    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) | 10,425.01  | (mg/s) | 10,425.01    | (mg/s) |
| u Xn                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,090.84  | (mg/s) | 53,090.84    | (mg/s) |
| ert o<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,931.55  | (mg/s) | 37,758.64  | (mg/s) | 37,758.64    | (mg/s) |
| mag                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 254.25    | (mg/s) | 254.25     | (mg/s) | 254.25       | (mg/s) |
| ទ ប័                              | mass flux in seepage from cell 2W                           | M_s2w =  | 10,240.73 | (mg/s) | 98,352.01  | (mg/s) | 98,352.01    | (mg/s) |
|                                   |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
| llance<br>node                    | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | 27,763.72  | (mg/s) | 286,383.27   | (mg/s) |
| Mass ba<br>at each                | mass flux in river at PM-13                                 | M_r13 =  | 26,981.12 | (mg/s) | 349,535.40 | (mg/s) | 1,877,975.95 | (mg/s) |
|                                   |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
| nvert mass<br>< to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) | 71.091     | (mg/L) | 70.104       | (mg/L) |
| flux<br>cor                       | concentration in river at PM-13                             | C_r13 =  | 152.032   | (mg/L) | 132.728    | (mg/L) | 76.751       | (mg/L) |

| Case      | Year 1  |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   |          |       |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 9.31  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|                                      |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
|--------------------------------------|---|----------|---------|--------|-----------|--------|-----------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39  | (mg/s) | 14,990    | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94     | (mg/s) | 38.94     | (mg/s) |
| tion                                 | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.05    | (mg/s) | 0.05      | (mg/s) | 0.05      | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81  | (mg/s) | 73,562    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 190.63    | (mg/s) | 190.63    | (mg/s) |
| uo:                                  | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 34.55     | (mg/s) | 34.55     | (mg/s) |
| ert e<br>ss f                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,029.85  | (mg/s) | 3,029.85  | (mg/s) |
| mag                                  | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 97.76   | (mg/s) | 938.93    | (mg/s) | 938.93    | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 182.25  | (mg/s) | 1,750.33  | (mg/s) | 1,750.33  | (mg/s) |
|                                      |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| ss balance<br>ach node               | mass flux in river at PM-12                                 | M_r12 =  | 38.99   | (mg/s) | 1,359.39  | (mg/s) | 15,029.28 | (mg/s) |
| Ma<br>at e                           | mass flux in river at PM-13                                 | M_r13 =  | 509.64  | (mg/s) | 13,746.49 | (mg/s) | 94,535.49 | (mg/s) |
|                                      |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 1.602   | (mg/L) | <br>3.481 | (mg/L) | 3.679     | (mg/l) |
| ర≓ర                                  | concentration in river at PM-13                             | C_r13 =  | 2.872   | (mg/L) | 5.220     | (mg/L) | 3.864     | (mg/l) |

| Case      | Year 1  |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Magnesium   |          |        |        |
|           |   |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| , p d     | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 44.03  | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

| <u>m</u>                                | nass flux of surface water into PM-12                       | M s12 -   |          |        |           |        |            |        |
|---|---|-----------|----------|--------|-----------|--------|------------|--------|
|   |   | 111_312 = | -        | (mg/s) | 2,141.18  | (mg/s) | 24,309     | (mg/s) |
|   | nass flux of ground water into PM-12                        | M_g12 =   | 259.20   | (mg/s) | 259.20    | (mg/s) | 259.20     | (mg/s) |
| n tộ                                    | nass flux in Babbitt WWTP discharge                         | M_sBab =  | -        | (mg/s) | 56.03     | (mg/s) | 56.03      | (mg/s) |
| m tra                                   | nass flux of surface water into PM-13                       | M_s13 =   | -        | (mg/s) | 10,447.79 | (mg/s) | 119,290    | (mg/s) |
| n ce                                    | nass flux of ground water into PM-13                        | M_g13 =   | 1,268.87 | (mg/s) | 1,268.87  | (mg/s) | 1,268.87   | (mg/s) |
| n li s                                  | nass flux of Area 5 Pit NW discharge                        | M_spit =  | -        | (mg/s) | 15,261.91 | (mg/s) | 15,261.91  | (mg/s) |
| ss fa                                   | nass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =    | 462.49   | (mg/s) | 4,441.73  | (mg/s) | 4,441.73   | (mg/s) |
| m ag m                                  | nass flux in hydrometallurgical residue cells liner leakage | M_rrs =   | 6.29     | (mg/s) | 6.29      | (mg/s) | 6.29       | (mg/s) |
| ា ឧ ប័                                  | nass flux in seepage from cell 2W                           | M_s2w =   | 1,641.19 | (mg/s) | 15,762.00 | (mg/s) | 15,762.00  | (mg/s) |
|   |   |           | Low Flow | N      | Average   | Flow   | High Fl    | ow     |
| s balance<br>ach node                   | nass flux in river at PM-12                                 | M_r12 =   | 259.20   | (mg/s) | 2,456.41  | (mg/s) | 24,623.80  | (mg/s) |
| Mas                                     | nass flux in river at PM-13                                 | M r13 =   | 3.638.04 | (ma/s) | 49.645.00 | (ma/s) | 180.654.19 | (ma/s) |
|   |   |           | Low Flow | N      | Average   | Flow   | High Fl    | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =   | 10.650   | (mg/L) | 6.290     | (mg/l) | 6.028      | (mg/l) |

| Case      | Year 1  |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
|           |   | -        |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| , p d     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.24 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                                   |   |          | Low Flo | W      | Average | Flow   | High Flo | w      |
|-----------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 107.06  | (mg/s) | 1,215    | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 4.58    | (mg/s) | 4.58    | (mg/s) | 4.58     | (mg/s) |
| tior                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 2.80    | (mg/s) | 2.80     | (mg/s) |
| ıtra                              | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 522.39  | (mg/s) | 5,964    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 22.40   | (mg/s) | 22.40   | (mg/s) | 22.40    | (mg/s) |
| u xn                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 27.31   | (mg/s) | 27.31    | (mg/s) |
| ert e<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.52    | (mg/s) | 24.25   | (mg/s) | 24.25    | (mg/s) |
| n ve<br>mas                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| ទ បំ                              | mass flux in seepage from cell 2W                           | M_s2w =  | 27.75   | (mg/s) | 266.49  | (mg/s) | 266.49   | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Flo | w      |
| lance<br>node                     | mass flux in river at PM-12                                 | M_r12 =  | 4.58    | (mg/s) | 114.44  | (mg/s) | 1,222.81 | (mg/s) |
| Mass ba<br>at each                | mass flux in river at PM-13                                 | M_r13 =  | 57.25   | (mg/s) | 977.28  | (mg/s) | 7,527.74 | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Flo | w      |
| nvert mass<br>k to<br>1centration | concentration in river at PM-12                             | C_r12 =  | 0.188   | (mg/L) | 0.293   | (mg/l) | 0.299    | (mg/l) |
| Co<br>Co<br>Co                    | concentration in river at PM-13                             | C_r13 =  | 0.323   | (mg/L) | 0.371   | (mg/l) | 0.308    | (mg/l) |

| Case      | Year 1  |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Sodium  |          |        |        |
|           |   |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 52.95  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|                             |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|-----------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180     | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.26     | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69      | (mg/s) |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,586     | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.80     | (mg/s) |
| u xn                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.88   | (mg/s) |
| ert c<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 556.20   | (mg/s) | 5,341.70  | (mg/s) | 5,341.70   | (mg/s) |
| n ve<br>ma:                 | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 7.53     | (mg/s) | 7.53      | (mg/s) | 7.53       | (mg/s) |
| ទ បំ                        | mass flux in seepage from cell 2W                           | M_s2w =  | 1,039.32 | (mg/s) | 9,981.63  | (mg/s) | 9,981.63   | (mg/s) |
|                             |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| lance<br>node               | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94  | (mg/s) |
| Mass bé<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 2,306.10 | (mg/s) | 30,140.04 | (mg/s) | 106,562.07 | (mg/s) |
|                             |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.508      | (mg/l) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C r13 =  | 12.994   | (mg/L) | 11.445    | (mg/l) | 4.355      | (mg/l) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Nickel  |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| ů p u     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.019144051 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|                               |   |          | Low Flo | W      | Average | Flow   | High Fl  | ow     |
|-------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.43    | (mg/s) | 5        | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s) | 0.17    | (mg/s) | 0.17     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| ıtrai                         | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.09    | (mg/s) | 24       | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 0.83    | (mg/s) | 0.83    | (mg/s) | 0.83     | (mg/s) |
| con sul                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.29    | (mg/s) | 0.29     | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.20    | (mg/s) | 1.93    | (mg/s) | 1.93     | (mg/s) |
| ma                            | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| ទ ប័                          | mass flux in seepage from cell 2W                           | M_s2w =  | 0.16    | (mg/s) | 1.55    | (mg/s) | 1.55     | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| balance<br>ch node            | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s) | 0.61    | (mg/s) | <br>5.04 | (mg/s) |
| Mass<br>at eac                | mass flux in river at PM-13                                 | M_r13 =  | 1.37    | (mg/s) | 7.31    | (mg/s) | 33.51    | (mg/s) |
|                               |   |          | Low Tio | **     | Average | 1101   | Ingili   | 011    |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001    | (mg/L) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 0.008   | (mg/L) | 0.003   | (mg/L) | 0.001    | (mg/L) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Lead  |          |             |        |
|           |   |          | -           | -      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000886329 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                                |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| _                              | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| Itration                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
|                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| cen                            | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s) | 0.14    | (mg/s) | 0.14    | (mg/s) |
| u xn                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
| ert e<br>Ss f                  | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| n ve<br>ma:                    | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ បំ                           | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.27    | (mg/s) | 0.27    | (mg/s) |
|                                |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| lance<br>node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| Mass ba<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) | 0.55    | (mg/s) | 0.55    | (mg/s) |
|                                |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| nvert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Cor<br>flux<br>con             | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 1  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 8.05E-03 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| ot        | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                                   |   |          | Low Flo | w      | Average | Flow   | High Flow | w     |
|-----------------------------------|---|----------|---------|--------|---------|--------|-----------|-------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.01    | (mg/s) | 0 (1      | mg/s) |
| -                                 | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04 (1   | mg/s) |
| tior                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00 (1   | mg/s) |
| itrat                             | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.03    | (mg/s) | 0 (1      | mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 0.18    | (mg/s) | 0.18    | (mg/s) | 0.18 (1   | mg/s) |
|                                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01 (1   | mg/s) |
| ert o<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.08    | (mg/s) | 0.81    | (mg/s) | 0.81 (1   | mg/s) |
| ma                                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00 (1   | mg/s) |
| ទ ប្                              | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s) | 0.06    | (mg/s) | 0.06 (1   | mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Flov | w     |
| lance<br>node                     | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.12 (1   | mg/s) |
| Mass ba<br>at each                | mass flux in river at PM-13                                 | M_r13 =  | 0.31    | (mg/s) | 1.14    | (mg/s) | 1.58 (1   | mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Flow | w     |
| nvert mass<br>x to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000 (1  | mg/L) |
| co<br>Llu<br>Co                   | concentration in river at PM-13                             | C_r13 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000 (1  | mg/L) |

| Case<br>Parameter | Year 1<br>Selenium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ita               | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| n de              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001106406 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| Cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                           |   |          | Low Flo | w      | Average  | Flow   | High Fl  | ow     |
|---------------------------|---|----------|---------|--------|----------|--------|----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.11     | (mg/s) | 1        | (mg/s) |
|                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07     | (mg/s) | 0.07     | (mg/s) |
| ntration                  | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00     | (mg/s) | 0.00     | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.52     | (mg/s) | 6        | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.35    | (mg/s) | 0.35     | (mg/s) | 0.35     | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.09     | (mg/s) | 0.09     | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.11     | (mg/s) | 0.11     | (mg/s) |
| ma                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00     | (mg/s) | 0.00     | (mg/s) |
| ទ ប័ ខ                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.25     | (mg/s) | 0.25     | (mg/s) |
|                           |   |          | Low Flo | w      | Average  | Flow   | High Fl  | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | <br>0.18 | (mg/s) | 1.29     | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 0.46    | (mg/s) | 1.50     | (mg/s) | 8.05     | (mg/s) |
|                           |   |          | LOW FIO | vv     | Average  | FIOW   | підії гі | 0₩     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.000    | (mg/L) | 0.000    | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001    | (mg/L) | 0.000    | (mg/L) |

| Case      | Year 1  |          |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
| -         |   | -        |         |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 190.00  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                                   |   |          | Low Flo  | w      | Average    | Flow   | High Fl        | ow     |
|-----------------------------------|---|----------|----------|--------|------------|--------|----------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,427.45   | (mg/s) | 16,206         | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 206.87   | (mg/s) | 206.87     | (mg/s) | 206.87         | (mg/s) |
| tior                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 37.36      | (mg/s) | 37.36          | (mg/s) |
| ntral                             | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,965.20   | (mg/s) | 79,526         | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72 | (mg/s) | 1,012.72   | (mg/s) | 1,012.72       | (mg/s) |
| nos                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 58,922.60  | (mg/s) | 58,922.60      | (mg/s) |
| ert e<br>ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,995.81 | (mg/s) | 19,167.71  | (mg/s) | 19,167.71      | (mg/s) |
| mag                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 216.95   | (mg/s) | 216.95     | (mg/s) | 216.95         | (mg/s) |
| ទ បំ                              | mass flux in seepage from cell 2W                           | M_s2w =  | 3,574.64 | (mg/s) | 34,330.84  | (mg/s) | 34,330.84      | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average    | Flow   | High Fl        | ow     |
| lass balance<br>t each node       | mass flux in river at PM-12                                 | M_r12 =  | 206.87   | (mg/s) | 1,671.68   | (mg/s) | 16,449.94      | (mg/s) |
| σĭΣ                               | mass flux in river at PM-13                                 | M_r13 =  | 7,006.99 | (mg/s) | 122,287.70 | (mg/s) | <br>209,627.16 | (mg/s) |
|                                   |   |          | LOW FIO  | w      | Average    | FIOW   | High Fi        | ow     |
| nvert mass<br>k to<br>1centration | concentration in river at PM-12                             | C_r12 =  | 8.500    | (mg/L) | 4.280      | (mg/l) | 4.027          | (mg/l) |
| cor tin                           | concentration in river at PM-13                             | C_r13 =  | 39.483   | (mg/L) | 46.436     | (mg/l) | 8.567          | (mg/l) |

| Case      | Year 1  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Thallium  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0002      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000907911 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| d L       | concentration of ground water into PM-13                        | C_g13 =  | 0.000004    | (mg/L) |

|                                   |   |          | Low Flo | W      | Average | Flow   | High Fl | ow     |
|-----------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.07    | (mg/s) | 1       | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itration                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|                                   | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.35    | (mg/s) | 4       | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| u Xn                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert o<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| mag                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                              | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node                    | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.07    | (mg/s) | 0.81    | (mg/s) |
| Mass ba<br>at each                | mass flux in river at PM-13                                 | M_r13 =  | 0.01    | (mg/s) | 0.59    | (mg/s) | 4.96    | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| nvert mass<br>t to<br>icentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Cor<br>flux<br>con                | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 1  |          |           |        |
|-----------|---|----------|-----------|--------|
| Parameter | Zinc  |          |           |        |
|           |   |          |           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.016     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.016     | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.0182086 | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01      | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435   | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0115    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.0115    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 5.71    | (mg/s) | 65      | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28    | (mg/s) | 0.28    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.15    | (mg/s) | 0.15    | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 27.86   | (mg/s) | 318     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.37    | (mg/s) | 1.37    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.19    | (mg/s) | 1.84    | (mg/s) | 1.84    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.34    | (mg/s) | 3.23    | (mg/s) | 3.23    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14    | (mg/s) | 65.25   | (mg/s) |
| Mass  <br>at eac           | mass flux in river at PM-13                                 | M_r13 =  | 2.18    | (mg/s) | 40.61   | (mg/s) | 389.97  | (mg/s) |
|                            |   |          | LOW FIO | w      | Average | FIOW   | High Fi | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016   | (mg/L) | 0.016   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.012   | (mg/L) | 0.015   | (mg/L) | 0.016   | (mg/L) |

Appendix F.10 Embarrass River Geotechnical Mitigation Year 5

#### FLOWS

| Case                             | Year 5   |                        |              |                |                |
|----------------------------------|--|------------------------|--------------|----------------|----------------|
| Flows                            | Low Flow Conditions (no surface runoff)          |                        |              |                | Node           |
| Fotal flow in<br>Embarrass River | flow in river at PM-12<br>flow in river at PM-13 | Q_r12_L =<br>Q_r13_L = | 0.86<br>6.28 | (cfs)<br>(cfs) | PM-12<br>PM-13 |
|                                  |  |                        | 0.20         | (015)          |                |
|                                  | surface water flow into PM-12                    | Q_s12_L =              | 0.00         | (cfs)          | PM-12          |
|                                  | surface water flow into PM-13                    | Q_s13_L =              | 0.00         | (cfs)          | PM-13          |
|                                  | Babbitt WWTP discharge                           | Q_sBab_L =             | 0.00         | (cfs)          | PM-12          |
|                                  | Area 5 Pit NW discharge                          | Q_spit_L =             | 0.00         | (cfs)          | PM-13          |
| ta                               | seepage from Tailings Basin Cells 1E and 2E      | Q_fs_L =               | 0.46         | (cfs)          | PM-13          |
| / da                             | hydrometallurgical residue cells liner leakage   | Q_rrs_L =              | 0.01         | (cfs)          | PM-13          |
| flow                             | seepage from cell 2W                             | Q_s2w_L =              | 0.74         | (cfs)          | PM-13          |
| ut 1                             | ground water flow into PM-12                     | Q_g12_L =              | 0.86         | (cfs)          | PM-12          |
| lnp                              | ground water flow into PM-13                     | Q_g13_L =              | 4.21         | (cfs)          | PM-13          |

| Case                | Year 5   |            |       |       |       |
|---------------------|--|------------|-------|-------|-------|
| Flow                | Average Flow Conditions (mean annual)          |            |       |       |       |
| n<br>River          | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| l flow iı<br>arrass | flow in river at PM-13                         | Q_r13_M =  | 94.54 | (cfs) | PM-13 |
| Total<br>Emb        | flow check                                     | Q_ck_M =   | 94.54 | (cfs) |       |
|                     | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|                     | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                     | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                     | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ta                  | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 5.04  | (cfs) | PM-13 |
| , da                | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.01  | (cfs) | PM-13 |
| Nol.                | seepage from cell 2W                           | Q_s2w_M =  | 7.96  | (cfs) | PM-13 |
| nt 1                | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| au                  | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case            | Year 5  |            |        |       |       |
|-----------------|---|------------|--------|-------|-------|
| Flow            | High Flow Conditions (avg. annual 1-day max flow) |            |        |       | _     |
| n<br>River      | flow in river at PM-12                            | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>rrass | flow in river at PM-13                            | Q_r13_H =  | 866.09 | (cfs) | PM-13 |
| Total<br>Emba   | flow check  | Q_ck_H =   | 866.09 | (cfs) | _     |
|                 | surface water flow into PM-12                     | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                 | surface water flow into PM-13                     | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                 | Babbitt WWTP discharge                            | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                 | Area 5 Pit NW discharge                           | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta              | seepage from Tailings Basin Cells 1E and 2E       | Q_fs_H =   | 5.04   | (cfs) | PM-13 |
| / da            | hydrometallurgical residue cells liner leakage    | Q_rrs_H =  | 0.01   | (cfs) | PM-13 |
| <u>o</u> l      | seepage from cell 2W                              | Q_s2w_H =  | 7.96   | (cfs) | PM-13 |
| E T             | ground water flow into PM-12                      | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| ů –             | ground water flow into PM-13                      | Q q13 H =  | 4.21   | (cfs) | PM-13 |

| Case      | Year 5  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Silver  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00086  | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| d L       | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.19    | (mg/s) | 2       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.12    | (mg/s) | 0.12    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>th node        | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.45    | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 0.01    | (mg/s) | 0.39    | (mg/s) | 2.79    | (mg/s) |
|                           |   |          | LOW FIO | w      | Average | FIOW   | High Fi | ow     |
| ert mass<br>ortration     | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 5  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Aluminum  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325  | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.00E-02 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.025    | (mg/L) |

|                                |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|--------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                                | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| tion                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) | 0.61    | (mg/s) | 0.61     | (mg/s) |
|                                | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itra                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                            | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) | 2.98    | (mg/s) | 2.98     | (mg/s) |
| u xn                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.75    | (mg/s) | 0.75     | (mg/s) |
| ert e<br>ss f                  | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.13    | (mg/s) | 1.42    | (mg/s) | 1.42     | (mg/s) |
| mag                            | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.08    | (mg/s) | 0.08    | (mg/s) | 0.08     | (mg/s) |
| ទ បំ                           | mass flux in seepage from cell 2W                           | M_s2w =  | 32.84   | (mg/s) | 355.65  | (mg/s) | 355.65   | (mg/s) |
|                                |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| lance<br>node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) | 37.23   | (mg/s) | 406.69   | (mg/s) |
| Mass ba<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 36.64   | (mg/s) | 572.24  | (mg/s) | 2,755.72 | (mg/s) |
|                                |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| nvert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) | 0.095   | (mg/L) | 0.100    | (mg/L) |
| Cor<br>flux<br>con             | concentration in river at PM-13                             | C_r13 =  | 0.206   | (mg/L) | 0.214   | (mg/L) | 0.112    | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Arsenic   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00075     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00075     | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00075     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.001325    | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.006769615 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00291     | (mg/L) |
| et        | concentration of ground water into PM-12                        | C_g12 =  | 0.00273     | (mg/L) |
| L L       | concentration of ground water into PM-13                        | C_g13 =  | 0.00273     | (mg/L) |

|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.27    | (mg/s) | 3       | (mg/s) |
| tion                        | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
|                             | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.31    | (mg/s) | 15      | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) | 0.33    | (mg/s) | 0.33    | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.09    | (mg/s) | 0.96    | (mg/s) | 0.96    | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.06    | (mg/s) | 0.65    | (mg/s) | 0.65    | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| lance<br>node               | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.34    | (mg/s) | 3.11    | (mg/s) |
| Mass ba<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.54    | (mg/s) | 3.67    | (mg/s) | 20.04   | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Boron   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| tra       | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.137838474 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| ont       | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                            |   |          | Low Flo | w      | A | verage | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---|--------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |   | 4.28   | (mg/s) | 49      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) |   | 0.52   | (mg/s) | 0.52    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |   | 0.11   | (mg/s) | 0.11    | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |   | 20.90  | (mg/s) | 239     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) |   | 2.53   | (mg/s) | 2.53    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |   | 7.41   | (mg/s) | 7.41    | (mg/s) |
| ert o<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.81    | (mg/s) |   | 19.64  | (mg/s) | 19.64   | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.05    | (mg/s) |   | 0.05   | (mg/s) | 0.05    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 6.86    | (mg/s) |   | 74.34  | (mg/s) | 74.34   | (mg/s) |
|                            |   |          | Low Flo | w      | A | verage | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) |   | 4.91   | (mg/s) | 49.25   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 11.77   | (mg/s) |   | 129.76 | (mg/s) | 391.78  | (mg/s) |
|                            |   |          | Low Flo | w      | A | verage | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) |   | 0.013  | (mg/L) | 0.012   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.066   | (mg/L) |   | 0.049  | (mg/L) | 0.016   | (mg/L) |

| Case<br>Parameter | Year 5<br>Barium  |          |          |        |
|-------------------|---|----------|----------|--------|
|                   |   | 4        |          |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.011    | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| р ц               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.05E-02 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| 별                 | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 3.93    | (mg/s) | 45      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 1.66    | (mg/s) | 1.66    | (mg/s) | 1.66    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 19.15   | (mg/s) | 219     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 8.11    | (mg/s) | 8.11    | (mg/s) | 8.11    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.66    | (mg/s) | 7.19    | (mg/s) | 7.19    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 1.93    | (mg/s) | 20.95   | (mg/s) | 20.95   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 1.66    | (mg/s) | 5.69    | (mg/s) | 46.33   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 12.37   | (mg/s) | 61.34   | (mg/s) | 301.52  | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.068   | (mg/L) | 0.015   | (mg/L) | 0.011   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.070   | (mg/L) | 0.023   | (mg/L) | 0.012   | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Beryllium   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0001      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0001      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000376001 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0           | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075     | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 0.000023    | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.000023    | (mg/L) |

|                                   |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
|-----------------------------------|---|----------|---------|--------|-----------|--------|---------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04      | (mg/s) | 0       | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| Itrai                             | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.17      | (mg/s) | 2       | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| u xn                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01      | (mg/s) | 0.01    | (mg/s) |
| ert e<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00    | (mg/s) | 0.05      | (mg/s) | 0.05    | (mg/s) |
| n ve<br>mas                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -       | (mg/s) | -         | (mg/s) | -       | (mg/s) |
| ទ ប័                              | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.17      | (mg/s) | 0.17    | (mg/s) |
|                                   |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
| s balance<br>ch node              | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | <br>0.04  | (mg/s) | 0.41    | (mg/s) |
| Mas:<br>at ea                     | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.44      | (mg/s) | 2.63    | (mg/s) |
|                                   |   | -        | Low Flo | w      | Average   | Flow   | High Fl | ow     |
| nvert mass<br>x to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | <br>0.000 | (mg/L) | 0.000   | (mg/L) |
| Sin                               | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000     | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 5<br>Calcium   |             |             |        |
|-------------------|---|-------------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =     | 13          | (mg/L) |
| ita               | concentration of surface water into PM-13                       | <br>C_s13 = | 13          | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 13          | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =    | 95.35       | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 77.28097689 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 416         | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =     | 59.78       | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =     | 19          | (mg/L) |
| lu du             | concentration of ground water into PM-13                        | C_g13 =     | 19          | (mg/L) |

|                             |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|-----------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4,639.22  | (mg/s) | 52,669     | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) | 462.42    | (mg/s) | 462.42     | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 121.41    | (mg/s) | 121.41     | (mg/s) |
| tral                        | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 22,636.89 | (mg/s) | 258,461    | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) | 2,263.72  | (mg/s) | 2,263.72   | (mg/s) |
| u xn                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 5,369.83  | (mg/s) | 5,369.83   | (mg/s) |
| ssf                         | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,016.90 | (mg/s) | 11,012.42 | (mg/s) | 11,012.42  | (mg/s) |
| nve<br>mas                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 176.59   | (mg/s) | 176.59    | (mg/s) | 176.59     | (mg/s) |
| ទ បិ                        | mass flux in seepage from cell 2W                           | M_s2w =  | 1,243.51 | (mg/s) | 13,466.52 | (mg/s) | 25.38      | (mg/s) |
|                             |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| balance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) | 5,223.05  | (mg/s) | 53,252.39  | (mg/s) |
| Mass                        | mass flux in river at PM-13                                 | M_r13 =  | 5,163.14 | (mg/s) | 60,149.00 | (mg/s) | 330,561.10 | (mg/s) |
|                             |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) | 13.374    | (mg/l) | 13.036     | (mg/l) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C r13 =  | 29.028   | (mg/L) | 22.481    | (mg/l) | 13.487     | (mg/l) |

| Case<br>Parameter | Year 5<br>Cadmium   |          |            |        |
|-------------------|---|----------|------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.00008    | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.00008    | (mg/L) |
| n de              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008    | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001     | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00032784 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004     | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188   | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =  | 0.0003     | (mg/L) |
| ln p              | concentration of ground water into PM-13                        | C_g13 =  | 0.0003     | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | H | ligh Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.03    | (mg/s) |   | 0       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.01    | (mg/s) | 0.01    | (mg/s) |   | 0.01    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) |   | 0.00    | (mg/s) |
| ıtra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.14    | (mg/s) |   | 2       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.04    | (mg/s) | 0.04    | (mg/s) |   | 0.04    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) |   | 0.01    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00    | (mg/s) | 0.05    | (mg/s) |   | 0.05    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) |   | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.04    | (mg/s) |   | 0.04    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | H | ligh Fl | ow     |
| balance<br>th node        | mass flux in river at PM-12                                 | M_r12 =  | 0.01    | (mg/s) | 0.04    | (mg/s) |   | 0.33    | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 0.05    | (mg/s) | 0.31    | (mg/s) |   | 2.05    | (mg/s) |
|                           |   |          | LOW FIO | w      | Average | Flow   | F | lign Fi | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) |   | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) |   | 0.000   | (mg/L) |

| Case      | Year 5  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Chloride  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.52E+01 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| rt .      | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| <u>d</u>  | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|----------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3,568.63  | (mg/s) | 40,514     | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 43.81    | (mg/s) | 43.81     | (mg/s) | 43.81      | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 93.39     | (mg/s) | 93.39      | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 17,412.99 | (mg/s) | 198,816    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 214.46   | (mg/s) | 214.46    | (mg/s) | 214.46     | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 335.09    | (mg/s) | 335.09     | (mg/s) |
| ert e<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 200.63   | (mg/s) | 2,172.67  | (mg/s) | 2,172.67   | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 747.10   | (mg/s) | 747.10    | (mg/s) | 747.10     | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 448.06   | (mg/s) | 4,852.27  | (mg/s) | 4,852.27   | (mg/s) |
|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 43.81    | (mg/s) | 3,705.83  | (mg/s) | 40,651.48  | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 1,654.05 | (mg/s) | 29,440.40 | (mg/s) | 247,789.05 | (mg/s) |
|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 1.800    | (mg/L) | 9.489     | (mg/L) | 9.951      | (mg/L) |
| Conv<br>flux t<br>conc     | concentration in river at PM-13                             | C_r13 =  | 9.299    | (mg/L) | 11.004    | (mg/L) | 10.110     | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Cobalt  |          |             |        |
| -         |   | -        |             | -      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0006      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001495727 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| <u>d</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|                           |   |          | Low Flo | w      | Average     | Flow   | High Fl  | ow     |
|---------------------------|---|----------|---------|--------|-------------|--------|----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.21        | (mg/s) | 2        | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03        | (mg/s) | 0.03     | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01        | (mg/s) | 0.01     | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.04        | (mg/s) | 12       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.13    | (mg/s) | 0.13        | (mg/s) | 0.13     | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03        | (mg/s) | 0.03     | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.21        | (mg/s) | 0.21     | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00        | (mg/s) | 0.00     | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.35        | (mg/s) | 0.35     | (mg/s) |
|                           |   |          | Low Flo | w      | Average     | Flow   | High Fl  | ow     |
| balance<br>th node        | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.25        | (mg/s) | 2.46     | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) | 2.02        | (mg/s) | 15.12    | (mg/s) |
|                           |   |          | LOW FIU | vv     | <br>Average | TOW    | підії гі | 0₩     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | <br>0.001   | (mg/L) | 0.001    | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.001       | (mg/L) | 0.001    | (mg/L) |

| Case      | Year 5  |          |           |        |
|-----------|---|----------|-----------|--------|
| Parameter | Copper  |          |           |        |
|           |   |          |           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0015    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0015    | (mg/L) |
| , p u     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345   | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.0068095 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015    | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.004     | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.004     | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.54    | (mg/s) | 6       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| ntration                   | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
|                            | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.61    | (mg/s) | 30      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s) | 0.48    | (mg/s) | 0.48    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.19    | (mg/s) | 0.19    | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.09    | (mg/s) | 0.97    | (mg/s) | 0.97    | (mg/s) |
| mas                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.09    | (mg/s) | 1.03    | (mg/s) | 1.03    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s) | 0.65    | (mg/s) | 6.19    | (mg/s) |
| Mass k<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.76    | (mg/s) | 5.93    | (mg/s) | 38.68   | (mg/s) |
|                            |   | _        | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |

| Case      | Year 5  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Fluoride  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 2.90E+00 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl  | ow     |
|-----------------------------|---|----------|---------|--------|----------|--------|----------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69    | (mg/s) | 405      | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s) | 9.37     | (mg/s) | 9.37     | (mg/s) |
| tior                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93     | (mg/s) | 0.93     | (mg/s) |
| ıtra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13   | (mg/s) | 1,988    | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s) | 45.87    | (mg/s) | 45.87    | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.04     | (mg/s) | 7.04     | (mg/s) |
| ert o<br>Ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 38.20   | (mg/s) | 413.72   | (mg/s) | 413.72   | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 1.21    | (mg/s) | 1.21     | (mg/s) | 1.21     | (mg/s) |
| ទ បំ                        | mass flux in seepage from cell 2W                           | M_s2w =  | 32.24   | (mg/s) | 349.17   | (mg/s) | 349.17   | (mg/s) |
|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl  | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 9.37    | (mg/s) | 45.99    | (mg/s) | 415.45   | (mg/s) |
| Mass ba<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 126.90  | (mg/s) | 1,037.13 | (mg/s) | 3,220.61 | (mg/s) |
|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl  | ow     |
| rt mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L) | 0.118    | (mg/L) | 0.102    | (mg/L) |
| Convei<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.713   | (mg/L) | 0.388    | (mg/L) | 0.131    | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Iron  |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 4.00E-03    | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| t         | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
|-----------------------------|---|----------|---------|--------|----------|--------|-----------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90 | (mg/s) | 11,749    | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85     | (mg/s) | 0.85      | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08    | (mg/s) | 27.08     | (mg/s) |
| Itrai                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77 | (mg/s) | 57,657    | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17     | (mg/s) | 4.17      | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13     | (mg/s) | 2.13      | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.05    | (mg/s) | 0.57     | (mg/s) | 0.57      | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.17    | (mg/s) | 0.17     | (mg/s) | 0.17      | (mg/s) |
| ទ ប័                        | mass flux in seepage from cell 2W                           | M_s2w =  | 95.56   | (mg/s) | 1,034.88 | (mg/s) | 1,034.88  | (mg/s) |
|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | 1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| Mass b<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 100.81  | (mg/s) | 7,154.52 | (mg/s) | 70,475.63 | (mg/s) |
|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| t mass<br>ntration          | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | 2.721    | (mg/L) | 2.883     | (mg/L) |
| Conver<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.567   | (mg/L) | 2.674    | (mg/L) | 2.875     | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 3.74E+02    | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|   |   |          | Low Flo   | w        | Average    | Flow   |   | High Fl      | ow       |
|---|---|----------|-----------|----------|------------|--------|---|--------------|----------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s)   | 24,980.41  | (mg/s) |   | 283,600      | (mg/s)   |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s)   | 2,129.58   | (mg/s) |   | 2,129.58     | (mg/s)   |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s)   | 653.73     | (mg/s) |   | 653.73       | (mg/s)   |
| itrai                                   | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s)   | 121,890.93 | (mg/s) |   | 1,391,712    | (mg/s)   |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s)   | 10,425.01  | (mg/s) |   | 10,425.01    | (mg/s)   |
| u Xn                                    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s)   | 53,090.84  | (mg/s) |   | 53,090.84    | (mg/s)   |
| ert o<br>Ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 4,924.93  | (mg/s)   | 53,334.08  | (mg/s) |   | 53,334.08    | (mg/s)   |
| mag                                     | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 3,654.83  | (mg/s)   | 3,654.83   | (mg/s) |   | 3,654.83     | (mg/s)   |
| ទ ប្                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 9,081.94  | (mg/s)   | 98,352.01  | (mg/s) |   | 98,352.01    | (mg/s)   |
|   |   |          | Low Flo   | w        | Average    | Flow   |   | High Fl      | ow       |
| s balance<br>ach node                   | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s)   | 27,763.72  | (mg/s) |   | 286,383.27   | (mg/s)   |
| Mas<br>at e                             | mass flux in river at PM-13                                 | M r13 =  | 30.216.30 | (ma/s)   | 368.511.42 | (ma/s) |   | 1.896.951.97 | (ma/s)   |
|   |   |          | Low Flo   | w        | Average    | Flow   |   | High Fl      | ow       |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L)   | 71.091     | (mg/L) |   | 70.104       | (mg/L)   |
| 0 = 0                                   | concentration in river at Pivi-13                           | C_113 =  | 109.883   | (IIIY/L) | 137.730    | (mg/∟) | 1 | 77.394       | (IIIg/L) |

| Case      | Year 5  |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   |          | -     |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 9.31  | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
|----------------------------|---|----------|---------|--------|-----------|--------|-----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39  | (mg/s) | 14,990    | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94     | (mg/s) | 38.94     | (mg/s) |
| tion                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.76    | (mg/s) | 0.76      | (mg/s) | 0.76      | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81  | (mg/s) | 73,562    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 190.63    | (mg/s) | 190.63    | (mg/s) |
| u xn                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 34.55     | (mg/s) | 34.55     | (mg/s) |
| ert o<br>Ss f              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,029.85  | (mg/s) | 3,029.85  | (mg/s) |
| n ve<br>mas                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 122.47  | (mg/s) | 1,326.24  | (mg/s) | 1,326.24  | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 161.63  | (mg/s) | 1,750.33  | (mg/s) | 1,750.33  | (mg/s) |
|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| oalance<br>1 node          | mass flux in river at PM-12                                 | M_r12 =  | 39.70   | (mg/s) | 1,360.10  | (mg/s) | 15,029.99 | (mg/s) |
| Mass b<br>at eacl          | mass flux in river at PM-13                                 | M_r13 =  | 514.43  | (mg/s) | 14,134.51 | (mg/s) | 94,923.51 | (mg/s) |
|                            |   |          | LOW FIO | w      | Average   | Flow   | High Fi   | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 1.631   | (mg/L) | 3.483     | (mg/L) | 3.679     | (mg/l) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 2.892   | (mg/L) | 5.283     | (mg/L) | 3.873     | (mg/l) |

| Case      | Year 5  |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Magnesium   |          |        |        |
|           |   |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 44.03  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|-------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 2,141.18  | (mg/s) | 24,309     | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s) | 259.20    | (mg/s) | 259.20     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 56.03     | (mg/s) | 56.03      | (mg/s) |
| trat                          | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 10,447.79 | (mg/s) | 119,290    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s) | 1,268.87  | (mg/s) | 1,268.87   | (mg/s) |
|                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 15,261.91 | (mg/s) | 15,261.91  | (mg/s) |
| ert e<br>Ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 579.34   | (mg/s) | 6,273.94  | (mg/s) | 6,273.94   | (mg/s) |
| n ve<br>ma:                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 90.42    | (mg/s) | 90.42     | (mg/s) | 90.42      | (mg/s) |
| ទ ប្                          | mass flux in seepage from cell 2W                           | M_s2w =  | 1,455.48 | (mg/s) | 15,762.00 | (mg/s) | 15,762.00  | (mg/s) |
|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| ulance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s) | 2,456.41  | (mg/s) | 24,623.80  | (mg/s) |
| Mass ba<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 3,653.31 | (mg/s) | 51,561.34 | (mg/s) | 182,570.53 | (mg/s) |
|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L) | <br>6.290 | (mg/l) | 6.028      | (mg/l) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 20.540   | (mg/L) | 19.272    | (mg/l) | 7.449      | (mg/l) |

| Case<br>Parameter | Year 5<br>Manganese   |          |      |        |
|-------------------|---|----------|------|--------|
|                   |   |          |      |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| , p u             | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.24 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| du l              | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|-------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 107.06  | (mg/s) | 1,215    | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 4.58    | (mg/s) | 4.58    | (mg/s) | 4.58     | (mg/s) |
| tior                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 2.80    | (mg/s) | 2.80     | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 522.39  | (mg/s) | 5,964    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 22.40   | (mg/s) | 22.40   | (mg/s) | 22.40    | (mg/s) |
| uo:                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 27.31   | (mg/s) | 27.31    | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3.16    | (mg/s) | 34.25   | (mg/s) | 34.25    | (mg/s) |
| mag                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| <u>۽</u> ڳ                    | mass flux in seepage from cell 2W                           | M_s2w =  | 24.61   | (mg/s) | 266.49  | (mg/s) | 266.49   | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| lance<br>node                 | mass flux in river at PM-12                                 | M_r12 =  | 4.58    | (mg/s) | 114.44  | (mg/s) | 1,222.81 | (mg/s) |
| Mass be<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 54.75   | (mg/s) | 987.28  | (mg/s) | 7,537.74 | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.188   | (mg/L) | 0.293   | (mg/l) | 0.299    | (mg/l) |
| Com<br>flux (<br>conc         | concentration in river at PM-13                             | C_r13 =  | 0.308   | (mg/L) | 0.369   | (mg/l) | 0.308    | (mg/l) |

| Case<br>Parameter | Year 5<br>Sodium  |          |        |        |
|-------------------|---|----------|--------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| sp r              | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 52.95  | (mg/L) |
| Icer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| h                 | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|---|---|----------|----------|--------|-----------|--------|------------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180     | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.26     | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69      | (mg/s) |
| Itra                                    | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,586     | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.80     | (mg/s) |
| u Xn                                    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.88   | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 696.73   | (mg/s) | 7,545.15  | (mg/s) | 7,545.15   | (mg/s) |
| mag                                     | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 108.24   | (mg/s) | 108.24    | (mg/s) | 108.24     | (mg/s) |
| <u>۽</u> ڳ                              | mass flux in seepage from cell 2W                           | M_s2w =  | 921.72   | (mg/s) | 9,981.63  | (mg/s) | 9,981.63   | (mg/s) |
|   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| is balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94  | (mg/s) |
| Mas<br>ate                              | mass flux in river at PM-13                                 | M r13 =  | 2,429.74 | (mq/s) | 32,444.21 | (mq/s) | 108,866.24 | (mq/s) |
|   | •   | • -      | Low Flo  | W      | Average   | Flow   | High Fl    | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.508      | (mg/l) |

| Case<br>Parameter | Year 5<br>Nickel  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| , de              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.019144051 | (mg/L) |
| Cei               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| COL               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| t                 | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Flo | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.43    | (mg/s) | 5        | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s) | 0.17    | (mg/s) | 0.17     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.09    | (mg/s) | 24       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.83    | (mg/s) | 0.83    | (mg/s) | 0.83     | (mg/s) |
| u Xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.29    | (mg/s) | 0.29     | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.25    | (mg/s) | 2.73    | (mg/s) | 2.73     | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04     | (mg/s) |
| <u>۽</u> ک                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.14    | (mg/s) | 1.55    | (mg/s) | 1.55     | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| t balance<br>ch node       | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s) | 0.61    | (mg/s) | 5.04     | (mg/s) |
| Mass<br>at ea              | mass flux in river at PM-13                                 | M_r13 =  | 1.44    | (mg/s) | 8.15    | (mg/s) | 34.35    | (mg/s) |
|                            | 1   | 1        | LOW FIO | w      | Average | FIOW   | підп гі  | ow     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001    | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.008   | (mg/L) | 0.003   | (mg/L) | 0.001    | (mg/L) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Lead  |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| ې مو      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000886329 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                            |   |          | Low Flo | w      | 4 | verage | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---|--------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |   | -      | (mg/s) | -       | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) |   | 0.03   | (mg/s) | 0.03    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |   | -      | (mg/s) | -       | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |   | -      | (mg/s) | -       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s) |   | 0.14   | (mg/s) | 0.14    | (mg/s) |
|                            | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) |   | 0.02   | (mg/s) | 0.02    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) |   | 0.13   | (mg/s) | 0.13    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) |   | 0.00   | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) |   | 0.27   | (mg/s) | 0.27    | (mg/s) |
|                            |   |          | Low Flo | w      | 4 | verage | Flow   | High Fl | ow     |
| alance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) |   | 0.03   | (mg/s) | 0.03    | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) |   | 0.59   | (mg/s) | 0.59    | (mg/s) |
|                            |   |          | Low Flo | w      | 4 | verage | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) |   | 0.000  | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) |   | 0.000  | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 5  |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  |          |          |        |
| -         |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 8.05E-03 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| et        | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.01    | (mg/s) | 0        | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.03    | (mg/s) | 0        | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.18    | (mg/s) | 0.18    | (mg/s) | 0.18     | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.11    | (mg/s) | 1.15    | (mg/s) | 1.15     | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| ទ ប័ ខ                     | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s) | 0.06    | (mg/s) | 0.06     | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.12     | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 0.33    | (mg/s) | 1.48    | (mg/s) | 1.91     | (mg/s) |
|                            |   |          | LOW FIO | vv     | Average | FIUW   | підії гі | 0₩     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000    | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.002   | (mg/L) | 0.001   | (mg/L) | 0.000    | (mg/L) |

| Case<br>Parameter | Year 5<br>Selenium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| a de              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001106406 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| ů d               | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                           |   |          | Low Flo | w      | Averaç | e Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|--------|----------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.1    | 1 (mg/s) | 1       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.0    | 7 (mg/s) | 0.07    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.0    | 0 (mg/s) | 0.00    | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.5    | 2 (mg/s) | 6       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.35    | (mg/s) | 0.3    | ō (mg/s) | 0.35    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.0    | 9 (mg/s) | 0.09    | (mg/s) |
| ert o<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.1    | 6 (mg/s) | 0.16    | (mg/s) |
| mas                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.02    | (mg/s) | 0.0    | 2 (mg/s) | 0.02    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.2    | 5 (mg/s) | 0.25    | (mg/s) |
|                           |   |          | Low Flo | w      | Averag | e Flow   | High Fl | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.1    | 3 (mg/s) | 1.29    | (mg/s) |
| Mass  <br>at eac          | mass flux in river at PM-13                                 | M_r13 =  | 0.48    | (mg/s) | 1.5    | 7 (mg/s) | 8.12    | (mg/s) |
|                           |   |          | Low Flo | w      | Averaç | e Flow   | High Fl | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.00   | ) (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.00   | 1 (mg/L) | 0.000   | (mg/L) |

| Case      | Year 5  |          |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
| -         |   | -        |         |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 190.00  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| rt .      | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                           |   |          | Low Flo   | w      | Average    | Flow   | High Fl    | ow     |
|---------------------------|---|----------|-----------|--------|------------|--------|------------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 1,427.45   | (mg/s) | 16,206     | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 206.87    | (mg/s) | 206.87     | (mg/s) | 206.87     | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 37.36      | (mg/s) | 37.36      | (mg/s) |
| Itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 6,965.20   | (mg/s) | 79,526     | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72  | (mg/s) | 1,012.72   | (mg/s) | 1,012.72   | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 58,922.60  | (mg/s) | 58,922.60  | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2,500.08  | (mg/s) | 27,074.39  | (mg/s) | 27,074.39  | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 3,118.71  | (mg/s) | 3,118.71   | (mg/s) | 3,118.71   | (mg/s) |
| ទ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 3,170.15  | (mg/s) | 34,330.84  | (mg/s) | 34,330.84  | (mg/s) |
|                           |   |          | Low Flo   | w      | Average    | Flow   | High Fl    | ow     |
| alance<br>n node          | mass flux in river at PM-12                                 | M_r12 =  | 206.87    | (mg/s) | 1,671.68   | (mg/s) | 16,449.94  | (mg/s) |
| Mass b<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 10,008.53 | (mg/s) | 133,096.13 | (mg/s) | 220,435.59 | (mg/s) |
|                           |   |          | Low Flo   | w      | Average    | Flow   | High Fl    | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 8.500     | (mg/L) | 4.280      | (mg/l) | 4.027      | (mg/l) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 56.270    | (mg/L) | 49.746     | (mg/l) | 8.994      | (mg/l) |

| Case      | Year 5  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Thallium  |          |             |        |
|           |   | -        | -           |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0002      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000907911 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.000004    | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.07    | (mg/s) | 1       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.35    | (mg/s) | 4       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.07    | (mg/s) | 0.81    | (mg/s) |
| Mass  <br>at eac          | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.63    | (mg/s) | 5.00    | (mg/s) |
|                           |   |          | LOW FIO | w      | Average | Flow   | High Fi | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 5<br>Zinc  |          |           |        |
|-------------------|---|----------|-----------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.016     | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.016     | (mg/L) |
| sh r              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003     | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.0182086 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01      | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435   | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.0115    | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.0115    | (mg/L) |

|                            |   |          | Low Flo | w      | Average I | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|-----------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 5.71      | (mg/s) | 65      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28      | (mg/s) | 0.28    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.15      | (mg/s) | 0.15    | (mg/s) |
| ntra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 27.86     | (mg/s) | 318     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.37      | (mg/s) | 1.37    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.17      | (mg/s) | 0.17    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.24    | (mg/s) | 2.59      | (mg/s) | 2.59    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.30    | (mg/s) | 3.23      | (mg/s) | 3.23    | (mg/s) |
|                            |   |          | Low Flo | w      | Average I | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14      | (mg/s) | 65.25   | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 2.19    | (mg/s) | 41.37     | (mg/s) | 390.73  | (mg/s) |
|                            |   |          | Low Flo | w      | Average I | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016     | (mg/L) | 0.016   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.012   | (mg/L) | 0.015     | (mg/L) | 0.016   | (mg/L) |

Appendix F.11 Embarrass River Geotechnical Mitigation Year 10

### FLOWS

| Case             | Year 10  |            |      |       |       |
|------------------|--|------------|------|-------|-------|
| Flows            | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| n<br>River       | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| flow i<br>arrass | flow in river at PM-13                         | Q_r13_L =  | 6.29 | (cfs) | PM-13 |
| Total<br>Emba    | flow check                                     | Q_ck_L =   | 6.29 | (cfs) | _     |
|                  | surface water flow into PM-12                  | Q s12 L =  | 0.00 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| ţa               | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.49 | (cfs) | PM-13 |
| / da             | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.02 | (cfs) | PM-13 |
| flov             | seepage from cell 2W                           | Q_s2w_L =  | 0.71 | (cfs) | PM-13 |
| ut 1             | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| dul              | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case                | Year 10  |            |       |       |       |
|---------------------|--|------------|-------|-------|-------|
| Flow                | Average Flow Conditions (mean annual)          |            |       |       |       |
| n<br>River          | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| l flow ir<br>arrass | flow in river at PM-13                         | Q_r13_M =  | 95.05 | (cfs) | PM-13 |
| Tota<br>Emb         | flow check                                     | Q_ck_M =   | 95.05 | (cfs) | _     |
|                     | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|                     | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                     | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                     | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ta                  | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 5.55  | (cfs) | PM-13 |
| / da                | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.02  | (cfs) | PM-13 |
| ut flow             | seepage from cell 2W                           | Q_s2w_M =  | 7.96  | (cfs) | PM-13 |
|                     | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| au                  | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case             | Year 10   |            |        |       |       |
|------------------|---|------------|--------|-------|-------|
| Flow             | High Flow Conditions (avg. annual 1-day max flow) |            |        |       | _     |
| n<br>River       | flow in river at PM-12                            | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>ırrass | flow in river at PM-13                            | Q_r13_H =  | 866.60 | (cfs) | PM-13 |
| Total<br>Emba    | flow check  | Q_ck_H =   | 866.60 | (cfs) | _     |
|                  | surface water flow into PM-12                     | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                     | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                            | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                           | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta               | seepage from Tailings Basin Cells 1E and 2E       | Q_fs_H =   | 5.55   | (cfs) | PM-13 |
| / da             | hydrometallurgical residue cells liner leakage    | Q_rrs_H =  | 0.02   | (cfs) | PM-13 |
| low              | seepage from cell 2W                              | Q_s2w_H =  | 7.96   | (cfs) | PM-13 |
| rt<br>D          | ground water flow into PM-12                      | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| du               | ground water flow into PM-13                      | Q q13 H =  | 4.21   | (cfs) | PM-13 |

| Case<br>Parameter | Year 10<br>Silver   |          |          |        |
|-------------------|---|----------|----------|--------|
|                   |   |          |          |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
| ip u              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00084  | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                             |   |          | Low Flor | w      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|----------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| -                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.00     | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = |          | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  |          | (mg/s) | 0.19    | (mg/s) | 2       | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.00     | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| nos                         | mass flux of Area 5 Pit NW discharge                        | M_spit = |          | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert (<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01     | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
| ma:                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00     | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
|                             |   |          | Low Flor | w      | Average | Flow   | High Fl | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.00     | (mg/s) | 0.04    | (mg/s) | 0.45    | (mg/s) |
| Mass bé<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.01     | (mg/s) | 0.40    | (mg/s) | 2.80    | (mg/s) |
|                             |   |          | Low Flo  | w      | Average | Flow   | High Fl | ow     |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C r13 =  | 0.000    | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 10<br>Aluminum   |          |          |        |
|-------------------|---|----------|----------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| , då              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325  | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.25E-01 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.025    | (mg/L) |

|   |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|---|---|----------|---------|--------|---------|--------|----------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) | 0.61    | (mg/s) | 0.61     | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itra                                    | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) | 2.98    | (mg/s) | 2.98     | (mg/s) |
| u su l                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.75    | (mg/s) | 0.75     | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.75    | (mg/s) | 19.65   | (mg/s) | 19.65    | (mg/s) |
| ma                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.09    | (mg/s) | 0.09    | (mg/s) | 0.09     | (mg/s) |
| ដ ប្                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 31.60   | (mg/s) | 355.65  | (mg/s) | 355.65   | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| is balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) | 37.23   | (mg/s) | 406.69   | (mg/s) |
| Mas<br>ate                              | mass flux in river at PM-13                                 | M r13 =  | 37.02   | (mq/s) | 590.47  | (mq/s) | 2,773.96 | (mq/s) |
|   | •   |          | Low Flo | w      | Average | Flow   | High Fl  | low    |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) | 0.095   | (mg/L) | 0.100    | (mg/L) |

| Case<br>Parameter | Year 10<br>Arsenic  |             |             |        |
|-------------------|---|-------------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =     | 0.00075     | (mg/L) |
| Ita               | concentration of surface water into PM-13                       | <br>C_s13 = | 0.00075     | (mg/L) |
| ab r              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.00075     | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.001325    | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 0.009432521 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 0.004       | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =     | 0.00291     | (mg/L) |
| Ĕ                 | concentration of ground water into PM-12                        | C_g12 =     | 0.00273     | (mg/L) |
| 4                 | concentration of ground water into PM-13                        | C_g13 =     | 0.00273     | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.27    | (mg/s) | 3       | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.31    | (mg/s) | 15      | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) | 0.33    | (mg/s) | 0.33    | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.13    | (mg/s) | 1.48    | (mg/s) | 1.48    | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.06    | (mg/s) | 0.65    | (mg/s) | 0.65    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ss balance<br>ach node               | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.34    | (mg/s) | 3.11    | (mg/s) |
| Ma:<br>ate                           | mass flux in river at PM-13                                 | M_r13 =  | 0.58    | (mg/s) | 4.18    | (mg/s) | 20.56   | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| o⊊ŏ                                  | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.002   | (mg/L) | 0.001   | (mg/L) |

| Case<br>Parameter | Year 10<br>Boron  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0.012       | (ma/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.149974322 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| <u>l</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---|---|----------|---------|--------|---------|--------|---------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 4.28    | (mg/s) | 49      | (mg/s) |
| _   | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) | 0.52    | (mg/s) | 0.52    | (mg/s) |
| tior  | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
| ıtra  | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 20.90   | (mg/s) | 239     | (mg/s) |
| cen   | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) | 2.53    | (mg/s) | 2.53    | (mg/s) |
| u si li xi li x | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.41    | (mg/s) | 7.41    | (mg/s) |
| ert o<br>ss f   | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.09    | (mg/s) | 23.55   | (mg/s) | 23.55   | (mg/s) |
| ma  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.05    | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
| ຊ ິ <u>ບ</u>  | mass flux in seepage from cell 2W                           | M_s2w =  | 6.60    | (mg/s) | 74.34   | (mg/s) | 74.34   | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>th node  | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) | 4.91    | (mg/s) | 49.25   | (mg/s) |
| Mass<br>at eac  | mass flux in river at PM-13                                 | M_r13 =  | 11.79   | (mg/s) | 133.68  | (mg/s) | 395.69  | (mg/s) |
|   |   | 1        | LOW FIO | w      | Average | FIOW   | підн гі | ow     |
| ert mass<br>o<br>entration  | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) | 0.013   | (mg/L) | 0.012   | (mg/L) |
| Conv<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.066   | (mg/L) | 0.050   | (mg/L) | 0.016   | (mg/L) |

| Case<br>Parameter | Year 10<br>Barium   |          |          |        |
|-------------------|---|----------|----------|--------|
|                   |   | -        |          |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.011    | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| p c               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 4.92E-02 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

| Mass flux of surface water into PM-12   M_s12 =   (mg/s)   3.93 (mg/s)     mass flux of ground water into PM-12   M_g12 =   1.66 (mg/s)   1.66 (mg/s)     mass flux of ground water into PM-12   M_g12 =   1.66 (mg/s)   0.10 (mg/s)     mass flux of surface water into PM-13   M_s13 =   (mg/s)   19.15 (mg/s)     mass flux of ground water into PM-13   M_g13 =   8.11 (mg/s)   8.11 (mg/s)     mass flux of Area 5 Pit NW discharge   M_spit =   (mg/s)   0.25 (mg/s)     mass flux in seepage from Tailings Basin Cells 1E and 2E   M_fs =   0.69 (mg/s)   7.73 (mg/s)     mass flux in seepage from cell 2W   M_s2w =   1.86 (mg/s)   20.95 (mg/s)  | w High Flow       | e Flow   | Average | 1     | Low Flow |          |   |                               |
|--|-------------------|----------|---------|-------|----------|----------|---|-------------------------------|
| Mass flux of ground water into PM-12   M_g12 =   1.66   (mg/s)   1.66   (mg/s)     mass flux in Babbitt WWTP discharge   M_sBab =   -   (mg/s)   0.10   (mg/s)     mass flux of surface water into PM-13   M_s13 =   -   (mg/s)   19.15   (mg/s)     mass flux of ground water into PM-13   M_g13 =   8.11   (mg/s)   8.11   (mg/s)     mass flux of Area 5 Pit NW discharge   M_spit =   -   (mg/s)   0.25   (mg/s)     mass flux in seepage from Tailings Basin Cells 1E and 2E   M_fs =   0.69   (mg/s)   7.73   (mg/s)     mass flux in seepage from cell 2W   M_s2w =   1.86   (mg/s)   0.00   (mg/s)   | g/s) 45 (mg/s     | 3 (mg/s) | 3.93    | mg/s) | -        | M_s12 =  | mass flux of surface water into PM-12                       |                               |
| mass flux in Babbitt WWTP discharge   M_sBab =   -   (mg/s)   0.10   (mg/s)     mass flux of surface water into PM-13   M_s13 =   -   (mg/s)   19.15   (mg/s)     mass flux of ground water into PM-13   M_g13 =   8.11   (mg/s)   8.11   (mg/s)     mass flux of ground water into PM-13   M_g13 =   8.11   (mg/s)   0.25   (mg/s)     mass flux in seepage from Tailings Basin Cells 1E and 2E   M_fs =   0.69   (mg/s)   7.73   (mg/s)     mass flux in hydrometallurgical residue cells liner leakage   M_rrs =   0.00   (mg/s)   0.00   (mg/s)     mass flux in seepage from Cell 2W   M_s2w =   1.86   (mg/s)   20.95   (mg/s)   | g/s) 1.66 (mg/s   | 6 (mg/s) | 1.66    | mg/s) | 1.66     | M_g12 =  | mass flux of ground water into PM-12                        | _                             |
| Image: Second | g/s) 0.10 (mg/s   | 0 (mg/s) | 0.10    | mg/s) | -        | M_sBab = | mass flux in Babbitt WWTP discharge                         | tio                           |
| mass flux of ground water into PM-13   M_g13 =   8.11   (mg/s)   8.11   (mg/s)     mass flux of Area 5 Pit NW discharge   M_spit =   -   (mg/s)   0.25   (mg/s)     mass flux in seepage from Tailings Basin Cells 1E and 2E   M_fs =   0.69   (mg/s)   7.73   (mg/s)     mass flux in hydrometallurgical residue cells liner leakage   M_rrs =   0.00   (mg/s)   0.00   (mg/s)     mass flux in seepage from Cell 2W   M_s2w =   1.86   (mg/s)   20.95   (mg/s)   | g/s) 219 (mg/s    | 5 (mg/s) | 19.15   | mg/s) | -        | M_s13 =  | mass flux of surface water into PM-13                       | itrai                         |
| bit   mass flux of Area 5 Pit NW discharge   M_spit =   -   (mg/s)   0.25   (mg/s)     mass flux in seepage from Tailings Basin Cells 1E and 2E   M_fs =   0.69   (mg/s)   7.73   (mg/s)     mass flux in hydrometallurgical residue cells liner leakage   M_rrs =   0.00   (mg/s)   0.00   (mg/s)     mass flux in seepage from cell 2W   M_s2w =   1.86   (mg/s)   20.95   (mg/s)  | g/s) 8.11 (mg/s   | 1 (mg/s) | 8.11    | mg/s) | 8.11     | M_g13 =  | mass flux of ground water into PM-13                        | cer                           |
| mass flux in seepage from Tailings Basin Cells 1E and 2E M_fs = 0.69 (mg/s) 7.73 (mg/s)   mass flux in hydrometallurgical residue cells liner leakage M_rrs = 0.00 (mg/s) 0.00 (mg/s)   mass flux in seepage from cell 2W M_s2w = 1.86 (mg/s) 20.95 (mg/s)   | g/s) 0.25 (mg/s   | 5 (mg/s) | 0.25    | mg/s) | -        | M_spit = | mass flux of Area 5 Pit NW discharge                        | uo Xn                         |
| No.00 (mg/s) 0.00 (mg/s)   No.00 mass flux in hydrometallurgical residue cells liner leakage M_rrs = 0.00 (mg/s) 0.00 (mg/s)   No.00 mass flux in seepage from cell 2W M_s2w = 1.86 (mg/s) 20.95 (mg/s)  | g/s) 7.73 (mg/s   | 3 (mg/s) | 7.73    | mg/s) | 0.69     | M_fs =   | mass flux in seepage from Tailings Basin Cells 1E and 2E    | ert o<br>Ss f                 |
| S 2   mass flux in seepage from cell 2W   M_s2w =   1.86   (mg/s)   20.95   (mg/s)   | g/s) 0.00 (mg/s   | 0 (mg/s) | 0.00    | mg/s) | 0.00     | M_rrs =  | mass flux in hydrometallurgical residue cells liner leakage | n ve<br>mai                   |
|  | g/s) 20.95 (mg/s  | 5 (mg/s) | 20.95   | mg/s) | 1.86     | M_s2w =  | mass flux in seepage from cell 2W                           | ដ ប្                          |
| Low Flow Average Flow  | w High Flow       | e Flow   | Average | 1     | Low Flow |          |   |                               |
| Step   mass flux in river at PM-12   M_r12 =   1.66 (mg/s)   5.69 (mg/s)   | g/s) 46.33 (mg/s  | 9 (mg/s) | 5.69    | mg/s) | 1.66     | M_r12 =  | mass flux in river at PM-12                                 | ss balance<br>ach node        |
| K mass flux in river at PM-13 M r13 = 12.32 (mg/s) 61.88 (mg/s)  | g/s) 302.06 (mg/s | 8 (mg/s) | 61.88   | mg/s) | 12.32    | M r13 =  | mass flux in river at PM-13                                 | Ma:<br>at e                   |
| Low Flow Average Flow  | w High Flow       | e Flow   | Average | 1     | Low Flow |          |   |                               |
| concentration in river at PM-12 C_r12 = 0.068 (mg/L) 0.015 (mg/L)  |                   | 5 (mg/L) | 0.015   | mg/L) | 0.068    | C_r12 =  | concentration in river at PM-12                             | wert mass<br>to<br>centration |

| Case<br>Parameter | Year 10<br>Beryllium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0 0001      | (ma/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0001      | (mg/L) |
| , då              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000587308 | (mg/L) |
| Cet               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0           | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075     | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.000023    | (mg/L) |
| 법                 | concentration of ground water into PM-13                        | C_g13 =  | 0.000023    | (mg/L) |

|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|-----------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04      | (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.17      | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| uos                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01      | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.09      | (mg/s) | 0.09    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -       | (mg/s) | -         | (mg/s) | -       | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.17      | (mg/s) | 0.17    | (mg/s) |
|                            |   |          | Low Flo | W      | Average   | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04      | (mg/s) | 0.41    | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.03    | (mg/s) | 0.48      | (mg/s) | 2.66    | (mg/s) |
|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | <br>0.000 | (mg/L) | 0.000   | (mg/L) |
| Conv<br>flux t             | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000     | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 10   |          |            |        |
|-----------|---|----------|------------|--------|
| Parameter | Calcium   |          |            |        |
|           |   |          |            |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 13         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 13         | (mg/L) |
| ü u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 13         | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 95.35      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 107.272439 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 416        | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 59.78      | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 19         | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 19         | (mg/L) |

|                                   |   |          | Low Flow |        | Average Flow |        | High Flow  |        |
|-----------------------------------|---|----------|----------|--------|--------------|--------|------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4,639.22     | (mg/s) | 52,669     | (mg/s) |
| -                                 | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) | 462.42       | (mg/s) | 462.42     | (mg/s) |
| tior                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 121.41       | (mg/s) | 121.41     | (mg/s) |
| Itrai                             | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 22,636.89    | (mg/s) | 258,461    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) | 2,263.72     | (mg/s) | 2,263.72   | (mg/s) |
|                                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 5,369.83     | (mg/s) | 5,369.83   | (mg/s) |
| ert e<br>ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,496.20 | (mg/s) | 16,841.82    | (mg/s) | 16,841.82  | (mg/s) |
| mas                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 202.28   | (mg/s) | 202.28       | (mg/s) | 202.28     | (mg/s) |
| ទ បំ                              | mass flux in seepage from cell 2W                           | M_s2w =  | 1,196.34 | (mg/s) | 13,466.52    | (mg/s) | 29.07      | (mg/s) |
|                                   |   |          | Low Flow |        | Average Flow |        | High Fl    | ow     |
| balance<br>ch node                | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) | 5,223.05     | (mg/s) | 53,252.39  | (mg/s) |
| Mass<br>at ea                     | mass flux in river at PM-13                                 | M_r13 =  | 5,620.95 | (mg/s) | 66,004.10    | (mg/s) | 336,419.89 | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average      | Flow   | High Fl    | ow     |
| nvert mass<br>x to<br>1centration | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) | 13.374       | (mg/l) | 13.036     | (mg/l) |
| COL CO                            | concentration in river at PM-13                             | C_r13 =  | 31.591   | (mg/L) | 24.536       | (mg/l) | 13.717     | (mg/l) |

| Case<br>Parameter | Year 10<br>Cadmium  |             |             |        |
|-------------------|---|-------------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =     | 0.00008     | (mg/L) |
| Ita               | concentration of surface water into PM-13                       | <br>C_s13 = | 0.00008     | (mg/L) |
| ab r              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.00008     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.0001      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 0.000645923 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 0.0004      | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =     | 0.000188    | (mg/L) |
| rt (              | concentration of ground water into PM-12                        | C_g12 =     | 0.0003      | (mg/L) |
| 별                 | concentration of ground water into PM-13                        | C_g13 =     | 0.0003      | (mg/L) |

|                               |   | Low Flow |          | Average Flow |              | High Flow |  | ow      |        |
|-------------------------------|---|----------|----------|--------------|--------------|-----------|--|---------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s)       | 0.03         | (mg/s)    |  | 0       | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.01     | (mg/s)       | 0.01         | (mg/s)    |  | 0.01    | (mg/s) |
| tior                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s)       | 0.00         | (mg/s)    |  | 0.00    | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s)       | 0.14         | (mg/s)    |  | 2       | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 0.04     | (mg/s)       | 0.04         | (mg/s)    |  | 0.04    | (mg/s) |
| u Xn                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s)       | 0.01         | (mg/s)    |  | 0.01    | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01     | (mg/s)       | 0.10         | (mg/s)    |  | 0.10    | (mg/s) |
| mag                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s)       | 0.00         | (mg/s)    |  | 0.00    | (mg/s) |
| <u>۹</u> ۵                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00     | (mg/s)       | 0.04         | (mg/s)    |  | 0.04    | (mg/s) |
|                               |   |          | Low Flow |              | Average Flow |           |  | High Fl | ow     |
| llance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 0.01     | (mg/s)       | 0.04         | (mg/s)    |  | 0.33    | (mg/s) |
| Mass ba<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 0.06     | (mg/s)       | 0.36         | (mg/s)    |  | 2.11    | (mg/s) |
|                               |   |          | Low Flo  | w            | Average      | Flow      |  | High Fl | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L)       | <br>0.000    | (mg/L)    |  | 0.000   | (mg/L) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 0.000    | (mg/L)       | 0.000        | (mg/L)    |  | 0.000   | (mg/L) |

| Case<br>Parameter | Year 10<br>Chloride   |  |          |        |
|-------------------|---|--|----------|--------|
|                   | concentration of ourfoce water into DM 12                       | C a12 -  | 10       | (mg/L) |
| ta                | concentration of surface water into PM-12                       | $C_{s12} = C_{s13} = C_{s$ | 10       | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab =   | 10       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =   | 5.95     | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.09E+00 | (mg/L) |
|                   | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| ğ                 | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| du 1              | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                           |   |          | Low Flow |        | Average   | Flow         |  | High Flow  |        |
|---------------------------|---|----------|----------|--------|-----------|--------------|--|------------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3,568.63  | (mg/s)       |  | 40,514     | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 43.81    | (mg/s) | 43.81     | (mg/s)       |  | 43.81      | (mg/s) |
| tior                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 93.39     | (mg/s)       |  | 93.39      | (mg/s) |
| itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 17,412.99 | (mg/s)       |  | 198,816    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 214.46   | (mg/s) | 214.46    | (mg/s)       |  | 214.46     | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 335.09    | (mg/s)       |  | 335.09     | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 71.00    | (mg/s) | 799.23    | (mg/s)       |  | 799.23     | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 855.78   | (mg/s) | 855.78    | (mg/s)       |  | 855.78     | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 431.07   | (mg/s) | 4,852.27  | (mg/s)       |  | 4,852.27   | (mg/s) |
|                           |   |          | Low Flow |        | Average   | Average Flow |  | High Fl    | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 43.81    | (mg/s) | 3,705.83  | (mg/s)       |  | 40,651.48  | (mg/s) |
| Mass  <br>at eac          | mass flux in river at PM-13                                 | M_r13 =  | 1,616.12 | (mg/s) | 28,175.65 | (mg/s)       |  | 246,524.30 | (mg/s) |
|                           |   |          | LOW FIO  | W      | Average   | Flow         |  | High Fi    | ow     |
| ert mass<br>n<br>ntration | concentration in river at PM-12                             | C_r12 =  | 1.800    | (mg/L) | 9.489     | (mg/L)       |  | 9.951      | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 9.083    | (mg/L) | 10.474    | (mg/L)       |  | 10.052     | (mg/L) |

| Case<br>Parameter | Year 10<br>Cobalt   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0.0006      | (ma/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| ן da              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001629161 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|                                      |   |          | Low Flow |        | Average Flow |        | High Flow |        |
|--------------------------------------|---|----------|----------|--------|--------------|--------|-----------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.21         | (mg/s) | 2         | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.03     | (mg/s) | 0.03         | (mg/s) | 0.03      | (mg/s) |
| tior                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.01         | (mg/s) | 0.01      | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 1.04         | (mg/s) | 12        | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.13     | (mg/s) | 0.13         | (mg/s) | 0.13      | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.03         | (mg/s) | 0.03      | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02     | (mg/s) | 0.26         | (mg/s) | 0.26      | (mg/s) |
| mas                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00         | (mg/s) | 0.00      | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03     | (mg/s) | 0.35         | (mg/s) | 0.35      | (mg/s) |
|                                      |   |          | Low Flow |        | Average Flow |        | High Fl   | ow     |
| ss balance<br>sach node              | mass flux in river at PM-12                                 | M_r12 =  | 0.03     | (mg/s) | 0.25         | (mg/s) | 2.46      | (mg/s) |
| Ma<br>at e                           | mass flux in river at PM-13                                 | M_r13 =  | 0.21     | (mg/s) | 2.06         | (mg/s) | 15.16     | (mg/s) |
|                                      |   |          | Low Flo  | w      | Average      | Flow   | High Fl   | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.001    | (mg/L) | 0.001        | (mg/L) | 0.001     | (mg/L) |
| ŬĘŬ                                  | concentration in river at PM-13                             | C_r13 =  | 0.001    | (mg/L) | 0.001        | (mg/L) | 0.001     | (mg/L) |

| Case      | Year 10   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Copper  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.006983188 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| et        | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| u d       | concentration of ground water into PM-13                        | C_g13 =  | 0.004       | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.54    | (mg/s) | 6       | (mg/s) |
| -                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.61    | (mg/s) | 30      | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s) | 0.48    | (mg/s) | 0.48    | (mg/s) |
|                                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.19    | (mg/s) | 0.19    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.10    | (mg/s) | 1.10    | (mg/s) | 1.10    | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.09    | (mg/s) | 1.03    | (mg/s) | 1.03    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ss balance<br>ach node               | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s) | 0.65    | (mg/s) | 6.19    | (mg/s) |
| Ma:<br>ate                           | mass flux in river at PM-13                                 | M_r13 =  | 0.76    | (mg/s) | 6.05    | (mg/s) | 38.80   | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |
| ర ≓ ర                                | concentration in river at PM-13                             | C_r13 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |

| Case      | Year 10   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Fluoride  |          |          |        |
| -         |   | -        |          | -      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.07E-01 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| <u>d</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|                           |   | Low Flow |          | Average | Average Flow |              | High Flow |          |        |
|---------------------------|---|----------|----------|---------|--------------|--------------|-----------|----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s)  | 35.69        | (mg/s)       |           | 405      | (mg/s) |
| -                         | mass flux of ground water into PM-12                        | M_g12 =  | 9.37     | (mg/s)  | 9.37         | (mg/s)       |           | 9.37     | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s)  | 0.93         | (mg/s)       |           | 0.93     | (mg/s) |
| Itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s)  | 174.13       | (mg/s)       |           | 1,988    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 45.87    | (mg/s)  | 45.87        | (mg/s)       |           | 45.87    | (mg/s) |
|                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s)  | 7.04         | (mg/s)       |           | 7.04     | (mg/s) |
| ert o<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 7.07     | (mg/s)  | 79.61        | (mg/s)       |           | 79.61    | (mg/s) |
| n ve<br>ma:               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 1.39     | (mg/s)  | 1.39         | (mg/s)       |           | 1.39     | (mg/s) |
| ទ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 31.02    | (mg/s)  | 349.17       | (mg/s)       |           | 349.17   | (mg/s) |
|                           |   |          | Low Flow |         | Average      | Average Flow |           | High Fl  | ow     |
| lance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 9.37     | (mg/s)  | 45.99        | (mg/s)       |           | 415.45   | (mg/s) |
| Mass ba<br>at each        | mass flux in river at PM-13                                 | M_r13 =  | 94.72    | (mg/s)  | 703.19       | (mg/s)       |           | 2,886.67 | (mg/s) |
|                           |   |          | Low Flo  | w       | Average      | Flow         |           | High Fl  | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.385    | (mg/L)  | 0.118        | (mg/L)       |           | 0.102    | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.532    | (mg/L)  | 0.261        | (mg/L)       |           | 0.118    | (mg/L) |
| Case      | Year 10   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Iron  |          |             |        |
|           |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 3.97E-02    | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| nt        | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
|-----------------------------|---|----------|---------|--------|----------|--------|-----------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90 | (mg/s) | 11,749    | (mg/s) |
|                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85     | (mg/s) | 0.85      | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08    | (mg/s) | 27.08     | (mg/s) |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77 | (mg/s) | 57,657    | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17     | (mg/s) | 4.17      | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13     | (mg/s) | 2.13      | (mg/s) |
| ert o<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.55    | (mg/s) | 6.24     | (mg/s) | 6.24      | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.19    | (mg/s) | 0.19     | (mg/s) | 0.19      | (mg/s) |
| <u>۽</u> ک                  | mass flux in seepage from cell 2W                           | M_s2w =  | 91.94   | (mg/s) | 1,034.88 | (mg/s) | 1,034.88  | (mg/s) |
|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| oalance<br>h node           | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | 1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| Mass I<br>at eacl           | mass flux in river at PM-13                                 | M_r13 =  | 97.71   | (mg/s) | 7,160.21 | (mg/s) | 70,481.32 | (mg/s) |
|                             |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| rt mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | 2.721    | (mg/L) | 2.883     | (mg/L) |
| Convel<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.549   | (mg/L) | 2.662    | (mg/L) | 2.874     | (mg/L) |

| Case<br>Parameter | Year 10<br>Hardness   |          |             |        |
|-------------------|---|----------|-------------|--------|
| i arameter        |   | 1        |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| ů pr              | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 3.11E+02    | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|                            |   |          | Low Flo   | w      | Average       | Flow   | High Fl      | ow     |
|----------------------------|---|----------|-----------|--------|---------------|--------|--------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,980.41     | (mg/s) | 283,600      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,129.58      | (mg/s) | 2,129.58     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 653.73        | (mg/s) | 653.73       | (mg/s) |
| Itral                      | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121,890.93    | (mg/s) | 1,391,712    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) | 10,425.01     | (mg/s) | 10,425.01    | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,090.84     | (mg/s) | 53,090.84    | (mg/s) |
| ert e<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 4,335.31  | (mg/s) | 48,800.08     | (mg/s) | 48,800.08    | (mg/s) |
| n ve<br>mas                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 4,186.52  | (mg/s) | 4,186.52      | (mg/s) | 4,186.52     | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 8,737.40  | (mg/s) | 98,352.01     | (mg/s) | 98,352.01    | (mg/s) |
|                            |   |          | Low Flo   | w      | Average       | Flow   | High Fl      | ow     |
| alance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | <br>27,763.72 | (mg/s) | 286,383.27   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 29,813.82 | (mg/s) | 364,509.11    | (mg/s) | 1,892,949.66 | (mg/s) |
|                            |   | -        | Low Flo   | w      | <br>Average   | Flow   | High Fl      | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) | 71.091        | (mg/L) | 70.104       | (mg/L) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 167.562   | (mg/L) | 135.503       | (mg/L) | 77.185       | (mg/L) |

| Case      | Year 10   |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   |          |       | -      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| р<br>р    | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 7.98  | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
|----------------------------|---|----------|---------|--------|-----------|--------|-----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39  | (mg/s) | 14,990    | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94     | (mg/s) | 38.94     | (mg/s) |
| tion                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.88    | (mg/s) | 0.88      | (mg/s) | 0.88      | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81  | (mg/s) | 73,562    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 190.63    | (mg/s) | 190.63    | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 34.55     | (mg/s) | 34.55     | (mg/s) |
| ert e<br>Ss f              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,029.85  | (mg/s) | 3,029.85  | (mg/s) |
| n ve<br>ma:                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 111.28  | (mg/s) | 1,252.62  | (mg/s) | 1,252.62  | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 155.50  | (mg/s) | 1,750.33  | (mg/s) | 1,750.33  | (mg/s) |
|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| lance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 39.82   | (mg/s) | 1,360.21  | (mg/s) | 15,030.10 | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 497.22  | (mg/s) | 14,061.01 | (mg/s) | 94,850.01 | (mg/s) |
|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 1.636   | (mg/L) | <br>3.483 | (mg/L) | 3.679     | (mg/l) |
| Conv<br>flux to<br>conce   | concentration in river at PM-13                             | C_r13 =  | 2.795   | (mg/L) | 5.227     | (mg/L) | 3.867     | (mg/l) |

| Case      | Year 10   |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Magnesium   | J        |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| ן da      | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| tior      | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 10.43  | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| ont       | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|                                      |   |          | Low Flo  | w      | Average   | Flow   | High Flo   | ow     |
|--------------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 2,141.18  | (mg/s) | 24,309     | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s) | 259.20    | (mg/s) | 259.20     | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 56.03     | (mg/s) | 56.03      | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 10,447.79 | (mg/s) | 119,290    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s) | 1,268.87  | (mg/s) | 1,268.87   | (mg/s) |
| u xn                                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 15,261.91 | (mg/s) | 15,261.91  | (mg/s) |
| ert e<br>Ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 145.53   | (mg/s) | 1,638.19  | (mg/s) | 1,638.19   | (mg/s) |
| n ve<br>mas                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 103.57   | (mg/s) | 103.57    | (mg/s) | 103.57     | (mg/s) |
| ទ បំ                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 1,400.27 | (mg/s) | 15,762.00 | (mg/s) | 15,762.00  | (mg/s) |
|                                      |   |          | Low Flo  | w      | Average   | Flow   | High Flo   | ow     |
| s balance<br>ich node                | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s) | 2,456.41  | (mg/s) | 24,623.80  | (mg/s) |
| Mas:<br>at ea                        | mass flux in river at PM-13                                 | M_r13 =  | 3,177.44 | (mg/s) | 46,938.74 | (mg/s) | 177,947.93 | (mg/s) |
|                                      |   |          | Low Flo  | w      | Average   | Flow   | High Flo   | ow     |
| onvert mass<br>ix to<br>incentration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L) | 6.290     | (mg/l) | 6.028      | (mg/l) |
| S E S                                | concentration in river at PM-13                             | C_r13 =  | 17.858   | (mg/L) | 17.449    | (mg/l) | 7.256      | (mg/l) |

| Case      | Year 10   |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
|           |   |          |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.16 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                                    |   |          | Low Flo | w      | Average   | Flow   | High Fl  | ow     |
|------------------------------------|---|----------|---------|--------|-----------|--------|----------|--------|
|                                    | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 107.06    | (mg/s) | 1,215    | (mg/s) |
| _                                  | mass flux of ground water into PM-12                        | M_g12 =  | 4.58    | (mg/s) | 4.58      | (mg/s) | 4.58     | (mg/s) |
| tion                               | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 2.80      | (mg/s) | 2.80     | (mg/s) |
| ıtral                              | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 522.39    | (mg/s) | 5,964    | (mg/s) |
| cen                                | mass flux of ground water into PM-13                        | M_g13 =  | 22.40   | (mg/s) | 22.40     | (mg/s) | 22.40    | (mg/s) |
| u Xn                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 27.31     | (mg/s) | 27.31    | (mg/s) |
| ert o<br>Ss f                      | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.21    | (mg/s) | 24.88     | (mg/s) | 24.88    | (mg/s) |
| mag                                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00     | (mg/s) |
| ទ ប័                               | mass flux in seepage from cell 2W                           | M_s2w =  | 23.67   | (mg/s) | 266.49    | (mg/s) | 266.49   | (mg/s) |
|                                    |   |          | Low Flo | w      | Average   | Flow   | High Fl  | ow     |
| lass balance<br>t each node        | mass flux in river at PM-12                                 | M_r12 =  | 4.58    | (mg/s) | 114.44    | (mg/s) | 1,222.81 | (mg/s) |
| ä ≤                                | mass flux in river at PM-13                                 | M_r13 =  | 52.86   | (mg/s) | 977.91    | (mg/s) | 7,528.37 | (mg/s) |
|                                    |   |          | LOW FIO | w      | Average   | FIOW   | High Fi  | ow     |
| invert mass<br>x to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 0.188   | (mg/L) | <br>0.293 | (mg/l) | 0.299    | (mg/l) |
| C II C                             | concentration in river at PM-13                             | C_r13 =  | 0.297   | (mg/L) | 0.364     | (mg/l) | 0.307    | (mg/l) |

| Case<br>Parameter | Year 10<br>Sodium   |          |        |        |
|-------------------|---|----------|--------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| n de              | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 31.37  | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|----------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180     | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.26     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69      | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,586     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.80     | (mg/s) |
|                            | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.88   | (mg/s) |
| ert e<br>Ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 437.49   | (mg/s) | 4,924.53  | (mg/s) | 4,924.53   | (mg/s) |
| n ve<br>ma:                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 123.99   | (mg/s) | 123.99    | (mg/s) | 123.99     | (mg/s) |
| ទ ប្                       | mass flux in seepage from cell 2W                           | M_s2w =  | 886.75   | (mg/s) | 9,981.63  | (mg/s) | 9,981.63   | (mg/s) |
|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| ulance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94  | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 2,151.28 | (mg/s) | 29,839.34 | (mg/s) | 106,261.36 | (mg/s) |
|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.508      | (mg/l) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 12.091   | (mg/L) | 11.092    | (mg/l) | 4.333      | (mg/l) |

| Case<br>Parameter | Year 10<br>Nickel   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| b r               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.024818317 | (mg/L) |
| ICer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| ů –               | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|                            |   |          | Low Flo  | w      | Average | Flow         |  | High Fl | ow     |
|----------------------------|---|----------|----------|--------|---------|--------------|--|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.43    | (mg/s)       |  | 5       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.17     | (mg/s) | 0.17    | (mg/s)       |  | 0.17    | (mg/s) |
| tratior                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.01    | (mg/s)       |  | 0.01    | (mg/s) |
|                            | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 2.09    | (mg/s)       |  | 24      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.83     | (mg/s) | 0.83    | (mg/s)       |  | 0.83    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.29    | (mg/s)       |  | 0.29    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.35     | (mg/s) | 3.90    | (mg/s)       |  | 3.90    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.05     | (mg/s) | 0.05    | (mg/s)       |  | 0.05    | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.14     | (mg/s) | 1.55    | (mg/s)       |  | 1.55    | (mg/s) |
|                            |   |          | Low Flow |        | Average | Average Flow |  | High Fl | ow     |
| oalance<br>1 node          | mass flux in river at PM-12                                 | M_r12 =  | 0.17     | (mg/s) | 0.61    | (mg/s)       |  | 5.04    | (mg/s) |
| Mass k<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 1.54     | (mg/s) | 9.32    | (mg/s)       |  | 35.52   | (mg/s) |
|                            |   |          | Low Flo  | w      | Average | Flow         |  | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.007    | (mg/L) | 0.002   | (mg/L)       |  | 0.001   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.009    | (mg/L) | 0.003   | (mg/L)       |  | 0.001   | (mg/L) |

| Case      | Year 10   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Lead  |          |             |        |
| -         |   | -        |             | -      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| р<br>ц    | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.002998768 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                             |   |          | Low Flo  | w      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|----------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.03     | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| ntra                        | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.14     | (mg/s) | 0.14    | (mg/s) | 0.14    | (mg/s) |
|                             | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
| ert o<br>Ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.04     | (mg/s) | 0.47    | (mg/s) | 0.47    | (mg/s) |
| mas                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប្                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02     | (mg/s) | 0.27    | (mg/s) | 0.27    | (mg/s) |
|                             |   |          | Low Flow |        | Average | Flow   | High Fl | ow     |
| alance                      | mass flux in river at PM-12                                 | M_r12 =  | 0.03     | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| Mass b<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 0.24     | (mg/s) | 0.93    | (mg/s) | 0.93    | (mg/s) |
|                             |   |          | Low Flo  | w      | Average | Flow   | High Fl | ow     |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 0.001    | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conver<br>flux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.001    | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 10   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.17E-02 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| L L       | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                             |   |          | Low Flow |        | Average Flow |        | High Flo |         | ow     |
|-----------------------------|---|----------|----------|--------|--------------|--------|----------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.01         | (mg/s) |          | 0       | (mg/s) |
| -                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.04     | (mg/s) | 0.04         | (mg/s) |          | 0.04    | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.00         | (mg/s) |          | 0.00    | (mg/s) |
| trat                        | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 0.03         | (mg/s) |          | 0       | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.18     | (mg/s) | 0.18         | (mg/s) |          | 0.18    | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.01         | (mg/s) |          | 0.01    | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.16     | (mg/s) | 1.84         | (mg/s) |          | 1.84    | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00         | (mg/s) |          | 0.00    | (mg/s) |
| ទ ប័                        | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01     | (mg/s) | 0.06         | (mg/s) |          | 0.06    | (mg/s) |
|                             |   |          | Low Flow |        | Average      | Flow   |          | High Fl | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.04     | (mg/s) | 0.04         | (mg/s) |          | 0.12    | (mg/s) |
| Mass bê<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.39     | (mg/s) | 2.17         | (mg/s) |          | 2.61    | (mg/s) |
|                             |   |          | Low Flo  | w      | Average      | Flow   |          | High Fl | ow     |
| rt mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 0.002    | (mg/L) | 0.000        | (mg/L) |          | 0.000   | (mg/L) |
| Convel<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.002    | (mg/L) | 0.001        | (mg/L) |          | 0.000   | (mg/L) |

| Case<br>Parameter | Year 10<br>Selenium   |          |            |        |
|-------------------|---|----------|------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0.0003     | (mg/L) |
| ita               | concentration of surface water into PM-13                       | C_s13 =  | 0.0003     | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003     | (mg/L) |
| tion              | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016     | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00156894 | (mg/L) |
| Icel              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054      | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109    | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =  | 0.00295    | (mg/L) |
| <u>l</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.00295    | (mg/L) |

|                           |   |          | Low Flow |        | Average | Flow   | High Flow |         | ow     |
|---------------------------|---|----------|----------|--------|---------|--------|-----------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.11    | (mg/s) |           | 1       | (mg/s) |
| -                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.07     | (mg/s) | 0.07    | (mg/s) |           | 0.07    | (mg/s) |
| tration                   | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.00    | (mg/s) |           | 0.00    | (mg/s) |
|                           | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 0.52    | (mg/s) |           | 6       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.35     | (mg/s) | 0.35    | (mg/s) |           | 0.35    | (mg/s) |
|                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.09    | (mg/s) |           | 0.09    | (mg/s) |
| ert o<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02     | (mg/s) | 0.25    | (mg/s) |           | 0.25    | (mg/s) |
| n ve<br>ma:               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.03     | (mg/s) | 0.03    | (mg/s) |           | 0.03    | (mg/s) |
| ទ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02     | (mg/s) | 0.25    | (mg/s) |           | 0.25    | (mg/s) |
|                           |   |          | Low Flow |        | Average | Flow   | High Flow |         | ow     |
| ulance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.07     | (mg/s) | 0.18    | (mg/s) |           | 1.29    | (mg/s) |
| Mass ba<br>at each        | mass flux in river at PM-13                                 | M_r13 =  | 0.49     | (mg/s) | 1.66    | (mg/s) |           | 8.21    | (mg/s) |
|                           |   |          | Low Flo  | w      | Average | Flow   |           | High Fl | ow     |
| ert mass<br>o<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.003    | (mg/L) | 0.000   | (mg/L) |           | 0.000   | (mg/L) |
| Conv<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.003    | (mg/L) | 0.001   | (mg/L) |           | 0.000   | (mg/L) |

| Case      | Year 10   |          |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
|           |   |          |         |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 223.12  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                              |   |          | Low Floy  | w      | Average    | Flow   | Hię     | gh Flow     |
|------------------------------|---|----------|-----------|--------|------------|--------|---------|-------------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 1,427.45   | (mg/s) | 16,     | 206 (mg/s)  |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 206.87    | (mg/s) | 206.87     | (mg/s) | 206     | 6.87 (mg/s) |
| tion                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 37.36      | (mg/s) | 37      | 7.36 (mg/s) |
| ıtrat                        | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 6,965.20   | (mg/s) | 79,     | 526 (mg/s)  |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72  | (mg/s) | 1,012.72   | (mg/s) | 1,012   | 2.72 (mg/s) |
| u xn                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 58,922.60  | (mg/s) | 58,922  | 2.60 (mg/s) |
| ert o<br>Ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,111.94  | (mg/s) | 35,029.37  | (mg/s) | 35,029  | 9.37 (mg/s) |
| mas                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 3,572.40  | (mg/s) | 3,572.40   | (mg/s) | 3,572   | 2.40 (mg/s) |
| ទ ប្                         | mass flux in seepage from cell 2W                           | M_s2w =  | 3,049.89  | (mg/s) | 34,330.84  | (mg/s) | 34,330  | 0.84 (mg/s) |
|                              |   |          | Low Flow  |        | Average    | Flow   | Hię     | gh Flow     |
| alance<br>n node             | mass flux in river at PM-12                                 | M_r12 =  | 206.87    | (mg/s) | 1,671.68   | (mg/s) | 16,449  | 9.94 (mg/s) |
| Mass b<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 10,953.82 | (mg/s) | 141,504.80 | (mg/s) | 228,844 | 4.26 (mg/s) |
|                              |   |          | Low Floy  | w      | Average    | Flow   | Hiç     | gh Flow     |
| t mass<br>tration            | concentration in river at PM-12                             | C_r12 =  | 8.500     | (mg/L) | 4.280      | (mg/l) | 4.      | 027 (mg/l)  |
| Convel<br>filux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 61.563    | (mg/L) | 52.603     | (mg/l) | 9.      | 331 (mg/l)  |

| Case<br>Parameter | Year 10<br>Thallium   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0002      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
| n de              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001032064 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| ln a              | concentration of ground water into PM-13                        | C_g13 =  | 0.000004    | (mg/L) |

|                              |   |          | Low Flow |        | Average Flow |         | High Flow |  | ow      |        |
|------------------------------|---|----------|----------|--------|--------------|---------|-----------|--|---------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) |              | 0.07    | (mg/s)    |  | 1       | (mg/s) |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.00     | (mg/s) |              | 0.00    | (mg/s)    |  | 0.00    | (mg/s) |
| Itratior                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) |              | 0.00    | (mg/s)    |  | 0.00    | (mg/s) |
|                              | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) |              | 0.35    | (mg/s)    |  | 4       | (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 0.00     | (mg/s) |              | 0.00    | (mg/s)    |  | 0.00    | (mg/s) |
| uo:                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) |              | 0.03    | (mg/s)    |  | 0.03    | (mg/s) |
| ert o<br>ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01     | (mg/s) |              | 0.16    | (mg/s)    |  | 0.16    | (mg/s) |
| mas                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) |              | 0.00    | (mg/s)    |  | 0.00    | (mg/s) |
| ទ បំ                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00     | (mg/s) |              | 0.05    | (mg/s)    |  | 0.05    | (mg/s) |
|                              |   |          | Low Flor | w      |              | Average | Flow      |  | High Fl | ow     |
| balance<br>ch node           | mass flux in river at PM-12                                 | M_r12 =  | 0.00     | (mg/s) |              | 0.07    | (mg/s)    |  | 0.81    | (mg/s) |
| Mass<br>at ea                | mass flux in river at PM-13                                 | M_r13 =  | 0.02     | (mg/s) |              | 0.66    | (mg/s)    |  | 5.03    | (mg/s) |
|                              |   | -        | Low Flor | W      |              | Average | Flow      |  | High Fl | ow     |
| /ert mass<br>to<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L) |              | 0.000   | (mg/L)    |  | 0.000   | (mg/L) |
| Con<br>Con<br>conc           | concentration in river at PM-13                             | C_r13 =  | 0.000    | (mg/L) |              | 0.000   | (mg/L)    |  | 0.000   | (mg/L) |

| Case<br>Parameter | Year 10<br>Zinc   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
| b r               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.063569909 | (mg/L) |
| Icer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| d L               | concentration of ground water into PM-13                        | C_g13 =  | 0.0115      | (mg/L) |

|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 5.71    | (mg/s) | 65      | (mg/s) |
|                             | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28    | (mg/s) | 0.28    | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.15    | (mg/s) | 0.15    | (mg/s) |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 27.86   | (mg/s) | 318     | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.37    | (mg/s) | 1.37    | (mg/s) |
| u su l                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| ert o<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.89    | (mg/s) | 9.98    | (mg/s) | 9.98    | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> ک                  | mass flux in seepage from cell 2W                           | M_s2w =  | 0.29    | (mg/s) | 3.23    | (mg/s) | 3.23    | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>h node           | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14    | (mg/s) | 65.25   | (mg/s) |
| Mass  <br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 2.83    | (mg/s) | 48.76   | (mg/s) | 398.11  | (mg/s) |
|                             |   | 1        | LOW FIO | w      | Average | FIOW   | High Fi | ow     |
| ert mass<br>or<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016   | (mg/L) | 0.016   | (mg/L) |
| Conve<br>flux to<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.016   | (mg/L) | 0.018   | (mg/L) | 0.016   | (mg/L) |

Appendix F.12 Embarrass River Geotechnical Mitigation Year 15

#### FLOWS

| Case                 | Year 15  |            |      |       |       |
|----------------------|--|------------|------|-------|-------|
| Flows                | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| w in<br>ass River    | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| Total flo<br>Embarra | flow check                                     | Q_r13_L =  | 6.29 | (cfs) | PM-13 |
|                      | surface water flow into PM-12                  | Q_s12_L =  | 0.00 | (cfs) | PM-12 |
|                      | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                      | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                      | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| Ita                  | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.52 | (cfs) | PM-13 |
| v da                 | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.02 | (cfs) | PM-13 |
| flov                 | seepage from cell 2W                           | Q_s2w_L =  | 0.68 | (cfs) | PM-13 |
| ont                  | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| li<br>I              | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case                | Year 15  |            |       |       |       |
|---------------------|--|------------|-------|-------|-------|
| Flow                | Average Flow Conditions (mean annual)          |            |       |       | _     |
| n<br>River          | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| l flow iı<br>arrass | flow in river at PM-13                         | Q_r13_M =  | 95.52 | (cfs) | PM-13 |
| Total<br>Emb        | flow check                                     | Q_ck_M =   | 95.52 | (cfs) |       |
|                     | surface water flow into PM-12                  | Q_s12_M =  | 12.61 | (cfs) | PM-12 |
|                     | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                     | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                     | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ta                  | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 6.02  | (cfs) | PM-13 |
| , da                | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.02  | (cfs) | PM-13 |
| Nol:                | seepage from cell 2W                           | Q_s2w_M =  | 7.96  | (cfs) | PM-13 |
| ut 1                | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| au                  | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case            | Year 15   |            |        |       |       |
|-----------------|---|------------|--------|-------|-------|
| Flow            | High Flow Conditions (avg. annual 1-day max flow) |            |        |       |       |
| n<br>River      | flow in river at PM-12                            | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>rrass | flow in river at PM-13                            | Q_r13_H =  | 867.07 | (cfs) | PM-13 |
| Total<br>Emba   | flow check  | Q_ck_H =   | 867.07 | (cfs) |       |
|                 | surface water flow into PM-12                     | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                 | surface water flow into PM-13                     | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                 | Babbitt WWTP discharge                            | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                 | Area 5 Pit NW discharge                           | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta              | seepage from Tailings Basin Cells 1E and 2E       | Q_fs_H =   | 6.02   | (cfs) | PM-13 |
| / da            | hydrometallurgical residue cells liner leakage    | Q_rrs_H =  | 0.02   | (cfs) | PM-13 |
| Į               | seepage from cell 2W                              | Q_s2w_H =  | 7.96   | (cfs) | PM-13 |
| et 1            | ground water flow into PM-12                      | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| du              | ground water flow into PM-13                      | Q q13 H =  | 4.21   | (cfs) | PM-13 |

| Case<br>Parameter | Year 15<br>Silver   |          |          |        |
|-------------------|---|----------|----------|--------|
|                   |   |          |          |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
| i p u             | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00089  | (mg/L) |
|                   | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| u<br>1            | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                              |   |          | Low Flor | w      | Average I    | Flow   | High Fl   | ow     |
|------------------------------|---|----------|----------|--------|--------------|--------|-----------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.04         | (mg/s) | 0         | (mg/s) |
| -                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.00     | (mg/s) | 0.00         | (mg/s) | 0.00      | (mg/s) |
| tion                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.00         | (mg/s) | 0.00      | (mg/s) |
| ntral                        | mass flux of surface water into PM-13                       | M_s13 =  |          | (mg/s) | 0.19         | (mg/s) | 2         | (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 0.00     | (mg/s) | 0.00         | (mg/s) | 0.00      | (mg/s) |
| uo:                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.01         | (mg/s) | 0.01      | (mg/s) |
| sts                          | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01     | (mg/s) | 0.15         | (mg/s) | 0.15      | (mg/s) |
| n ve<br>ma:                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00         | (mg/s) | 0.00      | (mg/s) |
| ទ ប្                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00     | (mg/s) | 0.02         | (mg/s) | 0.02      | (mg/s) |
|                              |   |          | Low Flow |        | Average Flow |        | High Flow |        |
| alance<br>node               | mass flux in river at PM-12                                 | M_r12 =  | 0.00     | (mg/s) | 0.04         | (mg/s) | 0.45      | (mg/s) |
| Mass bê<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 0.02     | (mg/s) | 0.42         | (mg/s) | 2.82      | (mg/s) |
|                              |   |          | Low Flo  | w      | Average      | Flow   | High Fl   | ow     |
| t mass<br>tration            | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L) | 0.000        | (mg/L) | 0.000     | (mg/L) |
| Conver<br>filux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.000    | (mg/L) | 0.000        | (mg/L) | 0.000     | (mg/L) |

| Case<br>Parameter | Year 15<br>Aluminum   |          |          |        |
|-------------------|---|----------|----------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0.1      | (ma/L) |
| ta                | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| ן da              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325  | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 8.74E-02 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| Ĕ                 | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| 1                 | concentration of ground water into PM-13                        | C_g13 =  | 0.025    | (mg/L) |

|                                      |   |          | Low Flo  | W      | Average      | Flow   |   | High Fl   | ow     |
|--------------------------------------|---|----------|----------|--------|--------------|--------|---|-----------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 35.69        | (mg/s) |   | 405       | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.61     | (mg/s) | 0.61         | (mg/s) |   | 0.61      | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.93         | (mg/s) |   | 0.93      | (mg/s) |
| ıtra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 174.13       | (mg/s) |   | 1,988     | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 2.98     | (mg/s) | 2.98         | (mg/s) |   | 2.98      | (mg/s) |
| uos                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.75         | (mg/s) |   | 0.75      | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.28     | (mg/s) | 14.87        | (mg/s) |   | 14.87     | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.09     | (mg/s) | 0.09         | (mg/s) |   | 0.09      | (mg/s) |
| ۹ ٽ<br>۲                             | mass flux in seepage from cell 2W                           | M_s2w =  | 30.54    | (mg/s) | 355.65       | (mg/s) |   | 355.65    | (mg/s) |
|                                      |   |          | Low Flow |        | Average Flow |        |   | High Flow |        |
| ss balance<br>sach node              | mass flux in river at PM-12                                 | M_r12 =  | 0.61     | (mg/s) | <br>37.23    | (mg/s) |   | 406.69    | (mg/s) |
| Ma<br>at e                           | mass flux in river at PM-13                                 | M_r13 =  | 35.49    | (mg/s) | 585.70       | (mg/s) |   | 2,769.19  | (mg/s) |
|                                      |   |          | Low Flo  | w      | Average      | Flow   |   | High Fl   | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.025    | (mg/L) | 0.095        | (mg/L) |   | 0.100     | (mg/L) |
| č≓S                                  | concentration in river at PM-13                             | C_r13 =  | 0.199    | (mg/L) | 0.217        | (mg/L) | I | 0.113     | (mg/L) |

| Case<br>Parameter | Year 15<br>Arsenic  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.00075     | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.00075     | (mg/L) |
| p r               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00075     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.001325    | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.007825647 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00291     | (mg/L) |
| or t              | concentration of ground water into PM-12                        | C_g12 =  | 0.00273     | (mg/L) |
| u<br>1            | concentration of ground water into PM-13                        | C_g13 =  | 0.00273     | (mg/L) |

|   |   |          | Low Flo  | w      | Average      | Flow   | High Fl   | ow     |
|---|---|----------|----------|--------|--------------|--------|-----------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.27         | (mg/s) | 3         | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.07     | (mg/s) | 0.07         | (mg/s) | 0.07      | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.01         | (mg/s) | 0.01      | (mg/s) |
| ıtra                                    | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 1.31         | (mg/s) | 15        | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 0.33     | (mg/s) | 0.33         | (mg/s) | 0.33      | (mg/s) |
| uo Xnj                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.07         | (mg/s) | 0.07      | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.11     | (mg/s) | 1.33         | (mg/s) | 1.33      | (mg/s) |
| ma                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00         | (mg/s) | 0.00      | (mg/s) |
| ដ ប្                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.06     | (mg/s) | 0.65         | (mg/s) | 0.65      | (mg/s) |
|   |   |          | Low Flow |        | Average Flow |        | High Flow |        |
| ss balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.07     | (mg/s) | 0.34         | (mg/s) | 3.11      | (mg/s) |
| Mas<br>ate                              | mass flux in river at PM-13                                 | M r13 =  | 0.56     | (mg/s) | 4.04         | (mg/s) | 20.41     | (mg/s) |
|   |   |          | Low Flo  | w      | Average      | Flow   | High FI   | ow     |
| Convert mass<br>lux to<br>:oncentration | concentration in river at PM-12                             | C_r12 =  | 0.003    | (mg/L) | 0.001        | (mg/L) | 0.001     | (mg/L) |

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Boron   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.153530941 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 4.28    | (mg/s) | 49      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) | 0.52    | (mg/s) | 0.52    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
| itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 20.90   | (mg/s) | 239     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) | 2.53    | (mg/s) | 2.53    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.41    | (mg/s) | 7.41    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.24    | (mg/s) | 26.14   | (mg/s) | 26.14   | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.05    | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 6.38    | (mg/s) | 74.34   | (mg/s) | 74.34   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) | 4.91    | (mg/s) | 49.25   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 11.72   | (mg/s) | 136.27  | (mg/s) | 398.29  | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) | 0.013   | (mg/L) | 0.012   | (mg/L) |
| Conv<br>flux to<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.066   | (mg/L) | 0.050   | (mg/L) | 0.016   | (mg/L) |

| Case      | Year 15   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Barium  |          |          |        |
| -         |   | -        |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.011    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.00E-02 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 3.93    | (mg/s) | 45      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 1.66    | (mg/s) | 1.66    | (mg/s) | 1.66    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 19.15   | (mg/s) | 219     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 8.11    | (mg/s) | 8.11    | (mg/s) | 8.11    | (mg/s) |
| uos                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.73    | (mg/s) | 8.50    | (mg/s) | 8.50    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 1.80    | (mg/s) | 20.95   | (mg/s) | 20.95   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| s balance<br>ich node      | mass flux in river at PM-12                                 | M_r12 =  | 1.66    | (mg/s) | 5.69    | (mg/s) | 46.33   | (mg/s) |
| Mas:<br>at ea              | mass flux in river at PM-13                                 | M_r13 =  | 12.30   | (mg/s) | 62.65   | (mg/s) | 302.84  | (mg/s) |
|                            |   | -        | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.068   | (mg/L) | 0.015   | (mg/L) | 0.011   | (mg/L) |
| Conv<br>flux t<br>conc     | concentration in river at PM-13                             | C_r13 =  | 0.069   | (mg/L) | 0.023   | (mg/L) | 0.012   | (mg/L) |

| Case<br>Parameter | Year 15<br>Beryllium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0001      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0001      | (mg/L) |
| ip u              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000487063 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0           | (mg/L) |
| cou               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075     | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.000023    | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 0.000023    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.17    | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| uos                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.08    | (mg/s) | 0.08    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.41    | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.47    | (mg/s) | 2.66    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conv<br>flux t             | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 15   |          |            |        |
|-----------|---|----------|------------|--------|
| Parameter | Calcium   |          |            |        |
|           |   |          |            |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 13         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 13         | (mg/L) |
| ü u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 13         | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 95.35      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 81.6110992 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 416        | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 59.78      | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 19         | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 19         | (mg/L) |

|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|----------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4,639.22  | (mg/s) | 52,669     | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) | 462.42    | (mg/s) | 462.42     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 121.41    | (mg/s) | 121.41     | (mg/s) |
| Itral                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 22,636.89 | (mg/s) | 258,461    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) | 2,263.72  | (mg/s) | 2,263.72   | (mg/s) |
| u xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 5,369.83  | (mg/s) | 5,369.83   | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,192.96 | (mg/s) | 13,893.59 | (mg/s) | 13,893.59  | (mg/s) |
| n ve<br>mas                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 205.46   | (mg/s) | 205.46    | (mg/s) | 205.46     | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 1,156.29 | (mg/s) | 13,466.52 | (mg/s) | 29.52      | (mg/s) |
|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| alance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) | 5,223.05  | (mg/s) | 53,252.39  | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 5,280.84 | (mg/s) | 63,059.05 | (mg/s) | 333,475.30 | (mg/s) |
|                            |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) | 13.374    | (mg/L) | 13.036     | (mg/l) |
| Conv<br>flux t<br>conce    | concentration in river at PM-13                             | C_r13 =  | 29.679   | (mg/L) | 23.327    | (mg/L) | 13.590     | (mg/l) |

| Case<br>Parameter | Year 15<br>Cadmium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0.00008     | (ma/L) |
| ita               | concentration of surface water into PM-13                       | C_s13 =  | 0.00008     | (mg/L) |
| ab r              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008     | (mg/L) |
| tion              | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000567381 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004      | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188    | (mg/L) |
| nt                | concentration of ground water into PM-12                        | C_g12 =  | 0.0003      | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.0003      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.14    | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| uos                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.01    | (mg/s) | 0.04    | (mg/s) | 0.33    | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.06    | (mg/s) | 0.36    | (mg/s) | 2.10    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conv<br>flux te<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 15   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Chloride  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.66E+00 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                                   |   |          | Low Flo  | w      | Average      | Flow   | High Fl    | ow     |
|-----------------------------------|---|----------|----------|--------|--------------|--------|------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3,568.63     | (mg/s) | 40,514     | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 43.81    | (mg/s) | 43.81        | (mg/s) | 43.81      | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 93.39        | (mg/s) | 93.39      | (mg/s) |
| Itra                              | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 17,412.99    | (mg/s) | 198,816    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 214.46   | (mg/s) | 214.46       | (mg/s) | 214.46     | (mg/s) |
| u Xn                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 335.09       | (mg/s) | 335.09     | (mg/s) |
| ert o<br>ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 82.77    | (mg/s) | 963.96       | (mg/s) | 963.96     | (mg/s) |
| n ve<br>mas                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 869.24   | (mg/s) | 869.24       | (mg/s) | 869.24     | (mg/s) |
| ទ បំ                              | mass flux in seepage from cell 2W                           | M_s2w =  | 416.64   | (mg/s) | 4,852.27     | (mg/s) | 4,852.27   | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average      | Flow   | High Fl    | ow     |
| ass balance<br>each node          | mass flux in river at PM-12                                 | M_r12 =  | 43.81    | (mg/s) | <br>3,705.83 | (mg/s) | 40,651.48  | (mg/s) |
| at                                | mass flux in river at PM-13                                 | M_r13 =  | 1,626.91 | (mg/s) | 28,353.84    | (mg/s) | 246,702.49 | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average      | Flow   | High Fl    | ow     |
| nvert mass<br>k to<br>icentration | concentration in river at PM-12                             | C_r12 =  | 1.800    | (mg/L) | 9.489        | (mg/L) | 9.951      | (mg/L) |
| flux<br>Co                        | concentration in river at PM-13                             | C_r13 =  | 9.143    | (mg/L) | 10.489       | (mg/L) | 10.054     | (mg/L) |

| Case<br>Parameter | Year 15<br>Cobalt   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0.0006      | (ma/L) |
| ita               | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tion              | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001926627 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| out               | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.21    | (mg/s) | 2        | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03     | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| Itra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.04    | (mg/s) | 12       | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.13    | (mg/s) | 0.13    | (mg/s) | 0.13     | (mg/s) |
| uos                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03     | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.03    | (mg/s) | 0.33    | (mg/s) | 0.33     | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| ۹ ٽ<br>۲                             | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.35    | (mg/s) | 0.35     | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| ss balance<br>sach node              | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.25    | (mg/s) | <br>2.46 | (mg/s) |
| Ma<br>at e                           | mass flux in river at PM-13                                 | M_r13 =  | 0.22    | (mg/s) | 2.13    | (mg/s) | 15.24    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001    | (mg/L) |
| ŬĘŬ                                  | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001    | (mg/L) |

| Case<br>Parameter | Year 15<br>Copper   |          |             |        |
|-------------------|---|----------|-------------|--------|
| i arameter        |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.009053616 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.004       | (mg/L) |

|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---|---|----------|---------|--------|---------|--------|---------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.54    | (mg/s) | 6       | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| tio                                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| itrai                                   | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.61    | (mg/s) | 30      | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s) | 0.48    | (mg/s) | 0.48    | (mg/s) |
| uo Xn                                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.19    | (mg/s) | 0.19    | (mg/s) |
| sste                                    | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.13    | (mg/s) | 1.54    | (mg/s) | 1.54    | (mg/s) |
| mä                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.09    | (mg/s) | 1.03    | (mg/s) | 1.03    | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| is balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s) | 0.65    | (mg/s) | 6.19    | (mg/s) |
| Mas<br>ate                              | mass flux in river at PM-13                                 | M r13 =  | 0.80    | (ma/s) | 6.50    | (ma/s) | 39.25   | (ma/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| Convert mass<br>lux to<br>:oncentration | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |

| Case      | Year 15   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Fluoride  |          |          |        |
| -         |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.63E-01 | (mg/L) |
| ICer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| cou       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|-------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | _       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s) | 9.37    | (mg/s) | 9.37     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s) | 45.87   | (mg/s) | 45.87    | (mg/s) |
| u Xn                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.04    | (mg/s) | 7.04     | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 8.23    | (mg/s) | 95.87   | (mg/s) | 95.87    | (mg/s) |
| mag                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 1.41    | (mg/s) | 1.41    | (mg/s) | 1.41     | (mg/s) |
| <u>۽</u> ڳ                    | mass flux in seepage from cell 2W                           | M_s2w =  | 29.98   | (mg/s) | 349.17  | (mg/s) | 349.17   | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| lance<br>node                 | mass flux in river at PM-12                                 | M_r12 =  | 9.37    | (mg/s) | 45.99   | (mg/s) | 415.45   | (mg/s) |
| Mass be<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 94.86   | (mg/s) | 719.47  | (mg/s) | 2,902.96 | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| wert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L) | 0.118   | (mg/L) | 0.102    | (mg/L) |
| Cor<br>flux<br>con            | concentration in river at PM-13                             | C_r13 =  | 0.533   | (mg/L) | 0.266   | (mg/L) | 0.118    | (mg/L) |

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Iron  |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| ן da      | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 3.86E-02    | (mg/L) |
| Cet       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|   |   |          | Low Flo | w      | Average      | Flow   | High Fl   | ow     |
|---|---|----------|---------|--------|--------------|--------|-----------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90     | (mg/s) | 11,749    | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85         | (mg/s) | 0.85      | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08        | (mg/s) | 27.08     | (mg/s) |
| itrai                                   | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77     | (mg/s) | 57,657    | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17         | (mg/s) | 4.17      | (mg/s) |
| uo Xnj                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13         | (mg/s) | 2.13      | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.56    | (mg/s) | 6.57         | (mg/s) | 6.57      | (mg/s) |
| ma                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.20    | (mg/s) | 0.20         | (mg/s) | 0.20      | (mg/s) |
| ដ ប្                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 88.86   | (mg/s) | 1,034.88     | (mg/s) | 1,034.88  | (mg/s) |
|   |   |          | Low Flo | w      | Average      | Flow   | High Fl   | ow     |
| s balance<br>ach node                   | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | <br>1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| Mas<br>ate                              | mass flux in river at PM-13                                 | M r13 =  | 94.64   | (ma/s) | 7.160.55     | (ma/s) | 70.481.66 | (ma/s) |
|   |   |          | Low Flo | w      | Average      | Flow   | High FI   | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | 2.721        | (mg/L) | 2.883     | (mg/L) |

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
| -         |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 2.55E+02    | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|                               |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
|-------------------------------|---|----------|-----------|--------|------------|--------|--------------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,980.41  | (mg/s) | 283,600      | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,129.58   | (mg/s) | 2,129.58     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 653.73     | (mg/s) | 653.73       | (mg/s) |
| Itrai                         | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121,890.93 | (mg/s) | 1,391,712    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) | 10,425.01  | (mg/s) | 10,425.01    | (mg/s) |
| nos                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,090.84  | (mg/s) | 53,090.84    | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,722.89  | (mg/s) | 43,358.02  | (mg/s) | 43,358.02    | (mg/s) |
| mas                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 4,252.38  | (mg/s) | 4,252.38   | (mg/s) | 4,252.38     | (mg/s) |
| ۹<br>۵                        | mass flux in seepage from cell 2W                           | M_s2w =  | 8,444.89  | (mg/s) | 98,352.01  | (mg/s) | 98,352.01    | (mg/s) |
|                               |   |          | Low Flo   | w      | Average    | Flow   | High Fl      | ow     |
| alance<br>n node              | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | 27,763.72  | (mg/s) | 286,383.27   | (mg/s) |
| Mass b<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 28,974.75 | (mg/s) | 359,132.91 | (mg/s) | 1,887,573.46 | (mg/s) |
|                               |   |          | Low Flo   | W      | Average    | Flow   | <br>High Fl  | ow     |
| wert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) | 71.091     | (mg/L) | 70.104       | (mg/L) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 162.839   | (mg/L) | 132.850    | (mg/L) | 76.924       | (mg/L) |

| Case<br>Parameter | Year 15<br>Potassium  |                    |       |        |
|-------------------|---|--------------------|-------|--------|
|                   | concentration of surface water into PM 12                       | C e12 -            | 3 70  | (mg/L) |
| ta                | concentration of surface water into PM-12                       | C_312 =<br>C_s13 = | 3.70  | (mg/L) |
| ן da              | concentration in Babbitt WWTP discharge                         | _<br>C_sBab =      | 3.70  | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =           | 53.80 | (mg/L) |
| Itra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =             | 6.68  | (mg/L) |
|                   | concentration in hydrometallurgical residue cells liner leakage | C_rrs =            | 1.80  | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =            | 7.77  | (mg/L) |
| ğ                 | concentration of ground water into PM-12                        | C_g12 =            | 1.60  | (mg/L) |
| du 1              | concentration of ground water into PM-13                        | C_g13 =            | 1.60  | (mg/L) |

|                                |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
|--------------------------------|---|----------|---------|--------|-----------|--------|-----------|--------|
|                                | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39  | (mg/s) | 14,990    | (mg/s) |
| _                              | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94     | (mg/s) | 38.94     | (mg/s) |
| tion                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.89    | (mg/s) | 34.55     | (mg/s) | 0.89      | (mg/s) |
| Itra                           | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81  | (mg/s) | 73,562    | (mg/s) |
| cen                            | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 190.63    | (mg/s) | 190.63    | (mg/s) |
| u Xn                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 3,029.85  | (mg/s) | 34.55     | (mg/s) |
| ert e<br>ss f                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 1,137.30  | (mg/s) | 3,029.85  | (mg/s) |
| mag                            | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 97.65   | (mg/s) | 0.89      | (mg/s) | 1,137.30  | (mg/s) |
| <u>۽</u> ڳ                     | mass flux in seepage from cell 2W                           | M_s2w =  | 150.29  | (mg/s) | 1,750.33  | (mg/s) | 1,750.33  | (mg/s) |
|                                |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| llance<br>node                 | mass flux in river at PM-12                                 | M_r12 =  | 39.83   | (mg/s) | 1,393.89  | (mg/s) | 15,030.11 | (mg/s) |
| Mass ba<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 478.40  | (mg/s) | 13,945.70 | (mg/s) | 94,734.70 | (mg/s) |
|                                |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| ivert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 1.637   | (mg/L) | 3.569     | (mg/L) | 3.679     | (mg/l) |
| Cor<br>flux<br>con             | concentration in river at PM-13                             | C_r13 =  | 2.689   | (mg/L) | 5.159     | (mg/L) | 3.861     | (mg/l) |

| Case      | Year 15   |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Magnesium   |          |        |        |
|           |   |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 12.36  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| 넵         | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|                               |   | Low Flow |          | Average Flow |              |        | High Flow |            |        |
|-------------------------------|---|----------|----------|--------------|--------------|--------|-----------|------------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s)       | 2,141.18     | (mg/s) |           | 24,309     | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s)       | 259.20       | (mg/s) |           | 259.20     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s)       | 56.03        | (mg/s) |           | 56.03      | (mg/s) |
| trat                          | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s)       | 10,447.79    | (mg/s) |           | 119,290    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s)       | 1,268.87     | (mg/s) |           | 1,268.87   | (mg/s) |
| u xn                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s)       | 15,261.91    | (mg/s) |           | 15,261.91  | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 180.69   | (mg/s)       | 2,104.35     | (mg/s) |           | 2,104.35   | (mg/s) |
| n ve<br>mas                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 105.20   | (mg/s)       | 105.20       | (mg/s) |           | 105.20     | (mg/s) |
| ទ បំ                          | mass flux in seepage from cell 2W                           | M_s2w =  | 1,353.39 | (mg/s)       | 15,762.00    | (mg/s) |           | 15,762.00  | (mg/s) |
|                               |   |          | Low Flow |              | Average Flow |        | High Flow |            | ow     |
| lance<br>node                 | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s)       | 2,456.41     | (mg/s) |           | 24,623.80  | (mg/s) |
| Mass ba<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 3,167.35 | (mg/s)       | 47,406.54    | (mg/s) |           | 178,415.73 | (mg/s) |
|                               |   |          | Low Flo  | w            | Average      | Flow   |           | High Fl    | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L)       | 6.290        | (mg/L) |           | 6.028      | (mg/l) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 17.801   | (mg/L)       | 17.537       | (mg/L) |           | 7.271      | (mg/l) |

| Case      | Year 15   |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
|           |   |          |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.19 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                             |   | Low Flow |          | Average Flow |              | High Flow |           |        |
|-----------------------------|---|----------|----------|--------------|--------------|-----------|-----------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s)       | 107.06       | (mg/s)    | 1,215     | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 4.58     | (mg/s)       | 4.58         | (mg/s)    | 4.58      | (mg/s) |
| tratior                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s)       | 2.80         | (mg/s)    | 2.80      | (mg/s) |
|                             | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s)       | 522.39       | (mg/s)    | 5,964     | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 22.40    | (mg/s)       | 22.40        | (mg/s)    | 22.40     | (mg/s) |
|                             | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s)       | 27.31        | (mg/s)    | 27.31     | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.83     | (mg/s)       | 33.00        | (mg/s)    | 33.00     | (mg/s) |
| n ve<br>ma:                 | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s)       | 0.00         | (mg/s)    | 0.00      | (mg/s) |
| ទ ប្                        | mass flux in seepage from cell 2W                           | M_s2w =  | 22.88    | (mg/s)       | 266.49       | (mg/s)    | 266.49    | (mg/s) |
|                             |   |          | Low Flow |              | Average Flow |           | High Flow |        |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 4.58     | (mg/s)       | 114.44       | (mg/s)    | 1,222.81  | (mg/s) |
| Mass b<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 52.69    | (mg/s)       | 986.03       | (mg/s)    | 7,536.49  | (mg/s) |
|                             |   |          | Low Flo  | w            | Average      | Flow      | High Fl   | ow     |
| t mass<br>tration           | concentration in river at PM-12                             | C_r12 =  | 0.188    | (mg/L)       | 0.293        | (mg/L)    | 0.299     | (mg/l) |
| Convel<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.296    | (mg/L)       | 0.365        | (mg/L)    | 0.307     | (mg/l) |

| Case      | Year 15   |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Sodium  |          |        |        |
| -         |   | -        |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 26.02  | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|   |   |          | Low Flow |        | Avera   | Average Flow |  | High Flow  |        |
|---|---|----------|----------|--------|---------|--------------|--|------------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.0 | 2 (mg/s)     |  | 14,180     | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.2   | 6 (mg/s)     |  | 119.26     | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.6    | 9 (mg/s)     |  | 32.69      | (mg/s) |
| trat                                    | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.  | 5 (mg/s)     |  | 69,586     | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.8   | 0 (mg/s)     |  | 583.80     | (mg/s) |
| u Xn                                    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.8 | 8 (mg/s)     |  | 6,729.88   | (mg/s) |
| ert e<br>Ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 380.42   | (mg/s) | 4,430.  | 3 (mg/s)     |  | 4,430.53   | (mg/s) |
| n ve<br>mas                             | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 125.94   | (mg/s) | 125.9   | 4 (mg/s)     |  | 125.94     | (mg/s) |
| ទ បំ                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 857.06   | (mg/s) | 9,981.6 | 3 (mg/s)     |  | 9,981.63   | (mg/s) |
|   |   |          | Low Flow |        | Avera   | e Flow       |  | High Fl    | ow     |
| s balance<br>ach node                   | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.9 | 6 (mg/s)     |  | 14,331.94  | (mg/s) |
| Mas<br>at ea                            | mass flux in river at PM-13                                 | M r13 =  | 2 066 48 | (ma/s) | 29 347  | 9 (ma/s)     |  | 105 769 32 | (ma/s) |
|   |   | 1        | Low Flo  | w      | Avera   | e Flow       |  | High Fl    | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.5     | 7 (mg/L)     |  | 3.508      | (mg/l) |

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Nickel  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| р с<br>р  | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.022174447 | (mg/L) |
| Cet       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|  |   | Low Flow |          | Average Flow |         | High Flow |   | ow      |        |
|--|---|----------|----------|--------------|---------|-----------|---|---------|--------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s)       | 0.43    | (mg/s)    |   | 5       | (mg/s) |
| -                                      | mass flux of ground water into PM-12                        | M_g12 =  | 0.17     | (mg/s)       | 0.17    | (mg/s)    |   | 0.17    | (mg/s) |
| tratior                                | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s)       | 0.01    | (mg/s)    |   | 0.01    | (mg/s) |
|  | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s)       | 2.09    | (mg/s)    |   | 24      | (mg/s) |
| cen                                    | mass flux of ground water into PM-13                        | M_g13 =  | 0.83     | (mg/s)       | 0.83    | (mg/s)    |   | 0.83    | (mg/s) |
| u si                                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s)       | 0.29    | (mg/s)    |   | 0.29    | (mg/s) |
| ert o<br>Ss f                          | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.32     | (mg/s)       | 3.78    | (mg/s)    |   | 3.78    | (mg/s) |
| ma ny                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.05     | (mg/s)       | 0.05    | (mg/s)    |   | 0.05    | (mg/s) |
| ទ ប័                                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.13     | (mg/s)       | 1.55    | (mg/s)    |   | 1.55    | (mg/s) |
|  |   |          | Low Flow |              | Average | Flow      |   | High Fl | ow     |
| s balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.17     | (mg/s)       | 0.61    | (mg/s)    |   | 5.04    | (mg/s) |
| Mas<br>at ea                           | mass flux in river at PM-13                                 | M r13 =  | 1.51     | (ma/s)       | 9 20    | (ma/s)    |   | 35 40   | (ma/s) |
|  |   | <u>-</u> | Low Flo  | w            | Average | Flow      |   | High Fl | ow     |
| convert mass<br>lux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.007    | (mg/L)       | 0.002   | (mg/L)    |   | 0.001   | (mg/L) |
| 0000                                   | concentration in river at PM-13                             | C_r13 =  | 0.008    | (mg/L)       | 0.003   | (mg/L)    | 1 | 0.001   | (mg/L) |

| Case      | Year 15   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Lead  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| ů pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.002700416 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                           |   | Low Flow |         | Avera  | Average Flow |           | High Flow |         |        |
|---------------------------|---|----------|---------|--------|--------------|-----------|-----------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) |              | (mg/s)    |           | -       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0            | 03 (mg/s) |           | 0.03    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) |              | (mg/s)    |           | -       | (mg/s) |
| Itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) |              | (mg/s)    |           | -       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s) | 0            | 14 (mg/s) |           | 0.14    | (mg/s) |
| u Xn                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0            | 02 (mg/s) |           | 0.02    | (mg/s) |
| ert e<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.04    | (mg/s) | 0            | 46 (mg/s) |           | 0.46    | (mg/s) |
| n ve<br>mas               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0            | 00 (mg/s) |           | 0.00    | (mg/s) |
| ទ បំ                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0            | 27 (mg/s) |           | 0.27    | (mg/s) |
|                           |   |          | Low Flo | w      | Avera        | ge Flow   |           | High Fl | low    |
| balance<br>ch node        | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0            | 03 (mg/s) |           | 0.03    | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 0.24    | (mg/s) | 0            | 92 (mg/s) |           | 0.92    | (mg/s) |
|                           |   |          | LOWIN   | vv     | Avera        | geriow    |           | Tight   | 0w     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.0          | 00 (mg/L) |           | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.0          | 00 (mg/L) |           | 0.000   | (mg/L) |

| Case      | Year 15   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 9.29E-03 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                           |   |          | Low Flow |        | Avera | Average Flow |  | High Flow |        |
|---------------------------|---|----------|----------|--------|-------|--------------|--|-----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.    | 1 (mg/s)     |  | 0         | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.04     | (mg/s) | 0.    | 4 (mg/s)     |  | 0.04      | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.    | 0 (mg/s)     |  | 0.00      | (mg/s) |
| trat                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 0.    | 3 (mg/s)     |  | 0         | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.18     | (mg/s) | 0.    | 8 (mg/s)     |  | 0.18      | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.    | 1 (mg/s)     |  | 0.01      | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.14     | (mg/s) | 1.    | 8 (mg/s)     |  | 1.58      | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.    | 0 (mg/s)     |  | 0.00      | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00     | (mg/s) | 0.    | 6 (mg/s)     |  | 0.06      | (mg/s) |
|                           |   |          | Low Flo  | w      | Avera | je Flow      |  | High Fl   | ow     |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 0.04     | (mg/s) | 0.    | 4 (mg/s)     |  | 0.12      | (mg/s) |
| Mass I<br>at eacl         | mass flux in river at PM-13                                 | M_r13 =  | 0.36     | (mg/s) | 1.    | 1 (mg/s)     |  | 2.35      | (mg/s) |
|                           |   |          | LOW FIO  | w      | Avera | Je Flow      |  | High Fi   | ow     |
| rt mass<br>ntration       | concentration in river at PM-12                             | C_r12 =  | 0.002    | (mg/L) | 0.0   | 0 (mg/L)     |  | 0.000     | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.002    | (mg/L) | 0.0   | 1 (mg/L)     |  | 0.000     | (mg/L) |
| Case<br>Parameter | Year 15<br>Selenium   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| tra               | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001534421 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| cou               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| ont               | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.11    | (mg/s) | 1       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tio                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.52    | (mg/s) | 6       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.35    | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.26    | (mg/s) | 0.26    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.18    | (mg/s) | 1.29    | (mg/s) |
| Mass k<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.49    | (mg/s) | 1.68    | (mg/s) | 8.23    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>concei | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 15   |          |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
|           |   | -        |         |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| р<br>ц    | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 183.93  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                             |   |          | Low Flo   | w      | Average    | Flow   | High Fl    | ow     |
|-----------------------------|---|----------|-----------|--------|------------|--------|------------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 1,427.45   | (mg/s) | 16,206     | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 206.87    | (mg/s) | 206.87     | (mg/s) | 206.87     | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 37.36      | (mg/s) | 37.36      | (mg/s) |
| tral                        | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 6,965.20   | (mg/s) | 79,526     | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72  | (mg/s) | 1,012.72   | (mg/s) | 1,012.72   | (mg/s) |
| u Xi                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 58,922.60  | (mg/s) | 58,922.60  | (mg/s) |
| ert c<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2,688.59  | (mg/s) | 31,312.16  | (mg/s) | 31,312.16  | (mg/s) |
| n ve<br>ma:                 | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 3,628.60  | (mg/s) | 3,628.60   | (mg/s) | 3,628.60   | (mg/s) |
| ទ បំ                        | mass flux in seepage from cell 2W                           | M_s2w =  | 2,947.78  | (mg/s) | 34,330.84  | (mg/s) | 34,330.84  | (mg/s) |
|                             |   |          | Low Flo   | w      | Average    | Flow   | High Fl    | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 206.87    | (mg/s) | 1,671.68   | (mg/s) | 16,449.94  | (mg/s) |
| Mass bé<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 10,484.55 | (mg/s) | 137,843.80 | (mg/s) | 225,183.26 | (mg/s) |
|                             |   |          | Low Flo   | w      | Average    | Flow   | High Fl    | ow     |
| 't mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 8.500     | (mg/L) | 4.280      | (mg/L) | 4.027      | (mg/l) |
| Conver<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 58.924    | (mg/L) | 50.991     | (mg/L) | 9.177      | (mg/l) |

| Case<br>Parameter | Year 15<br>Thallium   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0.0002      | (ma/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
| ep u              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| tior              | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001032291 | (mg/L) |
| Icer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.000004    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.07    | (mg/s) | 1       | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.35    | (mg/s) | 4       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.18    | (mg/s) | 0.18    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ulance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.07    | (mg/s) | 0.81    | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.68    | (mg/s) | 5.04    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 15<br>Zinc   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.066565637 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| ů de              | concentration of ground water into PM-13                        | C_g13 =  | 0.0115      | (mg/L) |

|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                              | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 5.71    | (mg/s) | 65      | (mg/s) |
| _                            | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28    | (mg/s) | 0.28    | (mg/s) |
| tion                         | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.15    | (mg/s) | 0.15    | (mg/s) |
| itra                         | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 27.86   | (mg/s) | 318     | (mg/s) |
| cen                          | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.37    | (mg/s) | 1.37    | (mg/s) |
| uo:                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| ert e<br>ss f                | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.97    | (mg/s) | 11.33   | (mg/s) | 11.33   | (mg/s) |
| mag                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.28    | (mg/s) | 3.23    | (mg/s) | 3.23    | (mg/s) |
|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| lance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14    | (mg/s) | 65.25   | (mg/s) |
| Mass ba<br>at each           | mass flux in river at PM-13                                 | M_r13 =  | 2.91    | (mg/s) | 50.11   | (mg/s) | 399.47  | (mg/s) |
|                              |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| t mass<br>tration            | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016   | (mg/L) | 0.016   | (mg/L) |
| Conver<br>filux to<br>concen | concentration in river at PM-13                             | C_r13 =  | 0.016   | (mg/L) | 0.019   | (mg/L) | 0.016   | (mg/L) |

Appendix F.13 Embarrass River Geotechnical Mitigation Year 20

## FLOWS

| Case             | Year 20  |            |      |       |       |
|------------------|--|------------|------|-------|-------|
| Flows            | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| v in<br>ss River | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| flov<br>rra:     | flow in river at PM-13                         | Q_r13_L =  | 6.29 | (cfs) | PM-13 |
| Total 1<br>Emba  | flow check                                     | Q_ck_L =   | 6.29 | (cfs) |       |
|                  | surface water flow into PM-12                  | Q_s12_L =  | 0.00 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| Ita              | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.54 | (cfs) | PM-13 |
| v da             | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.02 | (cfs) | PM-13 |
| flov             | seepage from cell 2W                           | Q_s2w_L =  | 0.66 | (cfs) | PM-13 |
| out              | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| dul              | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case               | Year 20  |            |       |       |       |
|--------------------|--|------------|-------|-------|-------|
| Flow               | Average Flow Conditions (mean annual)          |            |       |       |       |
| n<br>River         | flow in river at PM-12                         | Q_r12_M =  | 13.80 | (cfs) | PM-12 |
| l flow i<br>arrass | flow in river at PM-13                         | Q_r13_M =  | 95.97 | (cfs) | PM-13 |
| Total<br>Emb:      | flow check                                     | Q_ck_M =   | 95.97 | (cfs) | _     |
|                    | surface water flow into PM-12                  | Q s12 M =  | 12.61 | (cfs) | PM-12 |
|                    | surface water flow into PM-13                  | Q_s13_M =  | 61.53 | (cfs) | PM-13 |
|                    | Babbitt WWTP discharge                         | Q_sBab_M = | 0.33  | (cfs) | PM-12 |
|                    | Area 5 Pit NW discharge                        | Q_spit_M = | 1.99  | (cfs) | PM-13 |
| ta                 | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =   | 6.46  | (cfs) | PM-13 |
| / da               | hydrometallurgical residue cells liner leakage | Q_rrs_M =  | 0.02  | (cfs) | PM-13 |
| flow               | seepage from cell 2W                           | Q_s2w_M =  | 7.96  | (cfs) | PM-13 |
| out                | ground water flow into PM-12                   | Q_g12_M =  | 0.86  | (cfs) | PM-12 |
| dul                | ground water flow into PM-13                   | Q_g13_M =  | 4.21  | (cfs) | PM-13 |

| Case             | Year 20  |            |        |       |       |
|------------------|--|------------|--------|-------|-------|
| Flow             | High Flow Conditions (avg. annual 1-day ma     | ax flow)   |        |       |       |
| n<br>River       | flow in river at PM-12                         | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>ırrass | flow in river at PM-13                         | Q_r13_H =  | 867.52 | (cfs) | PM-13 |
| Total<br>Emba    | flow check                                     | Q_ck_H =   | 867.52 | (cfs) |       |
|                  | surface water flow into PM-12                  | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta               | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_H =   | 6.46   | (cfs) | PM-13 |
| / da             | hydrometallurgical residue cells liner leakage | Q_rrs_H =  | 0.02   | (cfs) | PM-13 |
| lo v             | seepage from cell 2W                           | Q_s2w_H =  | 7.96   | (cfs) | PM-13 |
| nt -             | ground water flow into PM-12                   | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| aul              | ground water flow into PM-13                   | Q g13 H =  | 4.21   | (cfs) | PM-13 |

| Case      | Year 20   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Silver  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
| , p u     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00095  | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|                                      |   |          | Low Flo | w      | Average     | Flow          | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|-------------|---------------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | _       | (mg/s) | 0.04        | (mg/s)        | 0       | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00        | (mg/s)        | 0.00    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00        | (mg/s)        | 0.00    | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.19        | (mg/s)        | 2       | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00        | (mg/s)        | 0.00    | (mg/s) |
| nos                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01        | (mg/s)        | 0.01    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.17        | (mg/s)        | 0.17    | (mg/s) |
| mas                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00        | (mg/s)        | 0.00    | (mg/s) |
| ຊ ິ <u>ບ</u>                         | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.02        | (mg/s)        | 0.02    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average     | Flow          | High Fl | ow     |
| ass balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | <br>0.04    | <u>(mg/s)</u> | 0.45    | (mg/s) |
| ata                                  | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.44        | (mg/s)        | 2.84    | (mg/s) |
|                                      |   | -        | Low Flo | w      | <br>Average | Flow          | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | <br>0.000   | (mg/L)        | 0.000   | (mg/L) |
| ŭĘŭ                                  | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000       | (mg/L)        | 0.000   | (mg/L) |

| Case<br>Parameter | Year 20<br>Aluminum   |          |          |        |
|-------------------|---|----------|----------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| ן da              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325  | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.88E-02 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| rt (              | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| 별                 | concentration of ground water into PM-13                        | C_g13 =  | 0.025    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) | 0.61    | (mg/s) | 0.61     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) | 2.98    | (mg/s) | 2.98     | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.75    | (mg/s) | 0.75     | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.05    | (mg/s) | 12.58   | (mg/s) | 12.58    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.10    | (mg/s) | 0.10    | (mg/s) | 0.10     | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 29.59   | (mg/s) | 355.65  | (mg/s) | 355.65   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| balance<br>th node         | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) | 37.23   | (mg/s) | 406.69   | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 34.33   | (mg/s) | 583.41  | (mg/s) | 2,766.90 | (mg/s) |
|                            |   |          | Low Flo | W      | Average | Flow   | High Fl  | ow     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) | 0.095   | (mg/L) | 0.100    | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.193   | (mg/L) | 0.215   | (mg/L) | 0.113    | (mg/L) |

| Case<br>Parameter | Year 20<br>Arsenic  |             |             |        |
|-------------------|---|-------------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =     | 0.00075     | (mg/L) |
| ata               | concentration of surface water into PM-13                       | <br>C_s13 = | 0.00075     | (mg/L) |
| ep r              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.00075     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.001325    | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 0.007453418 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 0.004       | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =     | 0.00291     | (mg/L) |
| đ                 | concentration of ground water into PM-12                        | C_g12 =     | 0.00273     | (mg/L) |
| <u>l</u>          | concentration of ground water into PM-13                        | C_g13 =     | 0.00273     | (mg/L) |

|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---|---|----------|---------|--------|---------|--------|---------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.27    | (mg/s) | 3       | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| itrai                                   | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.31    | (mg/s) | 15      | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) | 0.33    | (mg/s) | 0.33    | (mg/s) |
| uo Xnj                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.11    | (mg/s) | 1.36    | (mg/s) | 1.36    | (mg/s) |
| ma                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ដ ប្                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.05    | (mg/s) | 0.65    | (mg/s) | 0.65    | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ss balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.34    | (mg/s) | 3.11    | (mg/s) |
| Mas<br>ate                              | mass flux in river at PM-13                                 | M r13 =  | 0.56    | (mg/s) | 4.07    | (mg/s) | 20.44   | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| Convert mass<br>lux to<br>:oncentration | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |

| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Boron   |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| , p u     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.158659552 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                           |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|-----------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | _       | (mg/s) | 4.28      | (mg/s) | 49      | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) | 0.52      | (mg/s) | 0.52    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.11      | (mg/s) | 0.11    | (mg/s) |
| Itrai                     | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 20.90     | (mg/s) | 239     | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) | 2.53      | (mg/s) | 2.53    | (mg/s) |
| nos                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.41      | (mg/s) | 7.41    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.41    | (mg/s) | 29.01     | (mg/s) | 29.01   | (mg/s) |
| mas                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.06    | (mg/s) | 0.06      | (mg/s) | 0.06    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 6.19    | (mg/s) | 74.34     | (mg/s) | 74.34   | (mg/s) |
|                           |   |          | Low Flo | W      | Average   | Flow   | High Fl | ow     |
| alance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) | 4.91      | (mg/s) | 49.25   | (mg/s) |
| Mass b<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 11.70   | (mg/s) | 139.15    | (mg/s) | 401.17  | (mg/s) |
|                           |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) | <br>0.013 | (mg/L) | 0.012   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.066   | (mg/L) | 0.051     | (mg/L) | 0.016   | (mg/L) |

| Case<br>Parameter | Year 20<br>Barium   |             |          |        |
|-------------------|---|-------------|----------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =     | 0.011    | (mg/L) |
| ita               | concentration of surface water into PM-13                       | <br>C_s13 = | 0.011    | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.011    | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.0044   | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 5.40E-02 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 5.00E-03 | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =     | 0.09298  | (mg/L) |
| đ                 | concentration of ground water into PM-12                        | C_g12 =     | 0.0681   | (mg/L) |
| <u>l</u>          | concentration of ground water into PM-13                        | C_g13 =     | 0.0681   | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 3.93    | (mg/s) | 45      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 1.66    | (mg/s) | 1.66    | (mg/s) | 1.66    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 19.15   | (mg/s) | 219     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 8.11    | (mg/s) | 8.11    | (mg/s) | 8.11    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.82    | (mg/s) | 9.87    | (mg/s) | 9.87    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 1.74    | (mg/s) | 20.95   | (mg/s) | 20.95   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 1.66    | (mg/s) | 5.69    | (mg/s) | 46.33   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 12.34   | (mg/s) | 64.02   | (mg/s) | 304.21  | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.068   | (mg/L) | 0.015   | (mg/L) | 0.011   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.069   | (mg/L) | 0.024   | (mg/L) | 0.012   | (mg/L) |

| Case<br>Parameter | Year 20<br>Beryllium  |                    |             |        |
|-------------------|---|--------------------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C. s12 =           | 0.0001      | (ma/L) |
| ata               | concentration of surface water into PM-12                       | C_s12 =<br>C_s13 = | 0.0001      | (mg/L) |
| , då              | concentration in Babbitt WWTP discharge                         | C_sBab =           | 0.0001      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit =           | 0.0001      | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =             | 0.000472927 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =            | 0           | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =            | 0.00075     | (mg/L) |
| rt (              | concentration of ground water into PM-12                        | C_g12 =            | 0.000023    | (mg/L) |
| 별                 | concentration of ground water into PM-13                        | C_g13 =            | 0.000023    | (mg/L) |

|                            |   |          | Low Flo | W      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.17    | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| <u>۽</u> ڳ                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.41    | (mg/s) |
| Mass be<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.48    | (mg/s) | 2.66    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conv<br>flux t<br>conc     | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 20<br>Calcium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   | 010      | 10          | (      |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 13          | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 13          | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 13          | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 95.35       | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 65.23766506 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 416         | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 59.78       | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 19          | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 19          | (mg/L) |

|                                |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|--------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                | mass flux of surface water into PM-12                       | M_s12 =  | _        | (mg/s) | 4,639.22  | (mg/s) | 52,669     | (mg/s) |
| _                              | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) | 462.42    | (mg/s) | 462.42     | (mg/s) |
| tion                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 121.41    | (mg/s) | 121.41     | (mg/s) |
| Itra                           | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 22,636.89 | (mg/s) | 258,461    | (mg/s) |
| cen                            | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) | 2,263.72  | (mg/s) | 2,263.72   | (mg/s) |
| u Xn                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 5,369.83  | (mg/s) | 5,369.83   | (mg/s) |
| ert e<br>ss f                  | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 992.61   | (mg/s) | 11,928.83 | (mg/s) | 11,928.83  | (mg/s) |
| mag                            | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 227.25   | (mg/s) | 227.25    | (mg/s) | 227.25     | (mg/s) |
| <u>۽</u> ڳ                     | mass flux in seepage from cell 2W                           | M_s2w =  | 1,120.56 | (mg/s) | 13,466.52 | (mg/s) | 32.66      | (mg/s) |
|                                |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| llance<br>node                 | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) | 5,223.05  | (mg/s) | 53,252.39  | (mg/s) |
| Mass ba<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 5,066.56 | (mg/s) | 61,116.09 | (mg/s) | 331,535.47 | (mg/s) |
|                                |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| ivert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) | 13.374    | (mg/l) | 13.036     | (mg/l) |
| Cor<br>flux<br>con             | concentration in river at PM-13                             | C_r13 =  | 28.466   | (mg/L) | 22.503    | (mg/l) | 13.504     | (mg/l) |

| Case<br>Parameter | Year 20<br>Cadmium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   | -        |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.00008     | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.00008     | (mg/L) |
| i p u             | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000503271 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004      | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188    | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.0003      | (mg/L) |
| <u>d</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.0003      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.14    | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 0.01    | (mg/s) | 0.04    | (mg/s) | 0.33    | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.05    | (mg/s) | 0.35    | (mg/s) | 2.10    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 20<br>Chloride   |                    |          |        |
|-------------------|---|--------------------|----------|--------|
|                   | concentration of surface water into PM 12                       | C e12 -            | 10       | (mg/L) |
| ta                | concentration of surface water into PM-12                       | C_312 =<br>C_s13 = | 10       | (mg/L) |
| da<br>da          | concentration in Babbitt WWTP discharge                         | _<br>C_sBab =      | 10       | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit =           | 5.95     | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =             | 5.85E+00 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =            | 1.76E+03 | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =            | 21.54    | (mg/L) |
| Ĕ                 | concentration of ground water into PM-12                        | C_g12 =            | 1.8      | (mg/L) |
| <u>l</u>          | concentration of ground water into PM-13                        | C_g13 =            | 1.8      | (mg/L) |

|                             |   |          | Low Flo  | w      | Average   | Flow   | High Fl       | ow     |
|-----------------------------|---|----------|----------|--------|-----------|--------|---------------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 3,568.63  | (mg/s) | 40,514        | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 43.81    | (mg/s) | 43.81     | (mg/s) | 43.81         | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 93.39     | (mg/s) | 93.39         | (mg/s) |
| Itrai                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 17,412.99 | (mg/s) | 198,816       | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 214.46   | (mg/s) | 214.46    | (mg/s) | 214.46        | (mg/s) |
| uo:                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 335.09    | (mg/s) | 335.09        | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 89.08    | (mg/s) | 1,070.58  | (mg/s) | 1,070.58      | (mg/s) |
| mag                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 961.45   | (mg/s) | 961.45    | (mg/s) | 961.45        | (mg/s) |
| ទ ប័                        | mass flux in seepage from cell 2W                           | M_s2w =  | 403.76   | (mg/s) | 4,852.27  | (mg/s) | 4,852.27      | (mg/s) |
|                             |   |          | Low Flo  | w      | Average   | Flow   | High Fl       | ow     |
| oalance<br>1 node           | mass flux in river at PM-12                                 | M_r12 =  | 43.81    | (mg/s) | 3,705.83  | (mg/s) | <br>40,651.48 | (mg/s) |
| Mass b<br>at eacl           | mass flux in river at PM-13                                 | M_r13 =  | 1,712.56 | (mg/s) | 28,552.66 | (mg/s) | 246,901.31    | (mg/s) |
|                             |   |          | LOW FIO  | W      | Average   | Flow   | <br>High Fi   | ow     |
| rt mass<br>ntration         | concentration in river at PM-12                             | C_r12 =  | 1.800    | (mg/L) | 9.489     | (mg/L) | 9.951         | (mg/L) |
| Convel<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 9.622    | (mg/L) | 10.513    | (mg/L) | 10.057        | (mg/L) |

| Case<br>Parameter | Year 20<br>Cobalt   |             |            |        |
|-------------------|---|-------------|------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =     | 0.0006     | (mg/L) |
| Ita               | concentration of surface water into PM-13                       | <br>C_s13 = | 0.0006     | (mg/L) |
| ן da              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.0006     | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.000555   | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 0.00218589 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 0.005      | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =     | 0.001556   | (mg/L) |
| rt (              | concentration of ground water into PM-12                        | C_g12 =     | 0.0011     | (mg/L) |
| 1                 | concentration of ground water into PM-13                        | C_g13 =     | 0.0011     | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.21    | (mg/s) | 2       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.04    | (mg/s) | 12      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.13    | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.03    | (mg/s) | 0.40    | (mg/s) | 0.40    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| oalance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.25    | (mg/s) | 2.46    | (mg/s) |
| Mass k<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 0.22    | (mg/s) | 2.21    | (mg/s) | 15.31   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Conv<br>flux t<br>conc     | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |

| Case<br>Parameter | Year 20<br>Copper   |          |             |        |
|-------------------|---|----------|-------------|--------|
| i arameter        | 000000  |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.011428793 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.004       | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.54    | (mg/s) | 6       | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.61    | (mg/s) | 30      | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s) | 0.48    | (mg/s) | 0.48    | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.19    | (mg/s) | 0.19    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.17    | (mg/s) | 2.09    | (mg/s) | 2.09    | (mg/s) |
| mas                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.09    | (mg/s) | 1.03    | (mg/s) | 1.03    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ss balance<br>sach node              | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s) | 0.65    | (mg/s) | 6.19    | (mg/s) |
| M a:<br>at e                         | mass flux in river at PM-13                                 | M_r13 =  | 0.83    | (mg/s) | 7.05    | (mg/s) | 39.80   | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |
| ΩĘΥ                                  | concentration in river at PM-13                             | C_r13 =  | 0.005   | (mg/L) | 0.003   | (mg/L) | 0.002   | (mg/L) |

| Case      | Year 20   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Fluoride  |          |          |        |
| -         |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 5.99E-01 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s) | 9.37    | (mg/s) | 9.37     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s) | 45.87   | (mg/s) | 45.87    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.04    | (mg/s) | 7.04     | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 9.12    | (mg/s) | 109.60  | (mg/s) | 109.60   | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 1.56    | (mg/s) | 1.56    | (mg/s) | 1.56     | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 29.05   | (mg/s) | 349.17  | (mg/s) | 349.17   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| oalance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 9.37    | (mg/s) | 45.99   | (mg/s) | 415.45   | (mg/s) |
| Mass I<br>at eacl          | mass flux in river at PM-13                                 | M_r13 =  | 94.97   | (mg/s) | 733.35  | (mg/s) | 2,916.84 | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L) | 0.118   | (mg/L) | 0.102    | (mg/L) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 0.534   | (mg/L) | 0.270   | (mg/L) | 0.119    | (mg/L) |

| Case<br>Parameter | Year 20<br>Iron   |          |             |        |
|-------------------|---|----------|-------------|--------|
| i ulunetei        |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| ů pr              | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 2.17E-02    | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| out               | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| 별                 | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
|----------------------------|---|----------|---------|--------|----------|--------|-----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90 | (mg/s) | 11,749    | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85     | (mg/s) | 0.85      | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08    | (mg/s) | 27.08     | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77 | (mg/s) | 57,657    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17     | (mg/s) | 4.17      | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13     | (mg/s) | 2.13      | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.33    | (mg/s) | 3.97     | (mg/s) | 3.97      | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.22    | (mg/s) | 0.22     | (mg/s) | 0.22      | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 86.11   | (mg/s) | 1,034.88 | (mg/s) | 1,034.88  | (mg/s) |
|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| balance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | 1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| Mass k<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 91.68   | (mg/s) | 7,157.97 | (mg/s) | 70,479.08 | (mg/s) |
|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | 2.721    | (mg/L) | 2.883     | (mg/L) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 0.515   | (mg/L) | 2.636    | (mg/L) | 2.871     | (mg/L) |

| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
| -         |   | -        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 2.18E+02    | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|                               |   |          | Low Flo   | w      | Averag    | e Flow   | High Fl      | ow     |
|-------------------------------|---|----------|-----------|--------|-----------|----------|--------------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,980.4  | (mg/s)   | 283,600      | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,129.5   | 8 (mg/s) | 2,129.58     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 653.7     | 8 (mg/s) | 653.73       | (mg/s) |
| Itrai                         | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121,890.9 | 8 (mg/s) | 1,391,712    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) | 10,425.0  | (mg/s)   | 10,425.01    | (mg/s) |
| nos                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,090.8  | l (mg/s) | 53,090.84    | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,320.52  | (mg/s) | 39,904.8  | 6 (mg/s) | 39,904.86    | (mg/s) |
| mas                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 4,703.46  | (mg/s) | 4,703.4   | 6 (mg/s) | 4,703.46     | (mg/s) |
| ទ ប័                          | mass flux in seepage from cell 2W                           | M_s2w =  | 8,183.95  | (mg/s) | 98,352.0  | (mg/s)   | 98,352.01    | (mg/s) |
|                               |   |          | Low Flo   | w      | Averag    | e Flow   | High Fl      | ow     |
| alance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | 27,763.7  | 2 (mg/s) | 286,383.27   | (mg/s) |
| Mass b<br>at each             | mass flux in river at PM-13                                 | M_r13 =  | 28,762.52 | (mg/s) | 356,130.8 | 3 (mg/s) | 1,884,571.38 | (mg/s) |
|                               |   |          | Low Flo   | w      | Averag    | Flow     | High Fl      | ow     |
| wert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) | 71.09     | (mg/L)   | 70.104       | (mg/L) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 161.599   | (mg/L) | 131.12    | o (mg/L) | 76.762       | (mg/L) |

| Case<br>Parameter | Year 20<br>Potassium  |          |       |        |
|-------------------|---|----------|-------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 3.70  | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| , da              | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.23  | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|                               |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
|-------------------------------|---|----------|---------|--------|-----------|--------|-----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39  | (mg/s) | 14,990    | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94     | (mg/s) | 38.94     | (mg/s) |
| tion                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.98    | (mg/s) | 0.98      | (mg/s) | 0.98      | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81  | (mg/s) | 73,562    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 190.63    | (mg/s) | 190.63    | (mg/s) |
| uos                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 34.55     | (mg/s) | 34.55     | (mg/s) |
| ert e<br>ss f                 | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,029.85  | (mg/s) | 3,029.85  | (mg/s) |
| mag                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 94.77   | (mg/s) | 1,138.87  | (mg/s) | 1,138.87  | (mg/s) |
| ۹ ٽ<br>۲                      | mass flux in seepage from cell 2W                           | M_s2w =  | 145.65  | (mg/s) | 1,750.33  | (mg/s) | 1,750.33  | (mg/s) |
|                               |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| s balance<br>ch node          | mass flux in river at PM-12                                 | M_r12 =  | 39.92   | (mg/s) | 1,360.32  | (mg/s) | 15,030.21 | (mg/s) |
| Mass<br>at ea                 | mass flux in river at PM-13                                 | M_r13 =  | 470.97  | (mg/s) | 13,947.36 | (mg/s) | 94,736.36 | (mg/s) |
|                               |   | -        | Low Flo | W      | Average   | Flow   | High Fl   | ow     |
| wert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 1.640   | (mg/L) | 3.483     | (mg/L) | 3.679     | (mg/l) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 2.646   | (mg/L) | 5.135     | (mg/L) | 3.859     | (mg/l) |

| Case<br>Parameter | Year 20<br>Magnesium  |          |        |        |
|-------------------|---|----------|--------|--------|
|                   |   | -        |        |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| p c               | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 13.44  | (mg/L) |
| Cet               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|                                   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|-----------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 2,141.18  | (mg/s) | 24,309     | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s) | 259.20    | (mg/s) | 259.20     | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 56.03     | (mg/s) | 56.03      | (mg/s) |
| Itra                              | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 10,447.79 | (mg/s) | 119,290    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s) | 1,268.87  | (mg/s) | 1,268.87   | (mg/s) |
| u Xn                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 15,261.91 | (mg/s) | 15,261.91  | (mg/s) |
| ert e<br>ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 204.46   | (mg/s) | 2,457.15  | (mg/s) | 2,457.15   | (mg/s) |
| mag                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 116.36   | (mg/s) | 116.36    | (mg/s) | 116.36     | (mg/s) |
| ទ បំ                              | mass flux in seepage from cell 2W                           | M_s2w =  | 1,311.57 | (mg/s) | 15,762.00 | (mg/s) | 15,762.00  | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| llance<br>node                    | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s) | 2,456.41  | (mg/s) | 24,623.80  | (mg/s) |
| Mass ba<br>at each                | mass flux in river at PM-13                                 | M_r13 =  | 3,160.46 | (mg/s) | 47,770.50 | (mg/s) | 178,779.69 | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| nvert mass<br>t to<br>icentration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L) | 6.290     | (mg/l) | 6.028      | (mg/l) |
| Col                               | concentration in river at PM-13                             | C_r13 =  | 17.757   | (mg/L) | 17.589    | (mg/l) | 7.282      | (mg/l) |

| Case      | Year 20   |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
|           |   |          |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.23 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|-------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 107.06  | (mg/s) | 1,215    | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 4.58    | (mg/s) | 4.58    | (mg/s) | 4.58     | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 2.80    | (mg/s) | 2.80     | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 522.39  | (mg/s) | 5,964    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 22.40   | (mg/s) | 22.40   | (mg/s) | 22.40    | (mg/s) |
| u Xn                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 27.31   | (mg/s) | 27.31    | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3.51    | (mg/s) | 42.20   | (mg/s) | 42.20    | (mg/s) |
| n ve<br>mas                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| ទ បំ                          | mass flux in seepage from cell 2W                           | M_s2w =  | 22.18   | (mg/s) | 266.49  | (mg/s) | 266.49   | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| alance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 4.58    | (mg/s) | 114.44  | (mg/s) | 1,222.81 | (mg/s) |
| Mass be<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 52.66   | (mg/s) | 995.23  | (mg/s) | 7,545.69 | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.188   | (mg/L) | 0.293   | (mg/l) | 0.299    | (mg/l) |
| Con<br>flux<br>conc           | concentration in river at PM-13                             | C_r13 =  | 0.296   | (mg/L) | 0.366   | (mg/l) | 0.307    | (mg/l) |

| Case<br>Parameter | Year 20<br>Sodium   |          |        |        |
|-------------------|---|----------|--------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| , då              | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 22.22  | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|---|---|----------|----------|--------|-----------|--------|------------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180     | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.26     | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69      | (mg/s) |
| itrai                                   | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,586     | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.80     | (mg/s) |
| uo Xnj                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.88   | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 338.03   | (mg/s) | 4,062.28  | (mg/s) | 4,062.28   | (mg/s) |
| ma                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 139.30   | (mg/s) | 139.30    | (mg/s) | 139.30     | (mg/s) |
| ដ ប្                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 830.58   | (mg/s) | 9,981.63  | (mg/s) | 9,981.63   | (mg/s) |
|   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| is balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94  | (mg/s) |
| Mas<br>ate                              | mass flux in river at PM-13                                 | M r13 =  | 2.010.96 | (ma/s) | 28.992.40 | (ma/s) | 105.414.43 | (ma/s) |
|   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.508      | (mg/l) |

| Case<br>Parameter | Year 20<br>Nickel   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| sh r              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.023571036 | (mg/L) |
| Icer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.43    | (mg/s) | 5       | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.09    | (mg/s) | 24      | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.83    | (mg/s) | 0.83    | (mg/s) | 0.83    | (mg/s) |
| uos                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.29    | (mg/s) | 0.29    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.36    | (mg/s) | 4.31    | (mg/s) | 4.31    | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.05    | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
| ۹ ٽ<br>۲                             | mass flux in seepage from cell 2W                           | M_s2w =  | 0.13    | (mg/s) | 1.55    | (mg/s) | 1.55    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| iss balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s) | 0.61    | (mg/s) | 5.04    | (mg/s) |
| Ma                                   | mass flux in river at PM-13                                 | M_r13 =  | 1.55    | (mg/s) | 9.74    | (mg/s) | 35.94   | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ix to<br>incentration | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001   | (mg/L) |
| S = S                                | concentration in river at PM-13                             | C_r13 =  | 0.009   | (mg/L) | 0.004   | (mg/L) | 0.001   | (mg/L) |

| Case      | Year 20   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Lead  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0           | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0           | (mg/L) |
| i p u     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0           | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.002295615 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005      | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012      | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 0.0012      | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 0.0012      | (mg/L) |

|                                      |   |          | Low Flo | w      | Average  | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|----------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | -        | (mg/s) | -       | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03     | (mg/s) | 0.03    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | -        | (mg/s) | -       | (mg/s) |
| Itra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | -        | (mg/s) | -       | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s) | 0.14     | (mg/s) | 0.14    | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.02     | (mg/s) | 0.02    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.03    | (mg/s) | 0.42     | (mg/s) | 0.42    | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00     | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> ڳ                           | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.27     | (mg/s) | 0.27    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average  | Flow   | High Fl | ow     |
| s balance<br>ach node                | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | <br>0.03 | (mg/s) | 0.03    | (mg/s) |
| Mas<br>at ea                         | mass flux in river at PM-13                                 | M_r13 =  | 0.23    | (mg/s) | 0.88     | (mg/s) | 0.88    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average  | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.000    | (mg/L) | 0.000   | (mg/L) |
| ŭ≓ŭ                                  | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.000    | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 20   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Antimony  |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 2.00E-05 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 2.00E-05 | (mg/L) |
| , da      | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.00E-05 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 2.50E-04 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 8.78E-03 | (mg/L) |
| Icer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004    | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 2.50E-04 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.50E-03 | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 1.50E-03 | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.01    | (mg/s) | 0       | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.18    | (mg/s) | 0.18    | (mg/s) | 0.18    | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.13    | (mg/s) | 1.61    | (mg/s) | 1.61    | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ss balance<br>ach node               | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.12    | (mg/s) |
| Ma:<br>ate                           | mass flux in river at PM-13                                 | M_r13 =  | 0.36    | (mg/s) | 1.94    | (mg/s) | 2.37    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| o ∓ o                                | concentration in river at PM-13                             | C_r13 =  | 0.002   | (mg/L) | 0.001   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Year 20<br>Selenium   |             |             |        |
|-------------------|---|-------------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =     | 0.0003      | (mg/L) |
| ita               | concentration of surface water into PM-13                       | <br>C_s13 = | 0.0003      | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.0003      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.0016      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 0.001434159 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 0.054       | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =     | 0.00109     | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =     | 0.00295     | (mg/L) |
| <u>l</u>          | concentration of ground water into PM-13                        | C_g13 =     | 0.00295     | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.11    | (mg/s) | 1       | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.52    | (mg/s) | 6       | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.35    | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.26    | (mg/s) | 0.26    | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ss balance<br>ach node               | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.18    | (mg/s) | 1.29    | (mg/s) |
| Ma:<br>ate                           | mass flux in river at PM-13                                 | M_r13 =  | 0.50    | (mg/s) | 1.68    | (mg/s) | 8.23    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| o ∓ o                                | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.000   | (mg/L) |

| Case      | Year 20   |          |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
|           |   |          | -       |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 163.33  | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|   |   |          | Low Flo   | w      |    | Average   | Flow   | High Fl    | ow     |
|---|---|----------|-----------|--------|----|-----------|--------|------------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) |    | 1,427.45  | (mg/s) | 16,206     | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 206.87    | (mg/s) |    | 206.87    | (mg/s) | 206.87     | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) |    | 37.36     | (mg/s) | 37.36      | (mg/s) |
| Itra                                    | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) |    | 6,965.20  | (mg/s) | 79,526     | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72  | (mg/s) |    | 1,012.72  | (mg/s) | 1,012.72   | (mg/s) |
| u Xn                                    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 4  | 58,922.60 | (mg/s) | 58,922.60  | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2,485.06  | (mg/s) |    | 29,864.60 | (mg/s) | 29,864.60  | (mg/s) |
| n ve<br>ma:                             | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 4,013.51  | (mg/s) |    | 4,013.51  | (mg/s) | 4,013.51   | (mg/s) |
| ទ បំ                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 2,856.70  | (mg/s) | ;  | 34,330.84 | (mg/s) | 34,330.84  | (mg/s) |
|   |   |          | Low Flo   | w      |    | Average   | Flow   | High Fl    | ow     |
| is balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 206.87    | (mg/s) |    | 1,671.68  | (mg/s) | 16,449.94  | (mg/s) |
| Mas<br>at e                             | mass flux in river at PM-13                                 | M r13 =  | 10.574.86 | (ma/s) | 1: | 36.781.15 | (ma/s) | 224,120,61 | (ma/s) |
|   |   |          | Low Flo   | w      |    | Average   | Flow   | High Fl    | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 8.500     | (mg/L) |    | 4.280     | (mg/l) | 4.027      | (mg/l) |

| Case<br>Parameter | Year 20<br>Thallium   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             | 1      |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0002      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
| i p u             | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001001115 | (mg/L) |
| Cel               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| d L               | concentration of ground water into PM-13                        | C_g13 =  | 0.000004    | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl   | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|-----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.07    | (mg/s) | 1         | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00      | (mg/s) |
| tior                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00      | (mg/s) |
| itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.35    | (mg/s) | 4         | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00      | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03      | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.18    | (mg/s) | 0.18      | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00      | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.05    | (mg/s) | 0.05      | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl   | ow     |
| alance<br>n node          | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.07    | (mg/s) | 0.81      | (mg/s) |
| Mass b<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.68    | (mg/s) | 5.05      | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl   | ow     |
| ert mass<br>o<br>ntration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | <br>0.000 | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000     | (mg/L) |

| Case<br>Parameter | Year 20<br>Zinc   |             |             |        |
|-------------------|---|-------------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =     | 0.016       | (ma/L) |
| ata               | concentration of surface water into PM-13                       | <br>C_s13 = | 0.016       | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.016       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.003       | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 0.058688337 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 0.01        | (mg/L) |
| cor               | concentration in tailings basin cell 2W                         | C_s2w =     | 0.01435     | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =     | 0.0115      | (mg/L) |
| <u>l</u>          | concentration of ground water into PM-13                        | C_g13 =     | 0.0115      | (mg/L) |

|  |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--|---|----------|---------|--------|---------|--------|---------|--------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 5.71    | (mg/s) | 65      | (mg/s) |
| _  | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28    | (mg/s) | 0.28    | (mg/s) |
| tion                                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | I       | (mg/s) | 0.15    | (mg/s) | 0.15    | (mg/s) |
| Itra                                     | mass flux of surface water into PM-13                       | M_s13 =  | I       | (mg/s) | 27.86   | (mg/s) | 318     | (mg/s) |
| cen                                      | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.37    | (mg/s) | 1.37    | (mg/s) |
| u Xn                                     | mass flux of Area 5 Pit NW discharge                        | M_spit = | I       | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| ssfo                                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.89    | (mg/s) | 10.73   | (mg/s) | 10.73   | (mg/s) |
| n ve<br>ma:                              | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ទ បំ                                     | mass flux in seepage from cell 2W                           | M_s2w =  | 0.27    | (mg/s) | 3.23    | (mg/s) | 3.23    | (mg/s) |
|  |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| s balance<br>ach node                    | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14    | (mg/s) | 65.25   | (mg/s) |
| Mas<br>at ea                             | mass flux in river at PM-13                                 | M_r13 =  | 2.82    | (mg/s) | 49.51   | (mg/s) | 398.87  | (mg/s) |
|  |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| Convert mass<br>flux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016   | (mg/L) | 0.016   | (mg/L) |

Appendix F.14 Embarrass River Geotechnical Mitigation Closure

## FLOWS

| Case              | Closure  |            |      |       |       |
|-------------------|--|------------|------|-------|-------|
| Flows             | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| in<br>s River     | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| low<br>ras:       | flow in river at PM-13                         | Q r13 L =  | 6.27 | (cfs) | PM-13 |
| Total fi<br>Embar | flow check                                     | Q_ck_L =   | 6.27 | (cfs) |       |
|                   |  | a (a)      |      |       | -     |
|                   | surface water flow into PM-12                  | Q_s12_L =  | 0.00 | (cts) | PM-12 |
|                   | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                   | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                   | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| Ita               | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.41 | (cfs) | PM-13 |
| v da              | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.00 | (cfs) | PM-13 |
| flov              | seepage from cell 2W                           | Q_s2w_L =  | 0.79 | (cfs) | PM-13 |
| out               | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| dul               | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case             | Closure  |              |       |       |       |
|------------------|--|--------------|-------|-------|-------|
| Flow             | Average Flow Conditions (mean annual)          |              |       |       |       |
| in<br>s River    | flow in river at PM-12                         | Q_r12_M =    | 13.80 | (cfs) | PM-12 |
| flow<br>rrass    | flow in river at PM-13                         | Q_r13_M =    | 86.63 | (cfs) | PM-13 |
| Total 1<br>Embai | flow check                                     | Q_ck_M =     | 86.63 | (cfs) |       |
|                  | surface water flow into PM-12                  | 0 s12 M =    | 12.61 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | $Q_{312}M =$ | 61.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_M =   | 0.33  | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_M =   | 1.99  | (cfs) | PM-13 |
| ta               | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =     | 1.73  | (cfs) | PM-13 |
| / da             | hydrometallurgical residue cells liner leakage | Q_rrs_M =    | 0.00  | (cfs) | PM-13 |
| lov              | seepage from cell 2W                           | Q_s2w_M =    | 3.37  | (cfs) | PM-13 |
| out 1            | ground water flow into PM-12                   | Q_g12_M =    | 0.86  | (cfs) | PM-12 |
| dul              | ground water flow into PM-13                   | Q_g13_M =    | 4.21  | (cfs) | PM-13 |

| Case            | Closure  |            |        |       |       |
|-----------------|--|------------|--------|-------|-------|
| Flow            | High Flow Conditions (avg. annual 1-day ma     | ax flow)   |        |       |       |
| n<br>River      | flow in river at PM-12                         | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>rrass | flow in river at PM-13                         | Q_r13_H =  | 858.18 | (cfs) | PM-13 |
| Total<br>Emba   | flow check                                     | Q_ck_H =   | 858.18 | (cfs) |       |
|                 | surface water flow into PM-12                  | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                 | surface water flow into PM-13                  | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                 | Babbitt WWTP discharge                         | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                 | Area 5 Pit NW discharge                        | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta              | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_H =   | 1.73   | (cfs) | PM-13 |
| / da            | hydrometallurgical residue cells liner leakage | Q_rrs_H =  | 0.00   | (cfs) | PM-13 |
| low             | seepage from cell 2W                           | Q_s2w_H =  | 3.37   | (cfs) | PM-13 |
| rt<br>pr        | ground water flow into PM-12                   | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| dul             | ground water flow into PM-13                   | Q g13 H =  | 4.21   | (cfs) | PM-13 |

| Case      | Closure   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Silver  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00011  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00011  | (mg/L) |
| , p u     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00011  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00015  | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00124  | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.000125 | (mg/L) |
| cou       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000100 | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.00008  | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.00008  | (mg/L) |

|   |   |          | Low Flo | w      | Average  | Flow   | High Fl | ow     |
|---|---|----------|---------|--------|----------|--------|---------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04     | (mg/s) | 0       | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00     | (mg/s) | 0.00    | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00     | (mg/s) | 0.00    | (mg/s) |
| itrai                                   | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.19     | (mg/s) | 2       | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00     | (mg/s) | 0.00    | (mg/s) |
| uo Xnj                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01     | (mg/s) | 0.01    | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.06     | (mg/s) | 0.06    | (mg/s) |
| ma                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00     | (mg/s) | 0.00    | (mg/s) |
| ដ ប្                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.01     | (mg/s) | 0.01    | (mg/s) |
|   |   |          | Low Flo | w      | Average  | Flow   | High Fl | ow     |
| ss balance<br>sach node                 | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | <br>0.04 | (mg/s) | 0.45    | (mg/s) |
| Ma:<br>at e                             | mass flux in river at PM-13                                 | M_r13 =  | 0.02    | (mg/s) | 0.31     | (mg/s) | 2.71    | (mg/s) |
|   |   |          | Low Flo | w      | Average  | Flow   | High Fl | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000    | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Closure<br>Aluminum   |             |          |        |
|-------------------|---|-------------|----------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =     | 0.1      | (mg/L) |
| Ita               | concentration of surface water into PM-13                       | <br>C_s13 = | 0.1      | (mg/L) |
| ן da              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.1      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.01325  | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 6.15E-01 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 1.80E-01 | (mg/L) |
| 5                 | concentration in tailings basin cell 2W                         | C_s2w =     | 1.5788   | (mg/L) |
| Ĕ                 | concentration of ground water into PM-12                        | C_g12 =     | 0.025    | (mg/L) |
| 1                 | concentration of ground water into PM-13                        | C_g13 =     | 0.025    | (mg/L) |

|                             |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|-----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) | 0.61    | (mg/s) | 0.61     | (mg/s) |
| tion                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) | 2.98    | (mg/s) | 2.98     | (mg/s) |
| u Xn                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.75    | (mg/s) | 0.75     | (mg/s) |
| ert e<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 7.09    | (mg/s) | 30.13   | (mg/s) | 30.13    | (mg/s) |
| n ve<br>mas                 | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| ទ បំ                        | mass flux in seepage from cell 2W                           | M_s2w =  | 35.42   | (mg/s) | 150.57  | (mg/s) | 150.57   | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| alance<br>node              | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) | 37.23   | (mg/s) | 406.69   | (mg/s) |
| Mass ba<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 46.10   | (mg/s) | 395.79  | (mg/s) | 2,579.28 | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| rert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) | 0.095   | (mg/L) | 0.100    | (mg/L) |
| Conv<br>flux t<br>conc      | concentration in river at PM-13                             | C_r13 =  | 0.260   | (mg/L) | 0.161   | (mg/L) | 0.106    | (mg/L) |

| Case<br>Parameter                     | Closure<br>Arsenic  |                    |             |        |
|---------------------------------------|---|--------------------|-------------|--------|
|                                       | concentration of surface water into PM-12                       | C s12 =            | 0.00075     | (ma/L) |
| ita                                   | concentration of surface water into PM-12                       | C_s12 =<br>C_s13 = | 0.00075     | (mg/L) |
| n da                                  | concentration in Babbitt WWTP discharge                         | C_sBab =           | 0.00075     | (mg/L) |
| tio                                   | concentration in Area 5 Pit NW discharge                        | C_spit =           | 0.001325    | (mg/L) |
| ntra                                  | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =             | 0.027915158 | (mg/L) |
| ICE                                   | concentration in hydrometallurgical residue cells liner leakage | C_rrs =            | 0.004       | (mg/L) |
| L L L L L L L L L L L L L L L L L L L | concentration in tailings basin cell 2W                         | C_s2w =            | 0.00291     | (mg/L) |
| rt                                    | concentration of ground water into PM-12                        | C_g12 =            | 0.00273     | (mg/L) |
| <u>l</u>                              | concentration of ground water into PM-13                        | C_g13 =            | 0.00273     | (mg/L) |

|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---|---|----------|---------|--------|---------|--------|---------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.27    | (mg/s) | 3       | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tio                                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | I       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itra                                    | mass flux of surface water into PM-13                       | M_s13 =  | •       | (mg/s) | 1.31    | (mg/s) | 15      | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) | 0.33    | (mg/s) | 0.33    | (mg/s) |
| uo Xn                                   | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.32    | (mg/s) | 1.37    | (mg/s) | 1.37    | (mg/s) |
| ma                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> ک                              | mass flux in seepage from cell 2W                           | M_s2w =  | 0.07    | (mg/s) | 0.28    | (mg/s) | 0.28    | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| is balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.34    | (mg/s) | 3.11    | (mg/s) |
| Mas<br>ate                              | mass flux in river at PM-13                                 | M r13 =  | 0.78    | (ma/s) | 3.69    | (ma/s) | 20.07   | (ma/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Case<br>Parameter | Closure<br>Boron  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   | -        |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| p c               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.150573845 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
|                   | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | _       | (mg/s) | 4.28    | (mg/s) | 49      | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) | 0.52    | (mg/s) | 0.52    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 20.90   | (mg/s) | 239     | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) | 2.53    | (mg/s) | 2.53    | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.41    | (mg/s) | 7.41    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.74    | (mg/s) | 7.38    | (mg/s) | 7.38    | (mg/s) |
| ma                                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 7.40    | (mg/s) | 31.47   | (mg/s) | 31.47   | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| s balance<br>ach node                | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) | 4.91    | (mg/s) | 49.25   | (mg/s) |
| Mas<br>at ea                         | mass flux in river at PM-13                                 | M_r13 =  | 12.19   | (mg/s) | 74.59   | (mg/s) | 336.61  | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) | 0.013   | (mg/L) | 0.012   | (mg/L) |
| ర≓ర                                  | concentration in river at PM-13                             | C_r13 =  | 0.069   | (mg/L) | 0.030   | (mg/L) | 0.014   | (mg/L) |

| Case<br>Parameter | Closure<br>Barium   |  |          |        |
|-------------------|---|--|----------|--------|
|                   | encodesting of surface under inte DM 40                         | 0 -10 -  | 0.011    | (      |
| ŋ                 | concentration of surface water into PM-12                       | $C_{s12} = C_{s13} = C_{s$ | 0.011    | (mg/L) |
| dat               | concentration in Babbitt WWTP discharge                         | C_SBab =   | 0.011    | (mg/L) |
| tion              | concentration in Area 5 Pit NW discharge                        | C_spit =   | 0.0044   | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.95E-02 | (mg/L) |
| lei               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| S                 | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| but               | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| Ē                 | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

|                               |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 3.93    | (mg/s) | 45      | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 1.66    | (mg/s) | 1.66    | (mg/s) | 1.66    | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 19.15   | (mg/s) | 219     | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 8.11    | (mg/s) | 8.11    | (mg/s) | 8.11    | (mg/s) |
| uos                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.22    | (mg/s) | 0.95    | (mg/s) | 0.95    | (mg/s) |
| mas                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ បំ                          | mass flux in seepage from cell 2W                           | M_s2w =  | 2.09    | (mg/s) | 8.87    | (mg/s) | 8.87    | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>th node            | mass flux in river at PM-12                                 | M_r12 =  | 1.66    | (mg/s) | 5.69    | (mg/s) | 46.33   | (mg/s) |
| Mass<br>at eac                | mass flux in river at PM-13                                 | M_r13 =  | 12.08   | (mg/s) | 43.02   | (mg/s) | 283.21  | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| wert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 0.068   | (mg/L) | 0.015   | (mg/L) | 0.011   | (mg/L) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 0.068   | (mg/L) | 0.018   | (mg/L) | 0.012   | (mg/L) |

| Case<br>Parameter | Closure<br>Beryllium  |                    |             |        |
|-------------------|---|--------------------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =            | 0.0001      | (ma/L) |
| ita               | concentration of surface water into PM-12                       | C_s12 =<br>C_s13 = | 0.0001      | (mg/L) |
| ep c              | concentration in Babbitt WWTP discharge                         | C_sBab =           | 0.0001      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =           | 0.0001      | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =             | 0.001323498 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =            | 0           | (mg/L) |
| 5                 | concentration in tailings basin cell 2W                         | C_s2w =            | 0.00075     | (mg/L) |
| Ĕ                 | concentration of ground water into PM-12                        | C_g12 =            | 0.000023    | (mg/L) |
| 1                 | concentration of ground water into PM-13                        | C_g13 =            | 0.000023    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.17    | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| uos                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.41    | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.04    | (mg/s) | 0.36    | (mg/s) | 2.54    | (mg/s) |
|                            |   | -        | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conv<br>flux ti<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Calcium   |          |             |        |
| -         |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 13          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 13          | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 13          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 95.35       | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 68.73996034 | (mg/L) |
| ICer      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 416         | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 59.78       | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 19          | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 19          | (mg/L) |

|                                  |   |          | Low Flo  | w      | Averaç   | e Flow   | High Fl    | ow     |
|----------------------------------|---|----------|----------|--------|----------|----------|------------|--------|
|                                  | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4,639.2  | 2 (mg/s) | 52,669     | (mg/s) |
| _                                | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) | 462.4    | 2 (mg/s) | 462.42     | (mg/s) |
| tion                             | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 121.4    | 1 (mg/s) | 121.41     | (mg/s) |
| Itra                             | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 22,636.8 | 9 (mg/s) | 258,461    | (mg/s) |
| cen                              | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) | 2,263.7  | 2 (mg/s) | 2,263.72   | (mg/s) |
| u Xn                             | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 5,369.8  | 3 (mg/s) | 5,369.83   | (mg/s) |
| ert e<br>ss f                    | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 792.25   | (mg/s) | 3,367.9  | 0 (mg/s) | 3,367.90   | (mg/s) |
| n ve<br>mas                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 19.51    | (mg/s) | 19.5     | 1 (mg/s) | 19.51      | (mg/s) |
| ទ បំ                             | mass flux in seepage from cell 2W                           | M_s2w =  | 1,341.15 | (mg/s) | 5,701.2  | 8 (mg/s) | 2.80       | (mg/s) |
|                                  |   |          | Low Flo  | W      | Averaç   | e Flow   | High Fl    | ow     |
| ulance<br>node                   | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) | 5,223.0  | 5 (mg/s) | 53,252.39  | (mg/s) |
| Mass ba<br>at each               | mass flux in river at PM-13                                 | M_r13 =  | 4,879.05 | (mg/s) | 44,582.1 | 7 (mg/s) | 322,736.94 | (mg/s) |
|                                  |   |          | Low Flo  | w      | Averag   | e Flow   | High Fl    | ow     |
| vert mass<br>to<br>centration    | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) | 13.37    | 4 (mg/l) | 13.036     | (mg/l) |
| Con <sup>-</sup><br>flux<br>conc | concentration in river at PM-13                             | C_r13 =  | 27.489   | (mg/L) | 18.18    | 4 (mg/l) | 13.289     | (mg/l) |

| Case<br>Parameter | Closure<br>Cadmium  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.00008     | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.00008     | (mg/L) |
| β<br>β            | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001182282 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004      | (mg/L) |
| Con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188    | (mg/L) |
| ont               | concentration of ground water into PM-12                        | C_g12 =  | 0.0003      | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 0.0003      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.14    | (mg/s) | 2       | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| uos                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.01    | (mg/s) | 0.04    | (mg/s) | 0.33    | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.06    | (mg/s) | 0.29    | (mg/s) | 2.04    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conv<br>flux ti<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Closure   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Chloride  |          |          |        |
|           |   |          | -        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 10       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| ü u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 3.97E+00 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl    | ow     |
|----------------------------|---|----------|---------|--------|-----------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | _       | (mg/s) | 3,568.63  | (mg/s) | 40,514     | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 43.81   | (mg/s) | 43.81     | (mg/s) | 43.81      | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 93.39     | (mg/s) | 93.39      | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 17,412.99 | (mg/s) | 198,816    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 214.46  | (mg/s) | 214.46    | (mg/s) | 214.46     | (mg/s) |
| u Xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 335.09    | (mg/s) | 335.09     | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 45.80   | (mg/s) | 194.68    | (mg/s) | 194.68     | (mg/s) |
| n ve<br>mas                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 82.56   | (mg/s) | 82.56     | (mg/s) | 82.56      | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 483.24  | (mg/s) | 2,054.29  | (mg/s) | 2,054.29   | (mg/s) |
|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl    | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 43.81   | (mg/s) | 3,705.83  | (mg/s) | 40,651.48  | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 869.87  | (mg/s) | 23,999.89 | (mg/s) | 242,348.54 | (mg/s) |
|                            |   |          | Low Flo | w      | Average   | Flow   | High Fl    | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 1.800   | (mg/L) | 9.489     | (mg/L) | 9.951      | (mg/L) |
| Conv<br>flux t<br>conce    | concentration in river at PM-13                             | C_r13 =  | 4.901   | (mg/L) | 9.789     | (mg/L) | 9.979      | (mg/L) |

| Case<br>Parameter | Closure<br>Cobalt   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =  | 0.0006      | (ma/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| ů pr              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.002707554 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
| L S               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| nt                | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| 별                 | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.21    | (mg/s) | 2       | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.04    | (mg/s) | 12      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.13    | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.03    | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.15    | (mg/s) | 0.15    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| oalance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.25    | (mg/s) | 2.46    | (mg/s) |
| Mass I<br>at eacl          | mass flux in river at PM-13                                 | M_r13 =  | 0.22    | (mg/s) | 1.73    | (mg/s) | 14.84   | (mg/s) |
|                            |   |          | Low Flo | W      | Average | Flow   | High Fl | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |
| Conv<br>filux ti<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |

| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Copper  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| , pr      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.014116893 | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.004       | (mg/L) |

|  |   |          | Low Flo | w       | Average | Flow     |   | High Fl | ow       |
|--|---|----------|---------|---------|---------|----------|---|---------|----------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s)  | 0.54    | (mg/s)   |   | 6       | (mg/s)   |
| _                                      | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s)  | 0.10    | (mg/s)   |   | 0.10    | (mg/s)   |
| ntration                               | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s)  | 0.01    | (mg/s)   |   | 0.01    | (mg/s)   |
|  | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s)  | 2.61    | (mg/s)   |   | 30      | (mg/s)   |
| cen                                    | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s)  | 0.48    | (mg/s)   |   | 0.48    | (mg/s)   |
| uo:                                    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s)  | 0.19    | (mg/s)   |   | 0.19    | (mg/s)   |
| ert e<br>ss f                          | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.16    | (mg/s)  | 0.69    | (mg/s)   |   | 0.69    | (mg/s)   |
| mag                                    | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s)  | 0.00    | (mg/s)   |   | 0.00    | (mg/s)   |
| ទ ប័                                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.10    | (mg/s)  | 0.43    | (mg/s)   |   | 0.43    | (mg/s)   |
|  |   |          | Low Flo | w       | Average | Flow     |   | High Fl | ow       |
| is balance<br>ach node                 | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s)  | 0.65    | (mg/s)   |   | 6.19    | (mg/s)   |
| Mas<br>ate                             | mass flux in river at PM-13                                 | M r13 =  | 0.84    | (mg/s)  | 5.06    | (mg/s)   |   | 37.81   | (mg/s)   |
|  |   |          | Low Flo | w       | Average | Flow     |   | High Fl | ow       |
| convert mass<br>lux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L)  | 0.002   | (mg/L)   |   | 0.002   | (mg/L)   |
| 040                                    | concentration in river at PW-13                             | U_F13 =  | 0.005   | (Ing/L) | 0.002   | (IIIg/L) | 1 | 0.002   | (IIIg/L) |

| Case      | Closure   |          |          |        |
|-----------|---|----------|----------|--------|
| Parameter | Fluoride  |          |          |        |
|           |   |          |          |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.14E+00 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s) | 9.37    | (mg/s) | 9.37     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s) | 45.87   | (mg/s) | 45.87    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.04    | (mg/s) | 7.04     | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 13.10   | (mg/s) | 55.70   | (mg/s) | 55.70    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.13    | (mg/s) | 0.13    | (mg/s) | 0.13     | (mg/s) |
| <u>۽</u> ڳ                 | mass flux in seepage from cell 2W                           | M_s2w =  | 34.77   | (mg/s) | 147.83  | (mg/s) | 147.83   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| llance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 9.37    | (mg/s) | 45.99   | (mg/s) | 415.45   | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 103.25  | (mg/s) | 476.69  | (mg/s) | 2,660.18 | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L) | 0.118   | (mg/L) | 0.102    | (mg/L) |
| Conv<br>flux ti<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.582   | (mg/L) | 0.194   | (mg/L) | 0.110    | (mg/L) |

| Case<br>Parameter | Closure   |          |             |        |
|-------------------|---|----------|-------------|--------|
| i didileter       |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| p c               | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 9.94E-02    | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
|                   | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                           |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
|---------------------------|---|----------|---------|--------|----------|--------|-----------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90 | (mg/s) | 11,749    | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85     | (mg/s) | 0.85      | (mg/s) |
| ation                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08    | (mg/s) | 27.08     | (mg/s) |
| Itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77 | (mg/s) | 57,657    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17     | (mg/s) | 4.17      | (mg/s) |
| uos                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13     | (mg/s) | 2.13      | (mg/s) |
| ert o<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.15    | (mg/s) | 4.87     | (mg/s) | 4.87      | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.02    | (mg/s) | 0.02     | (mg/s) | 0.02      | (mg/s) |
| ۹ ٽ<br>۲                  | mass flux in seepage from cell 2W                           | M_s2w =  | 103.06  | (mg/s) | 438.13   | (mg/s) | 438.13    | (mg/s) |
|                           |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| balance<br>node           | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | 1,062.84 | (mg/s) | 11,777.08 | (mg/s) |
| Mass k<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 109.25  | (mg/s) | 6,561.92 | (mg/s) | 69,883.03 | (mg/s) |
|                           |   |          | Low Flo | w      | Average  | Flow   | High Fl   | ow     |
| ert mass<br>ortration     | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | 2.721    | (mg/L) | 2.883     | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.616   | (mg/L) | 2.676    | (mg/L) | 2.877     | (mg/L) |

| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Hardness  |          |             |        |
| -         |   | -        |             | -      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| βρι       | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 402         | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8610        | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|                                   |   |          | Low Flo   | w      | Average     | Flow   | High Fl      | ow     |
|-----------------------------------|---|----------|-----------|--------|-------------|--------|--------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,980.41   | (mg/s) | 283,600      | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,129.58    | (mg/s) | 2,129.58     | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) | 653.73      | (mg/s) | 653.73       | (mg/s) |
| Itra                              | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121,890.93  | (mg/s) | 1,391,712    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) | 10,425.01   | (mg/s) | 10,425.01    | (mg/s) |
| u xn                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,090.84   | (mg/s) | 53,090.84    | (mg/s) |
| ert e<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 4,633.95  | (mg/s) | 19,699.16   | (mg/s) | 19,699.16    | (mg/s) |
| n ve<br>mas                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 403.90    | (mg/s) | 403.90      | (mg/s) | 403.90       | (mg/s) |
| ទ បំ                              | mass flux in seepage from cell 2W                           | M_s2w =  | 9,794.98  | (mg/s) | 41,638.98   | (mg/s) | 41,638.98    | (mg/s) |
|                                   |   |          | Low Flo   | w      | Average     | Flow   | High Fl      | ow     |
| balance<br>node                   | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | 27,763.72   | (mg/s) | 286,383.27   | (mg/s) |
| Mass b<br>at each                 | mass flux in river at PM-13                                 | M_r13 =  | 27,387.42 | (mg/s) | 274,912.54  | (mg/s) | 1,803,353.09 | (mg/s) |
|                                   |   |          | Low Flo   | W      | <br>Average | Flow   | High Fl      | ow     |
| nvert mass<br>< to<br>icentration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) | <br>71.091  | (mg/L) | 70.104       | (mg/L) |
| Col                               | concentration in river at PM-13                             | C_r13 =  | 154.306   | (mg/L) | 112.131     | (mg/L) | 74.253       | (mg/L) |

| Case      | Closure   |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   |          |       |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| , p u     | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 21.31 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| dul       | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|                                   |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
|-----------------------------------|---|----------|---------|--------|-----------|--------|-----------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39  | (mg/s) | 14,990    | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94     | (mg/s) | 38.94     | (mg/s) |
| ation                             | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.08    | (mg/s) | 0.08      | (mg/s) | 0.08      | (mg/s) |
| Itra                              | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81  | (mg/s) | 73,562    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 190.63    | (mg/s) | 190.63    | (mg/s) |
| u Xn                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 34.55     | (mg/s) | 34.55     | (mg/s) |
| ert e<br>ss f                     | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,029.85  | (mg/s) | 3,029.85  | (mg/s) |
| mag                               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 245.57  | (mg/s) | 1,043.93  | (mg/s) | 1,043.93  | (mg/s) |
| <u>۽</u> ڳ                        | mass flux in seepage from cell 2W                           | M_s2w =  | 174.32  | (mg/s) | 741.03    | (mg/s) | 741.03    | (mg/s) |
|                                   |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| llance<br>node                    | mass flux in river at PM-12                                 | M_r12 =  | 39.03   | (mg/s) | 1,359.42  | (mg/s) | 15,029.31 | (mg/s) |
| Mass ba<br>at each                | mass flux in river at PM-13                                 | M_r13 =  | 649.54  | (mg/s) | 12,842.22 | (mg/s) | 93,631.22 | (mg/s) |
|                                   |   |          | Low Flo | w      | Average   | Flow   | High Fl   | ow     |
| nvert mass<br>t to<br>icentration | concentration in river at PM-12                             | C_r12 =  | 1.603   | (mg/L) | 3.481     | (mg/L) | 3.679     | (mg/l) |
| Col                               | concentration in river at PM-13                             | C_r13 =  | 3.660   | (mg/L) | 5.238     | (mg/L) | 3.855     | (mg/l) |

| Case      | Closure   |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Magnesium   |          |        |        |
|           |   | -        |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 55.96  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
| Lo Lo     | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| 넵         | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|                                   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
|-----------------------------------|---|----------|----------|--------|-----------|--------|------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 2,141.18  | (mg/s) | 24,309     | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s) | 259.20    | (mg/s) | 259.20     | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 56.03     | (mg/s) | 56.03      | (mg/s) |
| trat                              | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 10,447.79 | (mg/s) | 119,290    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s) | 1,268.87  | (mg/s) | 1,268.87   | (mg/s) |
| u xn                              | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 15,261.91 | (mg/s) | 15,261.91  | (mg/s) |
| ert e<br>Ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 644.90   | (mg/s) | 2,741.51  | (mg/s) | 2,741.51   | (mg/s) |
| n ve<br>mas                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 9.99     | (mg/s) | 9.99      | (mg/s) | 9.99       | (mg/s) |
| ទ បំ                              | mass flux in seepage from cell 2W                           | M_s2w =  | 1,569.75 | (mg/s) | 6,673.11  | (mg/s) | 6,673.11   | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| lance<br>node                     | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s) | 2,456.41  | (mg/s) | 24,623.80  | (mg/s) |
| Mass ba<br>at each                | mass flux in river at PM-13                                 | M_r13 =  | 3,752.72 | (mg/s) | 38,859.59 | (mg/s) | 169,868.78 | (mg/s) |
|                                   |   |          | Low Flo  | w      | Average   | Flow   | High Fl    | ow     |
| nvert mass<br>c to<br>icentration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L) | 6.290     | (mg/l) | 6.028      | (mg/l) |
| Co Lino                           | concentration in river at PM-13                             | C_r13 =  | 21.144   | (mg/L) | 15.850    | (mg/l) | 6.994      | (mg/l) |

| Case<br>Parameter | Closure<br>Manganese  |          |      |        |
|-------------------|---|----------|------|--------|
|                   |   | -        |      |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| р<br>ц            | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.14 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| L L L             | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| rt                | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| 별                 | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|-------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 107.06  | (mg/s) | 1,215    | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 4.58    | (mg/s) | 4.58    | (mg/s) | 4.58     | (mg/s) |
| tior                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 2.80    | (mg/s) | 2.80     | (mg/s) |
| ıtra                          | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 522.39  | (mg/s) | 5,964    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 22.40   | (mg/s) | 22.40   | (mg/s) | 22.40    | (mg/s) |
| uo:                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 27.31   | (mg/s) | 27.31    | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.65    | (mg/s) | 7.03    | (mg/s) | 7.03     | (mg/s) |
| mag                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| <u>۽</u> ڳ                    | mass flux in seepage from cell 2W                           | M_s2w =  | 26.54   | (mg/s) | 112.82  | (mg/s) | 112.82   | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| alance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 4.58    | (mg/s) | 114.44  | (mg/s) | 1,222.81 | (mg/s) |
| Mass be<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 55.17   | (mg/s) | 806.39  | (mg/s) | 7,356.85 | (mg/s) |
|                               |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| /ert mass<br>:0<br>:entration | concentration in river at PM-12                             | C_r12 =  | 0.188   | (mg/L) | 0.293   | (mg/l) | 0.299    | (mg/l) |
| Conv<br>flux 1<br>conc        | concentration in river at PM-13                             | C_r13 =  | 0.311   | (mg/L) | 0.329   | (mg/l) | 0.303    | (mg/l) |

| Case      | Closure   |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Sodium  |          |        |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| 3 de      | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 26.63  | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| 법         | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl   | ow     |
|-------------------------------|---|----------|----------|--------|-----------|--------|-----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180    | (mg/s) |
| -                             | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.26    | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69     | (mg/s) |
| Itrai                         | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,586    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.80    | (mg/s) |
| uo:                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.88  | (mg/s) |
| ert e<br>ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 306.88   | (mg/s) | 1,304.55  | (mg/s) | 1,304.55  | (mg/s) |
| mas                           | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 11.96    | (mg/s) | 11.96     | (mg/s) | 11.96     | (mg/s) |
| ទ បំ                          | mass flux in seepage from cell 2W                           | M_s2w =  | 994.08   | (mg/s) | 4,225.89  | (mg/s) | 4,225.89  | (mg/s) |
|                               |   |          | Low Flo  | w      | Average I | Flow   | High Fl   | ow     |
| balance<br>ch node            | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94 | (mg/s) |
| Mass<br>at eac                | mass flux in river at PM-13                                 | M_r13 =  | 2,015.98 | (mg/s) | 20,351.60 | (mg/s) | 96,773.63 | (mg/s) |
|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl   | ow     |
| wert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.508     | (mg/l) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 11.358   | (mg/L) | 8.301     | (mg/l) | 3.985     | (mg/l) |

| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Nickel  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| р с<br>р  | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.005498724 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
|           | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---|---|----------|---------|--------|---------|--------|---------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.43    | (mg/s) | 5       | (mg/s) |
| _   | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
| tior  | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ıtra  | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.09    | (mg/s) | 24      | (mg/s) |
| cen   | mass flux of ground water into PM-13                        | M_g13 =  | 0.83    | (mg/s) | 0.83    | (mg/s) | 0.83    | (mg/s) |
| u si li xi li x | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.29    | (mg/s) | 0.29    | (mg/s) |
| ert o<br>ss f   | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.06    | (mg/s) | 0.27    | (mg/s) | 0.27    | (mg/s) |
| ma  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| <u>۽</u> ک  | mass flux in seepage from cell 2W                           | M_s2w =  | 0.15    | (mg/s) | 0.66    | (mg/s) | 0.66    | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| s balance<br>ich node   | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s) | 0.61    | (mg/s) | 5.04    | (mg/s) |
| Mas:<br>at ea   | mass flux in river at PM-13                                 | M_r13 =  | 1.23    | (mg/s) | 4.76    | (mg/s) | 30.96   | (mg/s) |
|   |   | -        | Low Flo | w      | Average | Flow   | High Fl | ow     |
| vert mass<br>to<br>centration   | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001   | (mg/L) |
| Con<br>flux<br>conc   | concentration in river at PM-13                             | C_r13 =  | 0.007   | (mg/L) | 0.002   | (mg/L) | 0.001   | (mg/L) |

| Case      | Closure   |          |            |        |
|-----------|---|----------|------------|--------|
| Parameter | Lead  |          |            |        |
|           |   |          |            |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0          | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0          | (mg/L) |
| , p u     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0          | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003     | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00095888 | (mg/L) |
| ICEI      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005     | (mg/L) |
| cou       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012     | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 0.0012     | (mg/L) |
| du        | concentration of ground water into PM-13                        | C_g13 =  | 0.0012     | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| -                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s) | 0.14    | (mg/s) | 0.14    | (mg/s) |
|                                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.05    | (mg/s) | 0.05    | (mg/s) |
| mas                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.03    | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| s balance<br>ich node                | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| Mas:<br>at ea                        | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ix to<br>incentration | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| č≓ S                                 | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Closure<br>Antimony   |                      |          |        |
|-------------------|---|----------------------|----------|--------|
|                   | concentration of surface water into PM 12                       | C e12 -              | 2 00E 05 | (mg/L) |
| fa                | concentration of surface water into PM-12                       | C_\$12 =<br>C \$13 = | 2.00E-05 | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab =             | 2.00E-05 | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit =             | 2.50E-04 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =               | 1.16E-03 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =              | 0.004    | (mg/L) |
| 5                 | concentration in tailings basin cell 2W                         | C_s2w =              | 2.50E-04 | (mg/L) |
| rt (              | concentration of ground water into PM-12                        | C_g12 =              | 1.50E-03 | (mg/L) |
| 1                 | concentration of ground water into PM-13                        | C_g13 =              | 1.50E-03 | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.01    | (mg/s) | 0       | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itrai                                | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 0.18    | (mg/s) | 0.18    | (mg/s) | 0.18    | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.01    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s) | 0.02    | (mg/s) | 0.02    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ss balance<br>ach node               | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.12    | (mg/s) |
| Ma:<br>ate                           | mass flux in river at PM-13                                 | M_r13 =  | 0.23    | (mg/s) | 0.35    | (mg/s) | 0.79    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| onvert mass<br>ux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| o ∓ o                                | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Closure<br>Selenium   |          |             |        |
|-------------------|---|----------|-------------|--------|
| -                 |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| ip u              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.003346354 | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| cou               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| 법                 | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                            |   |          | Low Flo  | w      | Average      | Flow   | High Fl   | ow     |
|----------------------------|---|----------|----------|--------|--------------|--------|-----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.11         | (mg/s) | 1         | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.07     | (mg/s) | 0.07         | (mg/s) | 0.07      | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.00         | (mg/s) | 0.00      | (mg/s) |
| ıtra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 0.52         | (mg/s) | 6         | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.35     | (mg/s) | 0.35         | (mg/s) | 0.35      | (mg/s) |
| nos                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.09         | (mg/s) | 0.09      | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.04     | (mg/s) | 0.16         | (mg/s) | 0.16      | (mg/s) |
| mas                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00         | (mg/s) | 0.00      | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02     | (mg/s) | 0.10         | (mg/s) | 0.10      | (mg/s) |
|                            |   |          | Low Flow |        | Average Flow |        | High Flow |        |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.07     | (mg/s) | 0.18         | (mg/s) | 1.29      | (mg/s) |
| Mass ba<br>at each         | mass flux in river at PM-13                                 | M_r13 =  | 0.49     | (mg/s) | 1.42         | (mg/s) | 7.97      | (mg/s) |
|                            |   |          | Low Flo  | w      | Average      | Flow   | High Fl   | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.003    | (mg/L) | 0.000        | (mg/L) | 0.000     | (mg/L) |
| Conv<br>flux t             | concentration in river at PM-13                             | C_r13 =  | 0.003    | (mg/L) | 0.001        | (mg/L) | 0.000     | (mg/L) |

| Case      | Closure   |          |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
|           |   |          |         |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 176.50  | (mg/L) |
| Cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
|           | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|                                |   |          | Low Flo  | w      | Average      | Flow   | High Fl    | ow     |
|--------------------------------|---|----------|----------|--------|--------------|--------|------------|--------|
|                                | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,427.45     | (mg/s) | 16,206     | (mg/s) |
| _                              | mass flux of ground water into PM-12                        | M_g12 =  | 206.87   | (mg/s) | 206.87       | (mg/s) | 206.87     | (mg/s) |
| tion                           | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 37.36        | (mg/s) | 37.36      | (mg/s) |
| Itra                           | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,965.20     | (mg/s) | 79,526     | (mg/s) |
| cen                            | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72 | (mg/s) | 1,012.72     | (mg/s) | 1,012.72   | (mg/s) |
| u Xn                           | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 58,922.60    | (mg/s) | 58,922.60  | (mg/s) |
| ert o<br>ss f                  | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2,034.18 | (mg/s) | 8,647.39     | (mg/s) | 8,647.39   | (mg/s) |
| n ve<br>mas                    | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 344.66   | (mg/s) | 344.66       | (mg/s) | 344.66     | (mg/s) |
| ទ បំ                           | mass flux in seepage from cell 2W                           | M_s2w =  | 3,419.05 | (mg/s) | 14,534.54    | (mg/s) | 14,534.54  | (mg/s) |
|                                |   |          | Low Flow |        | Average Flow |        | High Flow  |        |
| lass balance<br>t each node    | mass flux in river at PM-12                                 | M_r12 =  | 206.87   | (mg/s) | 1,671.68     | (mg/s) | 16,449.94  | (mg/s) |
| a,                             | mass flux in river at PM-13                                 | M_r13 =  | 7,017.47 | (mg/s) | 92,098.78    | (mg/s) | 179,438.24 | (mg/s) |
|                                |   | 1        | LOW FIO  | w      | Average      | FIOW   | High Fi    | ow     |
| ivert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 8.500    | (mg/L) | 4.280        | (mg/l) | 4.027      | (mg/l) |
| Cor<br>flux<br>con             | concentration in river at PM-13                             | C_r13 =  | 39.538   | (mg/L) | 37.565       | (mg/l) | 7.388      | (mg/l) |

| Case<br>Parameter | Closure<br>Thallium   |                      |             |        |
|-------------------|---|----------------------|-------------|--------|
|                   | encoded in a faurine under inte DM 40                           | 0 - 10 -             | 0.0000      | (      |
| ta                | concentration of surface water into PM-12                       | C_\$12 =<br>C_\$13 = | 0.0002      | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab =             | 0.0002      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit =             | 0.0006      | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =               | 0.000106288 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =              | 0.0002      | (mg/L) |
| Con               | concentration in tailings basin cell 2W                         | C_s2w =              | 0.0002      | (mg/L) |
| rt (              | concentration of ground water into PM-12                        | C_g12 =              | 0.000004    | (mg/L) |
| 별                 | concentration of ground water into PM-13                        | C_g13 =              | 0.000004    | (mg/L) |

|  |   |          | Low Flo  | w      | Average      | Flow   |   | High Fl   | ow     |
|--|---|----------|----------|--------|--------------|--------|---|-----------|--------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 0.07         | (mg/s) |   | 1         | (mg/s) |
| _                                      | mass flux of ground water into PM-12                        | M_g12 =  | 0.00     | (mg/s) | 0.00         | (mg/s) |   | 0.00      | (mg/s) |
| tion                                   | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.00         | (mg/s) |   | 0.00      | (mg/s) |
| Itrai                                  | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 0.35         | (mg/s) |   | 4         | (mg/s) |
| cen                                    | mass flux of ground water into PM-13                        | M_g13 =  | 0.00     | (mg/s) | 0.00         | (mg/s) |   | 0.00      | (mg/s) |
| uo:                                    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.03         | (mg/s) |   | 0.03      | (mg/s) |
| ert e<br>ss f                          | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00     | (mg/s) | 0.01         | (mg/s) |   | 0.01      | (mg/s) |
| mag                                    | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.00         | (mg/s) |   | 0.00      | (mg/s) |
| ទ ប័                                   | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00     | (mg/s) | 0.02         | (mg/s) |   | 0.02      | (mg/s) |
|  |   |          | Low Flow |        | Average Flow |        |   | High Flow |        |
| ss balance<br>ach node                 | mass flux in river at PM-12                                 | M_r12 =  | 0.00     | (mg/s) | <br>0.07     | (mg/s) |   | 0.81      | (mg/s) |
| Ma:<br>ate                             | mass flux in river at PM-13                                 | M_r13 =  | 0.01     | (mg/s) | 0.48         | (mg/s) |   | 4.85      | (mg/s) |
|  |   |          | Low Flo  | w      | Average      | Flow   |   | High Fl   | ow     |
| convert mass<br>lux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.000    | (mg/L) | 0.000        | (mg/L) |   | 0.000     | (mg/L) |
| 0 = 0                                  | concentration in river at Pivi-13                           | C_F13 =  | 0.000    | (mg/L) | 0.000        | (mg/L) | I | 0.000     | (mg/L) |

| Case      | Closure   |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Zinc  |          |             |        |
|           |   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
| i p u     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.012754048 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| <u>d</u>  | concentration of ground water into PM-13                        | C_g13 =  | 0.0115      | (mg/L) |

|                            |   |          | Low Flo  | w      | Averag | e Flow       |  | High Fl | ow     |
|----------------------------|---|----------|----------|--------|--------|--------------|--|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 5.7    | l (mg/s)     |  | 65      | (mg/s) |
| -                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.28     | (mg/s) | 0.2    | B (mg/s)     |  | 0.28    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 0.1    | ō (mg/s)     |  | 0.15    | (mg/s) |
| itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 27.8   | 6 (mg/s)     |  | 318     | (mg/s) |
| ncer<br>K                  | mass flux of ground water into PM-13                        | M_g13 =  | 1.37     | (mg/s) | 1.3    | (mg/s)       |  | 1.37    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 0.1    | (mg/s)       |  | 0.17    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.15     | (mg/s) | 0.6    | 2 (mg/s)     |  | 0.62    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00     | (mg/s) | 0.0    | ) (mg/s)     |  | 0.00    | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.32     | (mg/s) | 1.3    | 7 (mg/s)     |  | 1.37    | (mg/s) |
|                            |   |          | Low Flow |        | Averag | Average Flow |  | High Fl | ow     |
| alance<br>node             | mass flux in river at PM-12                                 | M_r12 =  | 0.28     | (mg/s) | 6.1    | 4 (mg/s)     |  | 65.25   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 2.12     | (mg/s) | 37.5   | 3 (mg/s)     |  | 386.89  | (mg/s) |
|                            |   |          | Low Flo  | w      | Averag | e Flow       |  | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.012    | (mg/L) | 0.01   | 6 (mg/L)     |  | 0.016   | (mg/L) |
| Conve<br>flux to<br>concer | concentration in river at PM-13                             | C_r13 =  | 0.012    | (mg/L) | 0.01   | 5 (mg/L)     |  | 0.016   | (mg/L) |

Appendix F.15 Embarrass River Geotechnical Mitigation Post-Closure

### FLOWS

| Case             | Post-Closure                                   |            |      |       |       |
|------------------|--|------------|------|-------|-------|
| Flows            | Low Flow Conditions (no surface runoff)        |            |      |       | Node  |
| in<br>s River    | flow in river at PM-12                         | Q_r12_L =  | 0.86 | (cfs) | PM-12 |
| low<br>'ras:     | flow in river at PM-13                         | Q_r13_L =  | 6.27 | (cfs) | PM-13 |
| Total f<br>Embar | flow check                                     | Q_ck_L =   | 6.27 | (cfs) |       |
|                  | surface water flow into PM-12                  | Q_s12_L =  | 0.00 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_L =  | 0.00 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_L = | 0.00 | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_L = | 0.00 | (cfs) | PM-13 |
| Ita              | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_L =   | 0.67 | (cfs) | PM-13 |
| v da             | hydrometallurgical residue cells liner leakage | Q_rrs_L =  | 0.00 | (cfs) | PM-13 |
| flov             | seepage from cell 2W                           | Q_s2w_L =  | 0.53 | (cfs) | PM-13 |
| out              | ground water flow into PM-12                   | Q_g12_L =  | 0.86 | (cfs) | PM-12 |
| Ing              | ground water flow into PM-13                   | Q_g13_L =  | 4.21 | (cfs) | PM-13 |

| Case               | Post-Closure                                   |                    |       |       |       |
|--------------------|--|--------------------|-------|-------|-------|
| Flow               | Average Flow Conditions (mean annual)          |                    |       |       |       |
| n<br>River         | flow in river at PM-12                         | Q_r12_M =          | 13.80 | (cfs) | PM-12 |
| l flow i<br>arrass | flow in river at PM-13                         | Q_r13_M =          | 84.61 | (cfs) | PM-13 |
| Total<br>Embi      | flow check                                     | Q_ck_M =           | 84.61 | (cfs) |       |
|                    | surface water flow into PM-12                  | 0 s12 M =          | 12.61 | (cfs) | PM-12 |
|                    | surface water flow into PM-13                  | Q_ <u>\$12_M</u> = | 61.53 | (cfs) | PM-13 |
|                    | Babbitt WWTP discharge                         | Q sBab M =         | 0.33  | (cfs) | PM-12 |
|                    | Area 5 Pit NW discharge                        | Q_spit_M =         | 1.99  | (cfs) | PM-13 |
| ta                 | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_M =           | 1.73  | (cfs) | PM-13 |
| out flow da        | hydrometallurgical residue cells liner leakage | Q_rrs_M =          | 0.00  | (cfs) | PM-13 |
|                    | seepage from cell 2W                           | Q_s2w_M =          | 1.35  | (cfs) | PM-13 |
|                    | ground water flow into PM-12                   | Q_g12_M =          | 0.86  | (cfs) | PM-12 |
| dul                | ground water flow into PM-13                   | Q_g13_M =          | 4.21  | (cfs) | PM-13 |

| Case             | Post-Closure                                   |            |        |       |       |
|------------------|--|------------|--------|-------|-------|
| Flow             | High Flow Conditions (avg. annual 1-day ma     | ax flow)   |        |       |       |
| n<br>River       | flow in river at PM-12                         | Q_r12_H =  | 144.35 | (cfs) | PM-12 |
| flow i<br>arrass | flow in river at PM-13                         | Q_r13_H =  | 856.16 | (cfs) | PM-13 |
| Total<br>Emba    | flow check                                     | Q_ck_H =   | 856.16 | (cfs) |       |
|                  | surface water flow into PM-12                  | Q_s12_H =  | 143.16 | (cfs) | PM-12 |
|                  | surface water flow into PM-13                  | Q_s13_H =  | 702.53 | (cfs) | PM-13 |
|                  | Babbitt WWTP discharge                         | Q_sBab_H = | 0.33   | (cfs) | PM-12 |
|                  | Area 5 Pit NW discharge                        | Q_spit_H = | 1.99   | (cfs) | PM-13 |
| ta               | seepage from Tailings Basin Cells 1E and 2E    | Q_fs_H =   | 1.73   | (cfs) | PM-13 |
| , da             | hydrometallurgical residue cells liner leakage | Q_rrs_H =  | 0.00   | (cfs) | PM-13 |
| lo v             | seepage from cell 2W                           | Q_s2w_H =  | 1.35   | (cfs) | PM-13 |
| rt T             | ground water flow into PM-12                   | Q_g12_H =  | 0.86   | (cfs) | PM-12 |
| au               | ground water flow into PM-13                   | Q q13 H =  | 4.21   | (cfs) | PM-13 |

| Case<br>Parameter | Post-Closure<br>Silver  |             |          |        |
|-------------------|---|-------------|----------|--------|
|                   | concentration of surface water into PM-12                       | C s12 =     | 0.00011  | (mg/L) |
| ata               | concentration of surface water into PM-13                       | <br>C_s13 = | 0.00011  | (mg/L) |
| sh r              | concentration in Babbitt WWTP discharge                         | C_sBab =    | 0.00011  | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =    | 0.00015  | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =      | 0.00124  | (mg/L) |
| Icer              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =     | 0.000125 | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =     | 0.000100 | (mg/L) |
| or t              | concentration of ground water into PM-12                        | C_g12 =     | 0.00008  | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =     | 0.00008  | (mg/L) |

|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---|---|----------|---------|--------|---------|--------|---------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| itrai                                   | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.19    | (mg/s) | 2       | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| uo Xnj                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
| ma                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ដ ប្                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ss balance<br>sach node                 | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.45    | (mg/s) |
| Ma<br>at e                              | mass flux in river at PM-13                                 | M_r13 =  | 0.03    | (mg/s) | 0.31    | (mg/s) | 2.71    | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Paramotor | Post-Closure  |          |          |        |
|-------------------|---|----------|----------|--------|
| Faranieler        | Adminum   |          |          |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| ů pr              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.01325  | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 6.15E-01 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80E-01 | (mg/L) |
| - S               | concentration in tailings basin cell 2W                         | C_s2w =  | 1.5788   | (mg/L) |
| nt                | concentration of ground water into PM-12                        | C_g12 =  | 0.025    | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.025    | (mg/L) |

|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|--------------------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                                      | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                                    | mass flux of ground water into PM-12                        | M_g12 =  | 0.61    | (mg/s) | 0.61    | (mg/s) | 0.61     | (mg/s) |
| tion                                 | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itra                                 | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                                  | mass flux of ground water into PM-13                        | M_g13 =  | 2.98    | (mg/s) | 2.98    | (mg/s) | 2.98     | (mg/s) |
| uo:                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.75    | (mg/s) | 0.75     | (mg/s) |
| ert e<br>ss f                        | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 11.73   | (mg/s) | 30.13   | (mg/s) | 30.13    | (mg/s) |
| mag                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01     | (mg/s) |
| <u>۹</u> ۵                           | mass flux in seepage from cell 2W                           | M_s2w =  | 23.49   | (mg/s) | 60.32   | (mg/s) | 60.32    | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| iss balance<br>each node             | mass flux in river at PM-12                                 | M_r12 =  | 0.61    | (mg/s) | 37.23   | (mg/s) | 406.69   | (mg/s) |
| Ma                                   | mass flux in river at PM-13                                 | M_r13 =  | 38.82   | (mg/s) | 305.54  | (mg/s) | 2,489.02 | (mg/s) |
|                                      |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| onvert mass<br>ix to<br>incentration | concentration in river at PM-12                             | C_r12 =  | 0.025   | (mg/L) | 0.095   | (mg/L) | 0.100    | (mg/L) |
| S ≣ S                                | concentration in river at PM-13                             | C_r13 =  | 0.219   | (mg/L) | 0.128   | (mg/L) | 0.103    | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Arsenic   |  |             |        |
|-------------------|---|--|-------------|--------|
|                   | concentration of ourface water into DM 12                       | C a12 -  | 0.00075     | (mg/l) |
| ta                | concentration of surface water into PM-12                       | $C_{s12} = C_{s13} = C_{s$ | 0.00075     | (mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab =   | 0.00075     | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =   | 0.001325    | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.027915158 | (mg/L) |
| Cei               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.004       | (mg/L) |
| L S               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00291     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.00273     | (mg/L) |
| u<br>u            | concentration of ground water into PM-13                        | C_g13 =  | 0.00273     | (mg/L) |

|                           |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|-----------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.27      | (mg/s) | 3       | (mg/s) |
| -                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07      | (mg/s) | 0.07    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01      | (mg/s) | 0.01    | (mg/s) |
| itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.31      | (mg/s) | 15      | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.33    | (mg/s) | 0.33      | (mg/s) | 0.33    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.07      | (mg/s) | 0.07    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.53    | (mg/s) | 1.37      | (mg/s) | 1.37    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00      | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.04    | (mg/s) | 0.11      | (mg/s) | 0.11    | (mg/s) |
|                           |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
| alance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.34      | (mg/s) | 3.11    | (mg/s) |
| Mass ba<br>at each        | mass flux in river at PM-13                                 | M_r13 =  | 0.97    | (mg/s) | 3.53      | (mg/s) | 19.90   | (mg/s) |
|                           |   |          | Low Flo | w      | Average   | Flow   | High Fl | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | <br>0.001 | (mg/L) | 0.001   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.005   | (mg/L) | 0.001     | (mg/L) | 0.001   | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Boron   |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.012       | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.012       | (mg/L) |
| p c               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.012       | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.1315      | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.150573845 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.11        | (mg/L) |
| - S               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.33        | (mg/L) |
| t                 | concentration of ground water into PM-12                        | C_g12 =  | 0.0212      | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.0212      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 4.28    | (mg/s) | 49      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.52    | (mg/s) | 0.52    | (mg/s) | 0.52    | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.11    | (mg/s) | 0.11    | (mg/s) |
| entra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 20.90   | (mg/s) | 239     | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 2.53    | (mg/s) | 2.53    | (mg/s) | 2.53    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.41    | (mg/s) | 7.41    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.87    | (mg/s) | 7.38    | (mg/s) | 7.38    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ۹ ٽ<br>۲                   | mass flux in seepage from cell 2W                           | M_s2w =  | 4.91    | (mg/s) | 12.61   | (mg/s) | 12.61   | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>n node           | mass flux in river at PM-12                                 | M_r12 =  | 0.52    | (mg/s) | 4.91    | (mg/s) | 49.25   | (mg/s) |
| Mass b<br>at each          | mass flux in river at PM-13                                 | M_r13 =  | 10.83   | (mg/s) | 55.73   | (mg/s) | 317.75  | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.021   | (mg/L) | 0.013   | (mg/L) | 0.012   | (mg/L) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 0.061   | (mg/L) | 0.023   | (mg/L) | 0.013   | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Barium  |          |          |        |
|-------------------|---|----------|----------|--------|
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.011    | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.011    | (mg/L) |
| sh r              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.011    | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0044   | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.95E-02 | (mg/L) |
| cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 5.00E-03 | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.09298  | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.0681   | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 0.0681   | (mg/L) |

|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-----------------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 3.93    | (mg/s) | 45      | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 1.66    | (mg/s) | 1.66    | (mg/s) | 1.66    | (mg/s) |
| tion                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| Itra                              | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 19.15   | (mg/s) | 219     | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 8.11    | (mg/s) | 8.11    | (mg/s) | 8.11    | (mg/s) |
| uos                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.25    | (mg/s) | 0.25    | (mg/s) |
| ert e<br>ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.37    | (mg/s) | 0.95    | (mg/s) | 0.95    | (mg/s) |
| mag                               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ۹ ٽ<br>۲                          | mass flux in seepage from cell 2W                           | M_s2w =  | 1.38    | (mg/s) | 3.55    | (mg/s) | 3.55    | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| t balance<br>ch node              | mass flux in river at PM-12                                 | M_r12 =  | 1.66    | (mg/s) | 5.69    | (mg/s) | 46.33   | (mg/s) |
| Mass<br>at ea                     | mass flux in river at PM-13                                 | M_r13 =  | 11.53   | (mg/s) | 37.71   | (mg/s) | 277.89  | (mg/s) |
|                                   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| nvert mass<br>t to<br>icentration | concentration in river at PM-12                             | C_r12 =  | 0.068   | (mg/L) | 0.015   | (mg/L) | 0.011   | (mg/L) |
| Cor<br>Cor<br>Cor                 | concentration in river at PM-13                             | C_r13 =  | 0.065   | (mg/L) | 0.016   | (mg/L) | 0.011   | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Beryllium                                       |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   | •   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0001      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0001      | (mg/L) |
| u di              | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0001      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001323498 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0           | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00075     | (mg/L) |
| ort .             | concentration of ground water into PM-12                        | C_g12 =  | 0.000023    | (mg/L) |
| <u>u</u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.000023    | (mg/L) |

|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|-----------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                             | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.04    | (mg/s) | 0       | (mg/s) |
| -                           | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| tior                        | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| itra                        | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.17    | (mg/s) | 2       | (mg/s) |
| cen                         | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| con                         | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>ss f               | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.03    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
| ma                          | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | -       | (mg/s) | -       | (mg/s) | -       | (mg/s) |
| ម ប័ ម                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.01    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
|                             |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| t balance<br>ch node        | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.04    | (mg/s) | 0.41    | (mg/s) |
| Mass<br>at ea               | mass flux in river at PM-13                                 | M_r13 =  | 0.04    | (mg/s) | 0.31    | (mg/s) | 2.50    | (mg/s) |
|                             |   |          | LOW FIO | w      | Average | FIOW   | High Fi | ow     |
| rert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conv<br>flux t<br>conc      | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Calcium   |                       |             |                  |
|-------------------|---|-----------------------|-------------|------------------|
|                   | encontration of ourfease water into DM 40                       | 0 -10 -               | 10          | (                |
| ta                | concentration of surface water into PM-12                       | $C_{s12} = C_{s13} =$ | 13          | (mg/L)<br>(mg/L) |
| n da              | concentration in Babbitt WWTP discharge                         | C_sBab =              | 13          | (mg/L)           |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =              | 95.35       | (mg/L)           |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =                | 68.73996034 | (mg/L)           |
| Cel               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =               | 416         | (mg/L)           |
| LO LO             | concentration in tailings basin cell 2W                         | C_s2w =               | 59.78       | (mg/L)           |
| et .              | concentration of ground water into PM-12                        | C_g12 =               | 19          | (mg/L)           |
| u du              | concentration of ground water into PM-13                        | C_g13 =               | 19          | (mg/L)           |

|                           |   |          | Low Flo  | w      | Averag   | e Flow       |  | High Fl    | ow     |
|---------------------------|---|----------|----------|--------|----------|--------------|--|------------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 4,639.2  | 2 (mg/s)     |  | 52,669     | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 462.42   | (mg/s) | 462.4    | 2 (mg/s)     |  | 462.42     | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 121.4    | l (mg/s)     |  | 121.41     | (mg/s) |
| Itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 22,636.8 | ) (mg/s)     |  | 258,461    | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 2,263.72 | (mg/s) | 2,263.7  | 2 (mg/s)     |  | 2,263.72   | (mg/s) |
| u Xn                      | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 5,369.8  | 3 (mg/s)     |  | 5,369.83   | (mg/s) |
| ert e<br>Ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,311.63 | (mg/s) | 3,367.9  | ) (mg/s)     |  | 3,367.90   | (mg/s) |
| n ve<br>mas               | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 19.51    | (mg/s) | 19.5     | l (mg/s)     |  | 19.51      | (mg/s) |
| ដ                         | mass flux in seepage from cell 2W                           | M_s2w =  | 889.46   | (mg/s) | 2,283.8  | ) (mg/s)     |  | 2.80       | (mg/s) |
|                           |   |          | Low Flo  | w      | Averag   | Average Flow |  | High Flow  |        |
| balance<br>h node         | mass flux in river at PM-12                                 | M_r12 =  | 462.42   | (mg/s) | 5,223.0  | 5 (mg/s)     |  | 53,252.39  | (mg/s) |
| Mass  <br>at eac          | mass flux in river at PM-13                                 | M_r13 =  | 4,946.75 | (mg/s) | 41,164.7 | 3 (mg/s)     |  | 322,736.94 | (mg/s) |
|                           |   |          | LOW FIO  | W      | Averag   | e Flow       |  | High Fi    | ow     |
| rt mass<br>tration        | concentration in river at PM-12                             | C_r12 =  | 19.000   | (mg/L) | 13.37    | 4 (mg/l)     |  | 13.036     | (mg/l) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 27.871   | (mg/L) | 17.19    | l (mg/l)     |  | 13.320     | (mg/l) |

| Case      | Post-Closure  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Cadmium   | l        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.00008     | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.00008     | (mg/L) |
| ů pu      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.00008     | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0001      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.001182282 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0004      | (mg/L) |
| L S       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.000188    | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.0003      | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 0.0003      | (mg/L) |

|  |   |          | Low Flo | w      | Average | Flow   | High Fl   | ow     |
|--|---|----------|---------|--------|---------|--------|-----------|--------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.03    | (mg/s) | 0         | (mg/s) |
| -                                      | mass flux of ground water into PM-12                        | M_g12 =  | 0.01    | (mg/s) | 0.01    | (mg/s) | 0.01      | (mg/s) |
| tior                                   | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00      | (mg/s) |
| itra                                   | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.14    | (mg/s) | 2         | (mg/s) |
| cen                                    | mass flux of ground water into PM-13                        | M_g13 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04      | (mg/s) |
| con con                                | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01      | (mg/s) |
| ert o<br>ss f                          | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.06    | (mg/s) | 0.06      | (mg/s) |
| ma en                                  | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00      | (mg/s) |
| ទ ប័ ទ                                 | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.01    | (mg/s) | 0.01      | (mg/s) |
|  |   |          | Low Flo | w      | Average | Flow   | High Fl   | ow     |
| s balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.01    | (mg/s) | 0.04    | (mg/s) | 0.33      | (mg/s) |
| Mas<br>at e                            | mass flux in river at PM-13                                 | M r13 =  | 0.07    | (ma/s) | 0.28    | (ma/s) | 2.03      | (ma/s) |
|  |   | 1        | Low Flo | w      | Average | Flow   | High Fl   | ow     |
| convert mass<br>lux to<br>oncentration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | <br>0.000 | (mg/L) |
| 0 = 0                                  | concentration in river at Pivi-13                           | C_F13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000     | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Chloride  |          |          |        |
|-------------------|---|----------|----------|--------|
|                   | concentration of surface water into DM 40                       | 0 -10 -  | 10       | (      |
|                   | concentration of surface water into PM-12                       | C_\$12 = | 10       | (mg/L) |
| ati               | concentration of surface water into PM-13                       | C_s13 =  | 10       | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 10       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 5.95     | (mg/L) |
| Itra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 3.97E+00 | (mg/L) |
| Cel               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.76E+03 | (mg/L) |
| co                | concentration in tailings basin cell 2W                         | C_s2w =  | 21.54    | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 1.8      | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 1.8      | (mg/L) |

|                                   |   |          | Low Flo | w      | Average      | Flow   | High Fl    | ow     |
|-----------------------------------|---|----------|---------|--------|--------------|--------|------------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | _       | (mg/s) | 3,568.63     | (mg/s) | 40,514     | (mg/s) |
| -                                 | mass flux of ground water into PM-12                        | M_g12 =  | 43.81   | (mg/s) | 43.81        | (mg/s) | 43.81      | (mg/s) |
| tior                              | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 93.39        | (mg/s) | 93.39      | (mg/s) |
| ntra                              | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 17,412.99    | (mg/s) | 198,816    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 214.46  | (mg/s) | 214.46       | (mg/s) | 214.46     | (mg/s) |
| uo:                               | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 335.09       | (mg/s) | 335.09     | (mg/s) |
| ert e<br>ss f                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 75.82   | (mg/s) | 194.68       | (mg/s) | 194.68     | (mg/s) |
| ma                                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 82.56   | (mg/s) | 82.56        | (mg/s) | 82.56      | (mg/s) |
| ទ ប័                              | mass flux in seepage from cell 2W                           | M_s2w =  | 320.49  | (mg/s) | 822.94       | (mg/s) | 822.94     | (mg/s) |
|                                   |   |          | Low Flo | w      | Average      | Flow   | High Fl    | ow     |
| s balance<br>sch node             | mass flux in river at PM-12                                 | M_r12 =  | 43.81   | (mg/s) | <br>3,705.83 | (mg/s) | 40,651.48  | (mg/s) |
| Mas:<br>at ea                     | mass flux in river at PM-13                                 | M_r13 =  | 737.14  | (mg/s) | 22,768.54    | (mg/s) | 241,117.19 | (mg/s) |
|                                   |   |          | Low Flo | w      | Average      | Flow   | High Fl    | ow     |
| nvert mass<br>c to<br>icentration | concentration in river at PM-12                             | C_r12 =  | 1.800   | (mg/L) | <br>9.489    | (mg/L) | <br>9.951  | (mg/L) |
| Col Col                           | concentration in river at PM-13                             | C_r13 =  | 4.153   | (mg/L) | 9.509        | (mg/L) | 9.951      | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Cobalt  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.0006      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.0006      | (mg/L) |
| p c               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0006      | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.000555    | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.002707554 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.005       | (mg/L) |
|                   | concentration in tailings basin cell 2W                         | C_s2w =  | 0.001556    | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.0011      | (mg/L) |
| 법                 | concentration of ground water into PM-13                        | C_g13 =  | 0.0011      | (mg/L) |

|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---|---|----------|---------|--------|---------|--------|---------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.21    | (mg/s) | 2       | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| tio                                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ıtra                                    | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 1.04    | (mg/s) | 12      | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 0.13    | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
| uo Xnj                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03    | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.05    | (mg/s) | 0.13    | (mg/s) | 0.13    | (mg/s) |
| ma                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ដ ប្                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ss balance<br>sach node                 | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.25    | (mg/s) | 2.46    | (mg/s) |
| Ma<br>at e                              | mass flux in river at PM-13                                 | M_r13 =  | 0.23    | (mg/s) | 1.65    | (mg/s) | 14.75   | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.001   | (mg/L) | 0.001   | (mg/L) |

| Case      | Post-Closure  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | Copper  |          |             |        |
|           |   | r        |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0015      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0015      | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0015      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.00345     | (mg/L) |
| Itra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.014116893 | (mg/L) |
| Cel       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0015      | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 0.004555    | (mg/L) |
| et .      | concentration of ground water into PM-12                        | C_g12 =  | 0.004       | (mg/L) |
| 별         | concentration of ground water into PM-13                        | C_g13 =  | 0.004       | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | _       | (mg/s) | 0.54    | (mg/s) | 6       | (mg/s) |
| _                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.10    | (mg/s) | 0.10    | (mg/s) | 0.10    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ntra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.61    | (mg/s) | 30      | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.48    | (mg/s) | 0.48    | (mg/s) | 0.48    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.19    | (mg/s) | 0.19    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.27    | (mg/s) | 0.69    | (mg/s) | 0.69    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ຊ ິ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.07    | (mg/s) | 0.17    | (mg/s) | 0.17    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| balance<br>th node        | mass flux in river at PM-12                                 | M_r12 =  | 0.10    | (mg/s) | 0.65    | (mg/s) | 6.19    | (mg/s) |
| Mass<br>at eac            | mass flux in river at PM-13                                 | M_r13 =  | 0.91    | (mg/s) | 4.80    | (mg/s) | 37.55   | (mg/s) |
|                           |   |          | LOW FIO | w      | Average | FIOW   | High Fi | ow     |
| rt mass<br>tration        | concentration in river at PM-12                             | C_r12 =  | 0.004   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.005   | (mg/L) | 0.002   | (mg/L) | 0.002   | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Fluoride  |          |          |        |
|-------------------|---|----------|----------|--------|
|                   |   |          |          |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.1      | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.1      | (mg/L) |
| р<br>ц            | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.1      | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.125    | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 1.14E+00 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 2.85E+00 | (mg/L) |
| - S               | concentration in tailings basin cell 2W                         | C_s2w =  | 1.55     | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 0.385    | (mg/L) |
| 비                 | concentration of ground water into PM-13                        | C_g13 =  | 0.385    | (mg/L) |

|   |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|---|---|----------|---------|--------|---------|--------|----------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 35.69   | (mg/s) | 405      | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 9.37    | (mg/s) | 9.37    | (mg/s) | 9.37     | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.93    | (mg/s) | 0.93     | (mg/s) |
| Itra                                    | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 174.13  | (mg/s) | 1,988    | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 45.87   | (mg/s) | 45.87   | (mg/s) | 45.87    | (mg/s) |
| uo:                                     | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 7.04    | (mg/s) | 7.04     | (mg/s) |
| ert e<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 21.69   | (mg/s) | 55.70   | (mg/s) | 55.70    | (mg/s) |
| mag                                     | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.13    | (mg/s) | 0.13    | (mg/s) | 0.13     | (mg/s) |
| ۹ ٽ<br>۲                                | mass flux in seepage from cell 2W                           | M_s2w =  | 23.06   | (mg/s) | 59.22   | (mg/s) | 59.22    | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| s balance<br>ach node                   | mass flux in river at PM-12                                 | M_r12 =  | 9.37    | (mg/s) | 45.99   | (mg/s) | 415.45   | (mg/s) |
| Mas<br>ate                              | mass flux in river at PM-13                                 | M r13 =  | 100.13  | (ma/s) | 388.09  | (ma/s) | 2.571.57 | (ma/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl  | low    |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 0.385   | (mg/L) | 0.118   | (mg/L) | 0.102    | (mg/L) |
| Case<br>Parameter | Post-Closure<br>Iron  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 2.9         | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 2.9         | (mg/L) |
| р<br>р            | concentration in Babbitt WWTP discharge                         | C_sBab = | 2.9         | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.037761905 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 9.94E-02    | (mg/L) |
| Cei               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 4.00E-01    | (mg/L) |
| L S               | concentration in tailings basin cell 2W                         | C_s2w =  | 4.594       | (mg/L) |
| ot                | concentration of ground water into PM-12                        | C_g12 =  | 0.035       | (mg/L) |
| du                | concentration of ground water into PM-13                        | C_g13 =  | 0.035       | (mg/L) |

|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl       | ow     |
|----------------------------|---|----------|---------|--------|----------|--------|---------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,034.90 | (mg/s) | 11,749        | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.85    | (mg/s) | 0.85     | (mg/s) | 0.85          | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 27.08    | (mg/s) | 27.08         | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 5,049.77 | (mg/s) | 57,657        | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 4.17    | (mg/s) | 4.17     | (mg/s) | 4.17          | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 2.13     | (mg/s) | 2.13          | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1.90    | (mg/s) | 4.87     | (mg/s) | 4.87          | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.02    | (mg/s) | 0.02     | (mg/s) | 0.02          | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 68.35   | (mg/s) | 175.51   | (mg/s) | 175.51        | (mg/s) |
|                            |   |          | Low Flo | w      | Average  | Flow   | High Fl       | ow     |
| balance<br>ch node         | mass flux in river at PM-12                                 | M_r12 =  | 0.85    | (mg/s) | 1,062.84 | (mg/s) | 11,777.08     | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 75.29   | (mg/s) | 6,299.30 | (mg/s) | <br>69,620.41 | (mg/s) |
|                            |   |          | LOWIIO  | ~~     | Average  | 110₩   | Tigitti       | 0      |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.035   | (mg/L) | 2.721    | (mg/L) | 2.883         | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.424   | (mg/L) | 2.631    | (mg/L) | 2.873         | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Hardness  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   |          |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 70          | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 70          | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 70          | (mg/L) |
| ţi                | concentration in Area 5 Pit NW discharge                        | C_spit = | 942.7142857 | (mg/L) |
| ıtra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 4.02E+02    | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 8.61E+03    | (mg/L) |
|                   | concentration in tailings basin cell 2W                         | C_s2w =  | 436.6       | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 87.5        | (mg/L) |
| du du             | concentration of ground water into PM-13                        | C_g13 =  | 87.5        | (mg/L) |

|                            |   |          | Low Flo   | W      | A    | verage | Flow   | High Fl      | ow     |
|----------------------------|---|----------|-----------|--------|------|--------|--------|--------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -         | (mg/s) | 24,  | 980.41 | (mg/s) | 283,600      | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 2,129.58  | (mg/s) | 2,   | 129.58 | (mg/s) | 2,129.58     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -         | (mg/s) |      | 653.73 | (mg/s) | 653.73       | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -         | (mg/s) | 121, | 890.93 | (mg/s) | 1,391,712    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 10,425.01 | (mg/s) | 10,  | 425.01 | (mg/s) | 10,425.01    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -         | (mg/s) | 53,  | 090.84 | (mg/s) | 53,090.84    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 7,671.85  | (mg/s) | 19,  | 699.16 | (mg/s) | 19,699.16    | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 403.90    | (mg/s) |      | 403.90 | (mg/s) | 403.90       | (mg/s) |
| <u>د</u> ې                 | mass flux in seepage from cell 2W                           | M_s2w =  | 6,496.16  | (mg/s) | 16,  | 680.30 | (mg/s) | 16,680.30    | (mg/s) |
|                            |   |          | Low Flo   | w      | A    | verage | Flow   | High Fl      | ow     |
| balance<br>ch node         | mass flux in river at PM-12                                 | M_r12 =  | 2,129.58  | (mg/s) | 27,  | 763.72 | (mg/s) | 286,383.27   | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 27,126.50 | (mg/s) | 249  | 953.86 | (mg/s) | 1,778,394.41 | (mg/s) |
|                            |   |          | LOWIN     | vv     |      | verage | 110₩   | <br>ngirri   | 0w     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 87.500    | (mg/L) |      | 71.091 | (mg/L) | 70.104       | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 152.836   | (mg/L) | 1    | 04.385 | (mg/L) | 73.398       | (mg/L) |

| Case      | Post-Closure  |          |       |        |
|-----------|---|----------|-------|--------|
| Parameter | Potassium   |          |       |        |
|           |   | -        |       |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 3.70  | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 3.70  | (mg/L) |
| р<br>ц    | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.70  | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 53.80 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 21.31 | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 1.80  | (mg/L) |
| - S       | concentration in tailings basin cell 2W                         | C_s2w =  | 7.77  | (mg/L) |
| rt        | concentration of ground water into PM-12                        | C_g12 =  | 1.60  | (mg/L) |
| <u>u</u>  | concentration of ground water into PM-13                        | C_g13 =  | 1.60  | (mg/L) |

|                                   |   |          | Low Flo | w      | Average      | Flow   | High Fl   | ow     |
|-----------------------------------|---|----------|---------|--------|--------------|--------|-----------|--------|
|                                   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 1,320.39     | (mg/s) | 14,990    | (mg/s) |
| _                                 | mass flux of ground water into PM-12                        | M_g12 =  | 38.94   | (mg/s) | 38.94        | (mg/s) | 38.94     | (mg/s) |
| tion                              | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.08    | (mg/s) | 0.08         | (mg/s) | 0.08      | (mg/s) |
| Itrai                             | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 6,442.81     | (mg/s) | 73,562    | (mg/s) |
| cen                               | mass flux of ground water into PM-13                        | M_g13 =  | 190.63  | (mg/s) | 190.63       | (mg/s) | 190.63    | (mg/s) |
|                                   | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 34.55        | (mg/s) | 34.55     | (mg/s) |
| ert o<br>ss f                     | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 3,029.85     | (mg/s) | 3,029.85  | (mg/s) |
| n ve<br>ma:                       | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 406.56  | (mg/s) | 1,043.93     | (mg/s) | 1,043.93  | (mg/s) |
| ទ ប្                              | mass flux in seepage from cell 2W                           | M_s2w =  | 115.61  | (mg/s) | 296.85       | (mg/s) | 296.85    | (mg/s) |
|                                   |   |          | Low Flo | w      | Average      | Flow   | High Fl   | ow     |
| s balance<br>ch node              | mass flux in river at PM-12                                 | M_r12 =  | 39.03   | (mg/s) | <br>1,359.42 | (mg/s) | 15,029.31 | (mg/s) |
| Mass<br>at ea                     | mass flux in river at PM-13                                 | M_r13 =  | 751.82  | (mg/s) | 12,398.04    | (mg/s) | 93,187.04 | (mg/s) |
|                                   |   |          | Low Flo | w      | Average      | Flow   | High Fl   | ow     |
| nvert mass<br>x to<br>ncentration | concentration in river at PM-12                             | C_r12 =  | 1.603   | (mg/L) | 3.481        | (mg/L) | 3.679     | (mg/l) |
| C II C                            | concentration in river at PM-13                             | C_r13 =  | 4.236   | (mg/L) | 5.178        | (mg/L) | 3.846     | (mg/l) |

| Case      | Post-Closure  |          |        |        |
|-----------|---|----------|--------|--------|
| Parameter | Magnesium   |          |        |        |
|           |   |          |        | 1      |
|           | concentration of surface water into PM-12                       | C_s12 =  | 6.00   | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 6.00   | (mg/L) |
| p c       | concentration in Babbitt WWTP discharge                         | C_sBab = | 6.00   | (mg/L) |
| ţi        | concentration in Area 5 Pit NW discharge                        | C_spit = | 271.00 | (mg/L) |
| ıtra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 55.96  | (mg/L) |
| ICE       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 213.00 | (mg/L) |
|           | concentration in tailings basin cell 2W                         | C_s2w =  | 69.97  | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 10.65  | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 10.65  | (mg/L) |

|   |   |          | Low Flo  | w      | Average      | Flow   | High Fl    | ow     |
|---|---|----------|----------|--------|--------------|--------|------------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 2,141.18     | (mg/s) | 24,309     | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 259.20   | (mg/s) | 259.20       | (mg/s) | 259.20     | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 56.03        | (mg/s) | 56.03      | (mg/s) |
| Itra                                    | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 10,447.79    | (mg/s) | 119,290    | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 1,268.87 | (mg/s) | 1,268.87     | (mg/s) | 1,268.87   | (mg/s) |
| li n                                    | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 15,261.91    | (mg/s) | 15,261.91  | (mg/s) |
| ssfo                                    | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 1,067.68 | (mg/s) | 2,741.51     | (mg/s) | 2,741.51   | (mg/s) |
| n ve<br>ma:                             | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 9.99     | (mg/s) | 9.99         | (mg/s) | 9.99       | (mg/s) |
| ទ បំ                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 1,041.08 | (mg/s) | 2,673.20     | (mg/s) | 2,673.20   | (mg/s) |
|   |   |          | Low Flo  | W      | Average      | Flow   | High Fl    | ow     |
| ss balance<br>sach node                 | mass flux in river at PM-12                                 | M_r12 =  | 259.20   | (mg/s) | <br>2,456.41 | (mg/s) | 24,623.80  | (mg/s) |
| Ma:<br>ate                              | mass flux in river at PM-13                                 | M_r13 =  | 3,646.83 | (mg/s) | 34,859.69    | (mg/s) | 165,868.88 | (mg/s) |
|   |   |          | Low Flo  | w      | Average      | Flow   | High Fl    | ow     |
| Convert mass<br>lux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 10.650   | (mg/L) | 6.290        | (mg/l) | 6.028      | (mg/l) |

| Case      | Post-Closure  |          |      |        |
|-----------|---|----------|------|--------|
| Parameter | Manganese   |          |      |        |
|           |   | -        |      |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.30 | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.30 | (mg/L) |
| u di      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.30 | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.49 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.14 | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.00 | (mg/L) |
| con       | concentration in tailings basin cell 2W                         | C_s2w =  | 1.18 | (mg/L) |
| put       | concentration of ground water into PM-12                        | C_g12 =  | 0.19 | (mg/L) |
| u du      | concentration of ground water into PM-13                        | C_g13 =  | 0.19 | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 107.06  | (mg/s) | 1,215    | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 4.58    | (mg/s) | 4.58    | (mg/s) | 4.58     | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 2.80    | (mg/s) | 2.80     | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 522.39  | (mg/s) | 5,964    | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 22.40   | (mg/s) | 22.40   | (mg/s) | 22.40    | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 27.31   | (mg/s) | 27.31    | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 2.74    | (mg/s) | 7.03    | (mg/s) | 7.03     | (mg/s) |
| mas                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 17.60   | (mg/s) | 45.20   | (mg/s) | 45.20    | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 4.58    | (mg/s) | 114.44  | (mg/s) | 1,222.81 | (mg/s) |
| Mass  <br>at eac           | mass flux in river at PM-13                                 | M_r13 =  | 47.32   | (mg/s) | 738.77  | (mg/s) | 7,289.23 | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.188   | (mg/L) | 0.293   | (mg/l) | 0.299    | (mg/l) |
| Conv<br>flux to<br>conce   | concentration in river at PM-13                             | C_r13 =  | 0.267   | (mg/L) | 0.309   | (mg/l) | 0.301    | (mg/l) |

| Case<br>Parameter | Post-Closure<br>Sodium  |          |        |        |
|-------------------|---|----------|--------|--------|
|                   |   |          | -      |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 3.50   | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 3.50   | (mg/L) |
| , p u             | concentration in Babbitt WWTP discharge                         | C_sBab = | 3.50   | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 119.50 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 26.63  | (mg/L) |
| Cer               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 255.00 | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =  | 44.31  | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =  | 4.90   | (mg/L) |
| dul               | concentration of ground water into PM-13                        | C_g13 =  | 4.90   | (mg/L) |

|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl   | ow     |
|-------------------------------|---|----------|----------|--------|-----------|--------|-----------|--------|
|                               | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,249.02  | (mg/s) | 14,180    | (mg/s) |
| _                             | mass flux of ground water into PM-12                        | M_g12 =  | 119.26   | (mg/s) | 119.26    | (mg/s) | 119.26    | (mg/s) |
| tion                          | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 32.69     | (mg/s) | 32.69     | (mg/s) |
| Itra                          | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,094.55  | (mg/s) | 69,586    | (mg/s) |
| cen                           | mass flux of ground water into PM-13                        | M_g13 =  | 583.80   | (mg/s) | 583.80    | (mg/s) | 583.80    | (mg/s) |
| u Xn                          | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 6,729.88  | (mg/s) | 6,729.88  | (mg/s) |
| ert e<br>Ss f                 | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 508.06   | (mg/s) | 1,304.55  | (mg/s) | 1,304.55  | (mg/s) |
| n ve<br>mas                   | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 11.96    | (mg/s) | 11.96     | (mg/s) | 11.96     | (mg/s) |
| ទ បំ                          | mass flux in seepage from cell 2W                           | M_s2w =  | 659.29   | (mg/s) | 1,692.86  | (mg/s) | 1,692.86  | (mg/s) |
|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl   | ow     |
| llance<br>node                | mass flux in river at PM-12                                 | M_r12 =  | 119.26   | (mg/s) | 1,400.96  | (mg/s) | 14,331.94 | (mg/s) |
| Mass ba<br>at each            | mass flux in river at PM-13                                 | M_r13 =  | 1,882.37 | (mg/s) | 17,818.57 | (mg/s) | 94,240.60 | (mg/s) |
|                               |   |          | Low Flo  | w      | Average   | Flow   | High Fl   | ow     |
| vert mass<br>to<br>centration | concentration in river at PM-12                             | C_r12 =  | 4.900    | (mg/L) | 3.587     | (mg/l) | 3.508     | (mg/l) |
| Con<br>Con<br>con             | concentration in river at PM-13                             | C_r13 =  | 10.606   | (mg/L) | 7.441     | (mg/l) | 3.890     | (mg/l) |

| Case      | Post-Closure  |          |             |        |
|-----------|---|----------|-------------|--------|
| Parameter | NICKEI  |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0012      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0012      | (mg/L) |
| , p c     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0012      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0052      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.005498724 | (mg/L) |
| cer       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.098       | (mg/L) |
| cou       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00688     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.007       | (mg/L) |
| du du     | concentration of ground water into PM-13                        | C_g13 =  | 0.007       | (mg/L) |

|                            |   |          | Low Flo | w      | Average     | Flow   | High Fl    | ow     |
|----------------------------|---|----------|---------|--------|-------------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.43        | (mg/s) | 5          | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.17    | (mg/s) | 0.17        | (mg/s) | 0.17       | (mg/s) |
| tior                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.01        | (mg/s) | 0.01       | (mg/s) |
| itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 2.09        | (mg/s) | 24         | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.83    | (mg/s) | 0.83        | (mg/s) | 0.83       | (mg/s) |
| con                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.29        | (mg/s) | 0.29       | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.10    | (mg/s) | 0.27        | (mg/s) | 0.27       | (mg/s) |
| ma                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00        | (mg/s) | 0.00       | (mg/s) |
| ម ប័ ម                     | mass flux in seepage from cell 2W                           | M_s2w =  | 0.10    | (mg/s) | 0.26        | (mg/s) | 0.26       | (mg/s) |
|                            |   |          | Low Flo | w      | Average     | Flow   | High Fl    | ow     |
| balance<br>ch node         | mass flux in river at PM-12                                 | M_r12 =  | 0.17    | (mg/s) | <br>0.61    | (mg/s) | 5.04       | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 1.22    | (mg/s) | 4.36        | (mg/s) | 30.56      | (mg/s) |
|                            |   | -        | LOWING  | vv     | <br>Average | 1000   | <br>ngirri | 0w     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.007   | (mg/L) | 0.002       | (mg/L) | 0.001      | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.007   | (mg/L) | 0.002       | (mg/L) | 0.001      | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Lead  |          |            |        |
|-------------------|---|----------|------------|--------|
|                   |   |          |            |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0          | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0          | (mg/L) |
| р и               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0          | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0003     | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.00095888 | (mg/L) |
| ICE               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0005     | (mg/L) |
| - S               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0012     | (mg/L) |
| nt                | concentration of ground water into PM-12                        | C_g12 =  | 0.0012     | (mg/L) |
| 비                 | concentration of ground water into PM-13                        | C_g13 =  | 0.0012     | (mg/L) |

|                            |   |          | Low Flo | w      | Average     | Flow   | High Fl     | ow     |
|----------------------------|---|----------|---------|--------|-------------|--------|-------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | -           | (mg/s) | -           | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.03    | (mg/s) | 0.03        | (mg/s) | 0.03        | (mg/s) |
| ition                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | -           | (mg/s) | -           | (mg/s) |
| Itra                       | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | -           | (mg/s) | -           | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.14    | (mg/s) | 0.14        | (mg/s) | 0.14        | (mg/s) |
| u Xn                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.02        | (mg/s) | 0.02        | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.05        | (mg/s) | 0.05        | (mg/s) |
| n ve<br>mas                | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00        | (mg/s) | 0.00        | (mg/s) |
| ទ បំ                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.05        | (mg/s) | 0.05        | (mg/s) |
|                            |   |          | Low Flo | w      | Average     | Flow   | High Fl     | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.03    | (mg/s) | 0.03        | (mg/s) | 0.03        | (mg/s) |
| Mass I<br>at eacl          | mass flux in river at PM-13                                 | M_r13 =  | 0.21    | (mg/s) | 0.28        | (mg/s) | 0.28        | (mg/s) |
|                            |   | -        | Low Flo | W      | <br>Average | Flow   | <br>High Fl | ow     |
| rt mass<br>ntration        | concentration in river at PM-12                             | C_r12 =  | 0.001   | (mg/L) | 0.000       | (mg/L) | 0.000       | (mg/L) |
| Conve<br>flux to<br>concel | concentration in river at PM-13                             | C_r13 =  | 0.001   | (mg/L) | 0.000       | (mg/L) | 0.000       | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Antimony  |                      |          |        |
|-------------------|---|----------------------|----------|--------|
|                   | concentration of surface water into DM 12                       | C e12 -              | 2 00E 05 | (mg/L) |
| ta                | concentration of surface water into PM-12                       | C_\$12 =<br>C \$13 = | 2.00E-05 | (mg/L) |
| ן da              | concentration in Babbitt WWTP discharge                         | _<br>C_sBab =        | 2.00E-05 | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit =             | 2.50E-04 | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =               | 1.16E-03 | (mg/L) |
| ICEI              | concentration in hydrometallurgical residue cells liner leakage | C_rrs =              | 0.004    | (mg/L) |
| con               | concentration in tailings basin cell 2W                         | C_s2w =              | 2.50E-04 | (mg/L) |
| ort               | concentration of ground water into PM-12                        | C_g12 =              | 1.50E-03 | (mg/L) |
| u<br>l            | concentration of ground water into PM-13                        | C_g13 =              | 1.50E-03 | (mg/L) |

|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---|---|----------|---------|--------|---------|--------|---------|--------|
|   | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.01    | (mg/s) | 0       | (mg/s) |
| _                                       | mass flux of ground water into PM-12                        | M_g12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
| tion                                    | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| Itra                                    | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.03    | (mg/s) | 0       | (mg/s) |
| cen                                     | mass flux of ground water into PM-13                        | M_g13 =  | 0.18    | (mg/s) | 0.18    | (mg/s) | 0.18    | (mg/s) |
| u su l                                  | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
| ert o<br>ss f                           | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.02    | (mg/s) | 0.06    | (mg/s) | 0.06    | (mg/s) |
| ma                                      | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ដ ប្                                    | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.01    | (mg/s) | 0.01    | (mg/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| is balance<br>ach node                  | mass flux in river at PM-12                                 | M_r12 =  | 0.04    | (mg/s) | 0.04    | (mg/s) | 0.12    | (mg/s) |
| Mas<br>ate                              | mass flux in river at PM-13                                 | M r13 =  | 0.24    | (mg/s) | 0.34    | (mq/s) | 0.77    | (mq/s) |
|   |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| Convert mass<br>lux to<br>:oncentration | concentration in river at PM-12                             | C_r12 =  | 0.002   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |

| Case      | Post-Closure<br>Selenium  |          |             |        |
|-----------|---|----------|-------------|--------|
| Farameter | Seleman   |          |             |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 0.0003      | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 0.0003      | (mg/L) |
| ip u      | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0003      | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0016      | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.003346354 | (mg/L) |
| Cei       | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.054       | (mg/L) |
| cor       | concentration in tailings basin cell 2W                         | C_s2w =  | 0.00109     | (mg/L) |
| ort       | concentration of ground water into PM-12                        | C_g12 =  | 0.00295     | (mg/L) |
| ů de      | concentration of ground water into PM-13                        | C_g13 =  | 0.00295     | (mg/L) |

|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
|---------------------------|---|----------|---------|--------|---------|--------|---------|--------|
|                           | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.11    | (mg/s) | 1       | (mg/s) |
| -                         | mass flux of ground water into PM-12                        | M_g12 =  | 0.07    | (mg/s) | 0.07    | (mg/s) | 0.07    | (mg/s) |
| tion                      | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| itra                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.52    | (mg/s) | 6       | (mg/s) |
| cen                       | mass flux of ground water into PM-13                        | M_g13 =  | 0.35    | (mg/s) | 0.35    | (mg/s) | 0.35    | (mg/s) |
| uo:                       | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.09    | (mg/s) | 0.09    | (mg/s) |
| ert e<br>ss f             | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.06    | (mg/s) | 0.16    | (mg/s) | 0.16    | (mg/s) |
| mag                       | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00    | (mg/s) |
| ទ ប័                      | mass flux in seepage from cell 2W                           | M_s2w =  | 0.02    | (mg/s) | 0.04    | (mg/s) | 0.04    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| alance<br>node            | mass flux in river at PM-12                                 | M_r12 =  | 0.07    | (mg/s) | 0.18    | (mg/s) | 1.29    | (mg/s) |
| Mass ba<br>at each        | mass flux in river at PM-13                                 | M_r13 =  | 0.51    | (mg/s) | 1.35    | (mg/s) | 7.90    | (mg/s) |
|                           |   |          | Low Flo | w      | Average | Flow   | High Fl | ow     |
| ert mass<br>ntration      | concentration in river at PM-12                             | C_r12 =  | 0.003   | (mg/L) | 0.000   | (mg/L) | 0.000   | (mg/L) |
| Conve<br>flux to<br>conce | concentration in river at PM-13                             | C_r13 =  | 0.003   | (mg/L) | 0.001   | (mg/L) | 0.000   | (mg/L) |

| Case      | Post-Closure  |          |         |        |
|-----------|---|----------|---------|--------|
| Parameter | Sulfate   |          |         |        |
| -         |   | -        |         |        |
|           | concentration of surface water into PM-12                       | C_s12 =  | 4.00    | (mg/L) |
| ata       | concentration of surface water into PM-13                       | C_s13 =  | 4.00    | (mg/L) |
| p u       | concentration in Babbitt WWTP discharge                         | C_sBab = | 4.00    | (mg/L) |
| tio       | concentration in Area 5 Pit NW discharge                        | C_spit = | 1046.27 | (mg/L) |
| ntra      | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 176.50  | (mg/L) |
| ICel      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 7347.00 | (mg/L) |
| co        | concentration in tailings basin cell 2W                         | C_s2w =  | 152.40  | (mg/L) |
| ort .     | concentration of ground water into PM-12                        | C_g12 =  | 8.50    | (mg/L) |
| 넵         | concentration of ground water into PM-13                        | C_g13 =  | 8.50    | (mg/L) |

|  |   |          | Low Flo  | w      | Avera  | ge Flow   | High Fl    | ow     |
|--|---|----------|----------|--------|--------|-----------|------------|--------|
|  | mass flux of surface water into PM-12                       | M_s12 =  | -        | (mg/s) | 1,427  | 45 (mg/s) | 16,206     | (mg/s) |
| _  | mass flux of ground water into PM-12                        | M_g12 =  | 206.87   | (mg/s) | 206    | 87 (mg/s) | 206.87     | (mg/s) |
| tion                                     | mass flux in Babbitt WWTP discharge                         | M_sBab = | -        | (mg/s) | 37     | 36 (mg/s) | 37.36      | (mg/s) |
| Itra                                     | mass flux of surface water into PM-13                       | M_s13 =  | -        | (mg/s) | 6,965  | 20 (mg/s) | 79,526     | (mg/s) |
| cen                                      | mass flux of ground water into PM-13                        | M_g13 =  | 1,012.72 | (mg/s) | 1,012  | 72 (mg/s) | 1,012.72   | (mg/s) |
| li n                                     | mass flux of Area 5 Pit NW discharge                        | M_spit = | -        | (mg/s) | 58,922 | 60 (mg/s) | 58,922.60  | (mg/s) |
| ssfo                                     | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 3,367.73 | (mg/s) | 8,647  | 39 (mg/s) | 8,647.39   | (mg/s) |
| n ve<br>ma:                              | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 344.66   | (mg/s) | 344    | 66 (mg/s) | 344.66     | (mg/s) |
| ទ បំ                                     | mass flux in seepage from cell 2W                           | M_s2w =  | 2,267.55 | (mg/s) | 5,822  | 44 (mg/s) | 5,822.44   | (mg/s) |
|  |   |          | Low Flo  | W      | Avera  | ge Flow   | High Fl    | ow     |
| is balance<br>ach node                   | mass flux in river at PM-12                                 | M_r12 =  | 206.87   | (mg/s) | 1,671  | 68 (mg/s) | 16,449.94  | (mg/s) |
| Mas<br>at e                              | mass flux in river at PM-13                                 | M r13 =  | 7.199.53 | (ma/s) | 83.386 | 68 (ma/s) | 170.726.14 | (ma/s) |
|  |   |          | Low Flo  | w      | Avera  | ge Flow   | High Fl    | ow     |
| Convert mass<br>flux to<br>concentration | concentration in river at PM-12                             | C_r12 =  | 8.500    | (mg/L) | 4.2    | 80 (mg/l) | 4.027      | (mg/l) |

| Case                                     | Post-Closure  |          |             |        |
|--|---|----------|-------------|--------|
| Parameter                                | Inallium  | l        |             |        |
|  | concentration of surface water into PM-12                       | C_s12 =  | 0.0002      | (mg/L) |
| ata                                      | concentration of surface water into PM-13                       | C_s13 =  | 0.0002      | (mg/L) |
| , di                                     | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.0002      | (mg/L) |
| ţi                                       | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.0006      | (mg/L) |
| ıtra                                     | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.000106288 | (mg/L) |
| Cet                                      | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.0002      | (mg/L) |
| Lo L | concentration in tailings basin cell 2W                         | C_s2w =  | 0.0002      | (mg/L) |
| ort .                                    | concentration of ground water into PM-12                        | C_g12 =  | 0.000004    | (mg/L) |
| du                                       | concentration of ground water into PM-13                        | C_g13 =  | 0.000004    | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl    | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|------------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | -       | (mg/s) | 0.07    | (mg/s) | 1          | (mg/s) |
| _                          | mass flux of ground water into PM-12                        | M_g12 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00       | (mg/s) |
| tion                       | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.00    | (mg/s) | 0.00       | (mg/s) |
| Itrai                      | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 0.35    | (mg/s) | 4          | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00       | (mg/s) |
| uo:                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.03    | (mg/s) | 0.03       | (mg/s) |
| ert e<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.00    | (mg/s) | 0.01    | (mg/s) | 0.01       | (mg/s) |
| mag                        | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00       | (mg/s) |
| ទ ប័                       | mass flux in seepage from cell 2W                           | M_s2w =  | 0.00    | (mg/s) | 0.01    | (mg/s) | 0.01       | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl    | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.00    | (mg/s) | 0.07    | (mg/s) | 0.81       | (mg/s) |
| Mass  <br>at eac           | mass flux in river at PM-13                                 | M_r13 =  | 0.01    | (mg/s) | 0.47    | (mg/s) | 4.84       | (mg/s) |
|                            |   |          | LOWIN   | vv     | Average | 10.44  | <br>ngirri | 0w     |
| ert mass<br>o<br>intration | concentration in river at PM-12                             | C_r12 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000      | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.000   | (mg/L) | 0.000   | (mg/L) | 0.000      | (mg/L) |

| Case<br>Parameter | Post-Closure<br>Zinc  |          |             |        |
|-------------------|---|----------|-------------|--------|
|                   |   | -        |             |        |
|                   | concentration of surface water into PM-12                       | C_s12 =  | 0.016       | (mg/L) |
| ata               | concentration of surface water into PM-13                       | C_s13 =  | 0.016       | (mg/L) |
| p u               | concentration in Babbitt WWTP discharge                         | C_sBab = | 0.016       | (mg/L) |
| tio               | concentration in Area 5 Pit NW discharge                        | C_spit = | 0.003       | (mg/L) |
| ntra              | concentration in seepage from Tailings Basin Cells 1E and 2E    | C_fs =   | 0.012754048 | (mg/L) |
| Cei               | concentration in hydrometallurgical residue cells liner leakage | C_rrs =  | 0.01        | (mg/L) |
| COL               | concentration in tailings basin cell 2W                         | C_s2w =  | 0.01435     | (mg/L) |
| et .              | concentration of ground water into PM-12                        | C_g12 =  | 0.0115      | (mg/L) |
| <u> </u>          | concentration of ground water into PM-13                        | C_g13 =  | 0.0115      | (mg/L) |

|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
|----------------------------|---|----------|---------|--------|---------|--------|----------|--------|
|                            | mass flux of surface water into PM-12                       | M_s12 =  | _       | (mg/s) | 5.71    | (mg/s) | 65       | (mg/s) |
| Itration                   | mass flux of ground water into PM-12                        | M_g12 =  | 0.28    | (mg/s) | 0.28    | (mg/s) | 0.28     | (mg/s) |
|                            | mass flux in Babbitt WWTP discharge                         | M_sBab = | -       | (mg/s) | 0.15    | (mg/s) | 0.15     | (mg/s) |
|                            | mass flux of surface water into PM-13                       | M_s13 =  | -       | (mg/s) | 27.86   | (mg/s) | 318      | (mg/s) |
| cen                        | mass flux of ground water into PM-13                        | M_g13 =  | 1.37    | (mg/s) | 1.37    | (mg/s) | 1.37     | (mg/s) |
| con                        | mass flux of Area 5 Pit NW discharge                        | M_spit = | -       | (mg/s) | 0.17    | (mg/s) | 0.17     | (mg/s) |
| ert o<br>ss f              | mass flux in seepage from Tailings Basin Cells 1E and 2E    | M_fs =   | 0.24    | (mg/s) | 0.62    | (mg/s) | 0.62     | (mg/s) |
| ma                         | mass flux in hydrometallurgical residue cells liner leakage | M_rrs =  | 0.00    | (mg/s) | 0.00    | (mg/s) | 0.00     | (mg/s) |
| ម ប័ ម                     | mass flux in seepage from cell 2W                           | M_s2w =  | 0.21    | (mg/s) | 0.55    | (mg/s) | 0.55     | (mg/s) |
|                            |   |          | Low Flo | w      | Average | Flow   | High Fl  | ow     |
| balance<br>h node          | mass flux in river at PM-12                                 | M_r12 =  | 0.28    | (mg/s) | 6.14    | (mg/s) | 65.25    | (mg/s) |
| Mass<br>at eac             | mass flux in river at PM-13                                 | M_r13 =  | 2.11    | (mg/s) | 36.71   | (mg/s) | 386.07   | (mg/s) |
|                            |   |          | LOW FIU | w      | Average | FIOW   | підії гі | UW     |
| ert mass<br>o<br>entration | concentration in river at PM-12                             | C_r12 =  | 0.012   | (mg/L) | 0.016   | (mg/L) | 0.016    | (mg/L) |
| Conve<br>flux to<br>conce  | concentration in river at PM-13                             | C_r13 =  | 0.012   | (mg/L) | 0.015   | (mg/L) | 0.016    | (mg/L) |

# Appendix G

# Culpability Analysis of Plant Site, Tailings Basin and Embarrass River Watershed

# Tailings Basin - Proposed Action

| G.1 | Tailings Basin            |
|-----|---------------------------|
| G.2 | Embarrass River Watershed |

# Tailings Basin - Geotechnical Mitigation

| G.3 | Tailings Basin            |
|-----|---------------------------|
| G.4 | Embarrass River Watershed |

Appendix G.1 Tailings Basin Proposed Action

SO4, Year1, mass flux

# Proposed Action: Mass Flux (kg/year) of Tailings Basin Features in Year 1 for Sulfate (SO<sub>4</sub>)



SO4, Year 1, percent





SO4, Year 5, mass flux

# Proposed Action: Mass Flux (kg/year) of Tailings Basin Features in Year 5 for Sulfate (SO<sub>4</sub>)



SO4, Year 5, percent





SO4, Year 8, mass flux

# Proposed Action: Mass Flux (kg/year) of Tailings Basin Features in Year 8 for Sulfate (SO<sub>4</sub>)



SO4, Year 8, percent





SO4, Year 9, mass flux

# Proposed Action: Mass Flux (kg/year) of Tailings Basin Features in Year 9 for Sulfate (SO<sub>4</sub>)



SO4, Year 9, percent





SO4, Year 10, mass flux

# Proposed Action: Mass Flux (kg/year) of Tailings Basin Features in Year 10 for Sulfate $(SO_4)$







SO4, Year 15, mass flux









SO4, Year 20, mass flux

# Proposed Action: Mass Flux (kg/year) of Tailings Basin Features in Year 20 for Sulfate $(SO_4)$



SO4, Year 20, percent





SO4, Closure, mass flux





SO4, Closure, percent





Sb, Year 1, mass flux





Sb, Year 1, percent

# Proposed Action: Percent of Tailings Basin Features' Impacts in Year 1 for Antimony (Sb)



Sb, Year 5, mass flux





Sb, Year 5, percent





Sb, Year 8, mass flux




Sb, Year 8, percent





Sb, Year 9, mass flux





Sb, Year 9, percent





Sb, Year 10, mass flux

## Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 10 for Antimony (Sb)



Sb, Year 10, percent

## Proposed Action: Percent of Tailings Basin Features' Impacts in Year 10 for Antimony (Sb)



Sb, Year 15, mass flux

#### Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 15 for Antimony (Sb)



Sb, Year 15, percent





Sb, Year 20, mass flux

## Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 20 for Antimony (Sb)



Sb, Year 20, percent





Sb, Closure, mass flux

## Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Closure for Antimony (Sb)



Sb, Closure, percent

# Proposed Action: Percent of Tailings Basin Features' Impacts in Closure for Antimony (Sb)



As, Year 1, mass flux

## Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 1 for Arsenic (As)



As, Year 1, percent





As, Year 5, mass flux





As, Year 5, percent





As, Year 8, mass flux





As, Year 8, percent





As, Year 9, mass flux

# Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 9 for Arsenic (As)



As, Year 9, percent





As, Year 10, mass flux

# Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 10 for Arsenic (As)



As, Year 10, percent





As, Year 15, mass flux

# Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 15 for Arsenic (As)



As, Year 15, percent





As, Year 20, mass flux

## Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 20 for Arsenic (As)



As, Year 20, percent





As, Closure, mass flux





As, Closure, percent





Co, Year 1, mass flux

### Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 1 for Cobalt (Co)



Co, Year 1, percent





Co, Year 5, mass flux





Co, Year 5, percent





Co, Year 8, mass flux





Co, Year 8, percent





Co, Year 9, mass flux

### Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 9 for Cobalt (Co)



Co, Year 9, percent





Co, Year 10, mass flux

## Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 10 for Cobalt (Co)


Co, Year 10, percent





Co, Year 15, mass flux

### Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 15 for Cobalt (Co)







Co, Year 20, mass flux

### Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 20 for Cobalt (Co)



Co, Year 20, percent





Co, Closure, mass flux









Cu, Year 1, mass flux





Cu, Year 1, percent





Cu, Year 5, mass flux





Cu, Year 5, percent





Cu, Year 8, mass flux





Cu, Year 8, percent





Cu, Year 9, mass flux

## Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 9 for Copper (Cu)



Cu, Year 9, percent





Cu, Year 10, mass flux

# Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 10 for Copper (Cu)



Cu, Year 10, percent





Cu, Year 15, mass flux

## Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 15 for Copper (Cu)



Cu, Year 15, percent





Cu, Year 20, mass flux





Cu, Year 20, percent





Cu, Closure, mass flux

### Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Closure for Copper (Cu)



Cu, Closure, percent





Ni, Year 1, mass flux

### Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 1 for Nickel (Ni)



Ni, Year 1, percent

### Proposed Action: Percent of Tailings Basin Features' Impacts in Year 1 for Nickel (Ni)



Ni, Year 5, mass flux





Ni, Year 5, percent





Ni, Year 8, mass flux





Ni, Year 8, percent





Ni, Year 9, mass flux

## Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 9 for Nickel (Ni)



Ni, Year 9, percent





Ni, Year 10, mass flux

# Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 10 for Nickel (Ni)







Ni, Year 15, mass flux









Ni, Year 20, mass flux

#### Proposed Action: Mass Flux (g/year) of Tailings Basin Features in Year 20 for Nickel (Ni)






Ni, Closure, mass flux





Ni, Closure, percent





Appendix G.2 Embarrass River Watershed Proposed Action

#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Low Flow for Arsenic (As)



# Proposed Action: Percent of Impacts at PM-13 in Year 1 for Low Flow for Arsenic (As)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Average Flow for Arsenic (As)







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for High Flow for Arsenic (As)



# Proposed Action: Percent of Impacts at PM-13 in Year 1 for High Flow for Arsenic (As)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Low Flow for Cobalt (Co)







# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Average Flow for Cobalt (Co)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for High Flow for Cobalt (Co)



Proposed Action: Percent of Impacts at PM-13 in Year 1 for High Flow for Cobalt (Co)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Low Flow for Copper (Cu)



Proposed Action: Percent of Impacts at PM-13 in Year 1 for Low Flow for Copper (Cu)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Average Flow for Copper (Cu)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for High Flow for Copper (Cu)



Proposed Action: Percent of Impacts at PM-13 in Year 1 for High Flow for Copper (Cu)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Low Flow for Nickel (Ni)







# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Average Flow for Nickel (Ni)







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for High Flow for Nickel (Ni)



# Proposed Action: Percent of Impacts at PM-13 in Year 1 for High Flow for Nickel (Ni)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Low Flow for Antimony (Sb)







# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Average Flow for Antimony (Sb)







# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for High Flow for Antimony (Sb)



# Proposed Action: Percent of Impacts at PM-13 in Year 1 for High Flow for Antimony (Sb)



## Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 1 for Low Flow for Sulfate (SO<sub>4</sub>)






# Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 1 for Average Flow for Sulfate (SO<sub>4</sub>)



## Proposed Action: Percent of Impacts at PM-13 in Year 1 for Average Flow for Sulfate (SO<sub>4</sub>)



## Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 1 for High Flow for Sulfate (SO<sub>4</sub>)







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Low Flow for Arsenic (As)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Average Flow for Arsenic (As)







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for High Flow for Arsenic (As)



## Proposed Action: Percent of Impacts at PM-13 in Year 5 for High Flow for Arsenic (As)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Low Flow for Cobalt (Co)



# Proposed Action: Percent of Impacts at PM-13 in Year 5 for Low Flow for Cobalt (Co)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Average Flow for Cobalt (Co)







### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for High Flow for Cobalt (Co)



## Proposed Action: Percent of Impacts at PM-13 in Year 5 for High Flow for Cobalt (Co)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Low Flow for Copper (Cu)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Average Flow for Copper (Cu)







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for High Flow for Copper (Cu)



#### Proposed Action: Percent of Impacts at PM-13 in Year 5 for High Flow for Copper (Cu)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Low Flow for Nickel (Ni)



## Proposed Action: Percent of Impacts at PM-13 in Year 5 for Low Flow for Nickel (Ni)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Average Flow for Nickel (Ni)







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for High Flow for Nickel (Ni)



## Proposed Action: Percent of Impacts at PM-13 in Year 5 for High Flow for Nickel (Ni)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Low Flow for Antimony (Sb)



## Proposed Action: Percent of Impacts at PM-13 in Year 5 for Low Flow for Antimony (Sb)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Average Flow for Antimony(Sb)



# Proposed Action: Percent of Impacts at PM-13 in Year 5 for Average Flow for Antimony (Sb)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for High Flow for Antimony (Sb)



# Proposed Action: Percent of Impacts at PM-13 in Year 5 for High Flow for Antimony (Sb)



## Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 5 for Low Flow for Sulfate (SO<sub>4</sub>)



# Proposed Action: Percent of Impacts at PM-13 in Year 5 for Low Flow for Sulfate $(SO_4)$


## Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 5 for Average Flow for Sulfate (SO<sub>4</sub>)







# Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 5 for High Flow for Sulfate $(SO_4)$







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for Low Flow for Arsenic (As)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for Average Flow for Arsenic (As)







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for High Flow for Arsenic (As)



## Proposed Action: Percent of Impacts at PM-13 in Year 8 for High Flow for Arsenic (As)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for Low Flow for Cobalt (Co)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for Average Flow for Cobalt (Co)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for High Flow for Cobalt (Co)



## Proposed Action: Percent of Impacts at PM-13 in Year 8 for High Flow for Cobalt (Co)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for Low Flow for Copper (Cu)



#### Proposed Action: Percent of Impacts at PM-13 in Year 8 for Low Flow for Copper (Cu)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for Average Flow for Copper (Cu)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for High Flow for Copper (Cu)



#### Proposed Action: Percent of Impacts at PM-13 in Year 8 for High Flow for Copper (Cu)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for Low Flow for Nickel (Ni)



## Proposed Action: Percent of Impacts at PM-13 in Year 8 for Low Flow for Nickel (Ni)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for Average Flow for Nickel (Ni)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for High Flow for Nickel (Ni)



## Proposed Action: Percent of Impacts at PM-13 in Year 8 for High Flow for Nickel (Ni)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for Low Flow for Antimony (Sb)



## Proposed Action: Percent of Impacts at PM-13 in Year 8 for Low Flow for Antimony (Sb)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for Average Flow for Antimony (Sb)



## Proposed Action: Percent of Impacts at PM-13 in Year 8 for Average Flow for Antimony (Sb)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 8 for High Flow for Antimony (Sb)



## Proposed Action: Percent of Impacts at PM-13 in Year 8 for High Flow for Antimony (Sb)



# Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 8 for Low Flow for Sulfate $(SO_4)$






## Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 8 for Average Flow for Sulfate (SO<sub>4</sub>)







# Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 8 for High Flow for Sulfate $(SO_4)$







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for Low Flow for Arsenic (As)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for Average Flow for Arsenic (As)







### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for High Flow for Arsenic (As)



## Proposed Action: Percent of Impacts at PM-13 in Year 9 for High Flow for Arsenic (As)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for Low Flow for Cobalt (Co)



# Proposed Action: Percent of Impacts at PM-13 in Year 9 for Low Flow for Cobalt (Co)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for Average Flow for Cobalt (Co)







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for High Flow for Cobalt (Co)



## Proposed Action: Percent of Impacts at PM-13 in Year 9 for High Flow for Cobalt (Co)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for Low Flow for Copper (Cu)



## Proposed Action: Percent of Impacts at PM-13 in Year 9 for Low Flow for Copper (Cu)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for Average Flow for Copper (Cu)







### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for High Flow for Copper (Cu)



#### Proposed Action: Percent of Impacts at PM-13 in Year 9 for High Flow for Copper (Cu)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for Low Flow for Nickel (Ni)



# Proposed Action: Percent of Impacts at PM-13 in Year 9 for Low Flow for Nickel (Ni)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for Average Flow for Nickel (Ni)



# Proposed Action: Percent of Impacts at PM-13 in Year 9 for Average Flow for Nickel (Ni)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for High Flow for Nickel (Ni)



# Proposed Action: Percent of Impacts at PM-13 in Year 9 for High Flow for Nickel (Ni)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for Low Flow for Antimony (Sb)



# Proposed Action: Percent of Impacts at PM-13 in Year 9 for Low Flow for Antimony (Sb)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for Average Flow for Antimony (Sb)



# Proposed Action: Percent of Impacts at PM-13 in Year 9 for Average Flow for Antimony (Sb)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 9 for High Flow for Antimony (Sb)



# Proposed Action: Percent of Impacts at PM-13 in Year 9 for High Flow for Antimony (Sb)



## Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 9 for Low Flow for Sulfate (SO<sub>4</sub>)






## Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 9 for Average Flow for Sulfate (SO<sub>4</sub>)







# Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 9 for High Flow for Sulfate $(SO_4)$







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Low Flow for Arsenic (As)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Average Flow for Arsenic (As)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for Average Flow for Arsenic (As)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for High Flow for Arsenic (As)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for High Flow for Arsenic (As)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Low Flow for Cobalt (Co)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for Low Flow for Cobalt (Co)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Average Flow for Cobalt (Co)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for Average Flow for Cobalt (Co)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for High Flow for Cobalt (Co)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for High Flow for Cobalt (Co)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Low Flow for Copper (Cu)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for Low Flow for Copper (Cu)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Average Flow for Copper (Cu)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for Average Flow for Copper (Cu)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for High Flow for Copper (Cu)



#### Proposed Action: Percent of Impacts at PM-13 in Year 15 for High Flow for Copper (Cu)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Low Flow for Nickel (Ni)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for Low Flow for Nickel (Ni)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Average Flow for Nickel (Ni)



#### Proposed Action: Percent of Impacts at PM-13 in Year 15 for Average Flow for Nickel (Ni)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for High Flow for Nickel (Ni)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for High Flow for Nickel (Ni)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Low Flow for Antimony (Sb)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for Low Flow for Antimony (Sb)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Average Flow for Antimony (Sb)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for Average Flow for Antimony (Sb)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for High Flow for Antimony (Sb)



## Proposed Action: Percent of Impacts at PM-13 in Year 15 for High Flow for Antimony (Sb)



## Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 15 for Low Flow for Sulfate (SO<sub>4</sub>)



# Proposed Action: Percent of Impacts at PM-13 in Year 15 for Low Flow for Sulfate $(SO_4)$


# Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 15 for Average Flow for Sulfate (SO<sub>4</sub>)







#### Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 15 for High Flow for Sulfate $(SO_4)$







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Low Flow for Arsenic (As)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Average Flow for Arsenic (As)



## Proposed Action: Percent of Impacts at PM-13 in Year 20 for Average Flow for Arsenic (As)







Proposed Action: Percent of Impacts at PM-13 in Year 20 for High Flow for Arsenic (As)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Low Flow for Cobalt (Co)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Average Flow for Cobalt (Co)



## Proposed Action: Percent of Impacts at PM-13 in Year 20 for Average Flow for Cobalt (Co)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for High Flow for Cobalt (Co)



Proposed Action: Percent of Impacts at PM-13 in Year 20 for High Flow for Cobalt (Co)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Low Flow for Copper (Cu)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Average Flow for Copper (Cu)



## Proposed Action: Percent of Impacts at PM-13 in Year 20 for Average Flow for Copper (Cu)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for High Flow for Copper (Cu)



Proposed Action: Percent of Impacts at PM-13 in Year 20 for High Flow for Copper (Cu)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Low Flow for Nickel (Ni)







# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Average Flow for Nickel (Ni)



#### Proposed Action: Percent of Impacts at PM-13 in Year 20 for Average Flow for Nickel (Ni)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for High Flow for Nickel (Ni)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Low Flow for Antimony (Sb)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Average Flow for Antimony (Sb)



# Proposed Action: Percent of Impacts at PM-13 in Year 20 for Average Flow for Antimony (Sb)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for High Flow for Antimony (Sb)



#### Proposed Action: Percent of Impacts at PM-13 in Year 20 for High Flow for Antimony (Sb)



# Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 20 for Low Flow for Sulfate (SO<sub>4</sub>)






# Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 20 for Average Flow for Sulfate (SO<sub>4</sub>)



Proposed Action: Percent of Impacts at PM-13 in Year 20 for Average Flow for Sulfate  $(SO_4)$ 



#### Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Year 20 for High Flow for Sulfate $(SO_4)$







#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for Low Flow for Arsenic (As)







# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for Average Flow for Arsenic (As)



# Proposed Action: Percent of Impacts at PM-13 in Closure for Average Flow for Arsenic (As)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for High Flow for Arsenic (As)



## Proposed Action: Percent of Impacts at PM-13 in Closure for High Flow for Arsenic (As)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for Low Flow for Cobalt (Co)



# Proposed Action: Percent of Impacts at PM-13 in Closure for Low Flow for Cobalt (Co)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for Average Flow for Cobalt (Co)



#### Proposed Action: Percent of Impacts at PM-13 in Closure for Average Flow for Cobalt (Co)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for High Flow for Cobalt (Co)



# Proposed Action: Percent of Impacts at PM-13 in Closure for High Flow for Cobalt (Co)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for Low Flow for Copper (Cu)



## Proposed Action: Percent of Impacts at PM-13 in Closure for Low Flow for Copper (Cu)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for Average Flow for Copper (Cu)







# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for High Flow for Copper (Cu)



#### Proposed Action: Percent of Impacts at PM-13 in Closure for High Flow for Copper (Cu)



#### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for Low Flow for Nickel (Ni)







# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for Average Flow for Nickel (Ni)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for High Flow for Nickel (Ni)



# Proposed Action: Percent of Impacts at PM-13 in Closure for High Flow for Nickel (Ni)



## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for Low Flow for Antimony (Sb)







# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for Average Flow for Antimony (Sb)



# Proposed Action: Percent of Impacts at PM-13 in Closure for Average Flow for Antimony (Sb)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Closure for High Flow for Antimony (Sb)







## Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Closure for Low Flow for Sulfate (SO4)






# Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Closure for Average Flow for Sulfate (SO4)



# Proposed Action: Percent of Impacts at PM-13 in Closure for Average Flow for Sulfate (SO4)



# Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Closure for High Flow for Sulfate (SO4)







## Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for Low Flow for Arsenic (As)



### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for Low Flow for Arsenic (As)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for Average Flow for Arsenic (As)



### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Arsenic (As)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for High Flow for Arsenic (As)



#### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for High Flow for Arsenic (As)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for Low Flow for Cobalt (Co)



### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for Low Flow for Cobalt (Co)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for Average Flow for Cobalt (Co)



### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Cobalt (Co)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for High Flow for Cobalt (Co)



### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for High Flow for Cobalt (Co)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for Low Flow for Copper (Cu)



# Proposed Action: Percent of Impacts at PM-13 in Post - Closure for Low Flow for Copper (Cu)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for Average Flow for Copper (Cu)



### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Copper (Cu)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for High Flow for Copper (Cu)



### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for High Flow for Copper (Cu)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for Low Flow for Nickel (Ni)



### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for Low Flow for Nickel (Ni)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for Average Flow for Nickel (Ni)



# Proposed Action: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Nickel (Ni)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for High Flow for Nickel (Ni)



### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for High Flow for Nickel (Ni)



### Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for Low Flow for Antimony (Sb)



### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for Low Flow for Antimony (Sb)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for Average Flow for Antimony (Sb)



# Proposed Action: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Antimony (Sb)



# Proposed Action: Mass Flux (g/year) of Impacts at PM-13 in Post - Closure for High Flow for Antimony (Sb)



### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for High Flow for Antimony (Sb)



# Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Post - Closure for Low Flow for Sulfate (SO<sub>4</sub>)






#### Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Post - Closure for Average Flow for Sulfate (SO<sub>4</sub>)



#### Proposed Action: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Sulfate (SO<sub>4</sub>)



#### Proposed Action: Mass Flux (kg/year) of Impacts at PM-13 in Post - Closure for High Flow for Sulfate (SO<sub>4</sub>)







Appendix G.3 Tailings Basin Geotechnical Mitigation

### Geotechnical Mitigation: Mass Flux (kg/year) of Tailings Basin Features in Year 1 for Sulfate (SO<sub>4</sub>)



SO4, Year 1, percent

## Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 1 for Sulfate $(SO_4)$



# Geotechnical Mitigation: Mass Flux (kg/year) of Tailings Basin Features in Year 5 for Sulfate $(SO_4)$



SO4, Year 5, percent

## Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 5 for Sulfate $(SO_4)$



# Geotechnical Mitigation: Mass Flux (kg/year) of Tailings Basin Features in Year 10 for Sulfate (SO<sub>4</sub>)



## Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 10 for Sulfate $(SO_4)$



# Geotechnical Mitigation: Mass Flux (kg/year) of Tailings Basin Features in Year 15 for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 15 for Sulfate $(SO_4)$



# Geotechnical Mitigation: Mass Flux (kg/year) of Tailings Basin Features in Year 20 for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 20 for Sulfate $(SO_4)$











Sb, Year1, mass flux

## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 1 for Antimony (Sb)



Sb, Year 1, percent

### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 1 for Antimony (Sb)



Sb, Year 5, mass flux





Sb, Year 5, percent

### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 5 for Antimony (Sb)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 10 for Antimony (Sb)



Sb, Year 10, percent

### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 10 for Antimony (Sb)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 15 for Antimony (Sb)



Sb, Year 15, percent

#### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 15 for Antimony (Sb)



### Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 20 for Antimony (Sb)



Sb, Year 20, percent

## Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 20 for Antimony (Sb)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Closure for Antimony (Sb)



Sb, Closure, percent

### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Closure for Antimony (Sb)



As, Year1, mass flux

## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 1 for Arsenic (As)



As, Year 1, percent

### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 1 for Arsenic (As)



As, Year 5, mass flux

### Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 5 for Arsenic (As)



As, Year 5, percent

#### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 5 for Arsenic (As)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 10 for Arsenic (As)



As, Year 10, percent

#### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 10 for Arsenic (As)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 15 for Arsenic (As)


As, Year 15, percent

#### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 15 for Arsenic (As)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 20 forArsenic (As)



As, Year 20, percent

#### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 20 for Arsenic (As)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Closure for Arsenic (As)



As, Closure, percent





Co, Year1, mass flux

### Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 1 for Cobalt (Co)



Co Year 1, percent

#### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 1 for Cobalt (Co)



Co, Year 5, mass flux

## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 5 for Cobalt (Co)



Co, Year 5, percent

# Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 5 for Cobalt (Co)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 10 for Cobalt (Co)



Co, Year 10, percent

# Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 10 for Cobalt (Co)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 15 for Cobalt (Co)



Co, Year 15, percent

#### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 15 for Cobalt (Co)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 20 for Cobalt (Co)



Co, Year 20, percent

# Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 20 for Cobalt (Co)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Closure for Cobalt (Co)



Co, Closure, percent





Cu, Year1, mass flux

## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 1 for Copper (Cu)



Cu Year 1, percent

#### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 1 for Copper (Cu)



Cu, Year 5, mass flux





Cu, Year 5, percent

### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 5 for Copper (Cu)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 10 for Copper (Cu)



Cu, Year 10, percent

### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 10 for Copper (Cu)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 15 for Copper (Cu)



Cu, Year 15, percent

#### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 15 for Copper (Cu)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 20 for Copper (Cu)



Cu, Year 20, percent

# Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 20 for Copper (Cu)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Closure for Copper (Cu)



Cu, Closure, percent





Ni, Year1, mass flux

## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 1 for Nickel (Ni)



Ni, Year 1, percent

### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 1 for Nickel (Ni)



Ni, Year 5, mass flux

### Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 5 for Nickel (Ni)



Ni, Year 5, percent

#### Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 5 for Nickel (Ni)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 10 for Nickel (Ni)



Ni, Year 10, percent

## Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 10 for Nickel (Ni)



## Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 15 for Nickel (Ni)


Ni, Year 15, percent

## Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 15 for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Tailings Basin Features in Year 20 for Nickel (Ni)



Ni, Year 20, percent

# Geotechnical Mitigation: Percent of Tailings Basin Features' Impacts in Year 20 for Nickel (Ni)







Ni, Closure, percent





Appendix G.4 Embarass River Watershed Geotechnical Mitigation

# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Low Flow for Arsenic (As)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for Low Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Average Flow for Arsenic (As)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for Average Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for High Flow for Arsenic (As)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for High Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Low Flow for Cobalt (Co)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for Low Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Average Flow for Cobalt (Co)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for Average Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for High Flow for Cobalt (Co)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for High Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Low Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for Low Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Average Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for Average Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for High Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for High Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Low Flow for Nickel (Ni)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for Low Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Average Flow for Nickel (Ni)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for Average Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for High Flow for Nickel (Ni)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for High Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Low Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for Low Flow for Antimony (Sb)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for Average Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for Average Flow for Antimony (Sb)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 1 for High Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for High Flow for Antimony (Sb)


# Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 1 for Low Flow for Sulfate (SO<sub>4</sub>)



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## Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 1 for Average Flow for Sulfate (SO<sub>4</sub>)







#### Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 1 for High Flow for Sulfate (SO<sub>4</sub>)



Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 1 for High Flow for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Low Flow for Arsenic (As)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for Low Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Average Flow for Arsenic (As)



#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for Average Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for High Flow for Arsenic (As)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for High Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Low Flow for Cobalt (Co)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for Low Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Average Flow for Cobalt (Co)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for Average Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for High Flow for Cobalt (Co)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for High Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Low Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for Low Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Average Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for Average Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for High Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for High Flow for Copper (Cu)



#### Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Low Flow for Nickel (Ni)







# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Average Flow for Nickel (Ni)



#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for Average Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for High Flow for Nickel (Ni)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for High Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Low Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for Low Flow for Antimony (Sb)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for Average Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for Average Flow for Antimony (Sb)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 5 for High Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for High Flow for Antimony (Sb)


#### Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 5 for Low Flow for Sulfate (SO<sub>4</sub>)



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# Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 5 for Average Flow for Sulfate (SO<sub>4</sub>)







# Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 5 for High Flow for Sulfate (SO<sub>4</sub>)



Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 5 for High Flow for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for Low Flow for Arsenic (As)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for Low Flow for Arsenic (As)



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#### Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for Average Flow for Arsenic (As)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for Average Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for High Flow for Arsenic (As)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for High Flow for Arsenic (As)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for Low Flow for Cobalt (Co)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for Low Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for Average Flow for Cobalt (Co)



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# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for High Flow for Cobalt (Co)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for High Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for Low Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for Low Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for Average Flow for Copper (Cu)



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# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for High Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for High Flow for Copper (Cu)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for Low Flow for Nickel (Ni)







# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for Average Flow for Nickel (Ni)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for Average Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for High Flow for Nickel (Ni)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for High Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for Low Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for Low Flow for Antimony (Sb)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for Average Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for Average Flow for Antimony (Sb)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 10 for High Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for High Flow for Antimony (Sb)


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#### Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 10 for Low Flow for Sulfate (SO<sub>4</sub>)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 10 for Low Flow for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 10 for Average Flow for Sulfate (SO<sub>4</sub>)



#### GeotechnicalMitigation: Percent of Impacts at PM-13 in Year 10 for Average Flow for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 10 for High Flow for Sulfate (SO<sub>4</sub>)







# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Low Flow for Arsenic (As)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for Low Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Average Flow for Arsenic (As)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for Average Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for High Flow for Arsenic (As)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for High Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Low Flow for Cobalt (Co)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for Low Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Average Flow for Cobalt (Co)



## GeotechnicalMitigation: Percent of Impacts at PM-13 in Year 15 for Average Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for High Flow for Cobalt (Co)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for High Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Low Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for Low Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Average Flow for Copper (Cu)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for Average Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for High Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for High Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Low Flow for Nickel (Ni)







# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Average Flow for Nickel (Ni)



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### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for Average Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for High Flow for Nickel (Ni)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for High Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Low Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for Low Flow for Antimony (Sb)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for Average Flow for Antimony (Sb)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for Average Flow for Antimony (Sb)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 15 for High Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for High Flow for Antimony (Sb)


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#### Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 15 for Low Flow for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 15 for Low Flow for Sulfate $(SO_4)$



## Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 15 for Average Flow for Sulfate (SO<sub>4</sub>)



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## Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 15 for High Flow for Sulfate (SO<sub>4</sub>)







## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Low Flow for Arsenic (As)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for Low Flow for Arsenic (As)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Average Flow for Arsenic (As)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for Average Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for High Flow for Arsenic (As)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for High Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Low Flow for Cobalt (Co)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for Low Flow for Cobalt (Co)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Average Flow for Cobalt (Co)



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# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for High Flow for Cobalt (Co)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for High Flow for Cobalt (Co)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Low Flow for Copper (Cu)







## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Average Flow for Copper (Cu)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for Average Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for High Flow for Copper (Cu)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for High Flow for Copper (Cu)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Low Flow for Nickel (Ni)







# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Average Flow for Nickel (Ni)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for Average Flow for Nickel (Ni)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for High Flow for Nickel (Ni)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for High Flow for Nickel (Ni)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Low Flow for Antimony (Sb)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for Low Flow for Antimony (Sb)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for Average Flow for Antimony (Sb)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for Average Flow for Antimony (Sb)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Year 20 for High Flow for Antimony (Sb)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for High Flow for Antimony (Sb)


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#### Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 20 for Low Flow for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for Low Flow for Sulfate $(SO_4)$



### Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 20 for Average Flow for Sulfate (SO4)



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> Geotechnical Mitigation: Percent of Impacts at PM-13 in Year 20 for Average Flow for Sulfate (SO<sub>4</sub>)



## Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Year 20 for High Flow for Sulfate (SO<sub>4</sub>)







## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for Low Flow for Arsenic (As)



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## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for Average Flow for Arsenic (As)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for Average Flow for Arsenic (As)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for High Flow for Arsenic (As)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for High Flow for Arsenic (As)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for Low Flow for Cobalt (Co)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for Low Flow for Cobalt (Co)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for Average Flow for Cobalt (Co)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for Average Flow for Cobalt (Co)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for High Flow for Cobalt (Co)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for High Flow for Cobalt (Co)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for Low Flow for Copper (Cu)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for Low Flow for Copper (Cu)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for Average Flow for Copper (Cu)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for Average Flow for Copper (Cu)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for High Flow for Copper (Cu)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for High Flow for Copper (Cu)



### Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for Low Flow for Nickel (Ni)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for Low Flow for Nickel (Ni)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for Average Flow for Nickel (Ni)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for Average Flow for Nickel (Ni)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for High Flow for Nickel (Ni)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for High Flow for Nickel (Ni)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for Low Flow for Antimony (Sb)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for Low Flow for Antimony (Sb)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for Average Flow for Antimony (Sb)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for Average Flow for Antimony (Sb)



## Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Closure for High Flow for Antimony (Sb)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for High Flow for Antimony (Sb)


# Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Closure for Low Flow for Sulfate (SO<sub>4</sub>)



#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for Low Flow for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Closure for Average Flow for Sulfate (SO<sub>4</sub>)



Geotechnical Mitigation: Percent of Impacts at PM-13 in Closure for Average Flow for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Closure for High Flow for Sulfate (SO<sub>4</sub>)







# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for Low Flow for Arsenic (As)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Low Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for Average Flow for Arsenic (As)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for High Flow for Arsenic (As)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for High Flow for Arsenic (As)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for Low Flow for Cobalt (Co)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Low Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for Average Flow for Cobalt (Co)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Cobalt (Co)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for High Flow for Cobalt (Co)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for High Flow for Cobalt (Co)



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#### Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for Low Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Low Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for Average Flow for Copper (Cu)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for High Flow for Copper (Cu)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for High Flow for Copper (Cu)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for Low Flow for Nickel (Ni)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Low Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for Average Flow for Nickel (Ni)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for High Flow for Nickel (Ni)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for High Flow for Nickel (Ni)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for Low Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Low Flow for Antimony (Sb)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for Average Flow for Antimony (Sb)



## Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Antimony (Sb)



# Geotechnical Mitigation: Mass Flux (g/year) of Impacts at PM-13 in Post -Closure for High Flow for Antimony (Sb)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for High Flow for Antimony (Sb)


### Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Post -Closure for Low Flow for Sulfate (SO<sub>4</sub>)



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#### Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Low Flow for Sulfate (SO<sub>4</sub>)



### Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Post -Closure for Average Flow for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for Average Flow for Sulfate (SO<sub>4</sub>)



### Geotechnical Mitigation: Mass Flux (kg/year) of Impacts at PM-13 in Post -Closure for High Flow for Sulfate (SO<sub>4</sub>)



# Geotechnical Mitigation: Percent of Impacts at PM-13 in Post - Closure for High Flow for Sulfate $(SO_4)$

