Appendix I

Calibration of Mass-Balance Model for Existing LTVSMC Tailings Basin Seepage Rate in the Embarrass River Watershed P:\Mpls\23 MN\69\2369862_MovedFromMpls_P\WO 015 EIS Rpts Studies\RS74 Water Quality Modeling\Model Predictions\Embarrass_Calibertian and the studies and the Embarrass_River_Calibration_TBSeepage_Summary_v2.xls

Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Calcium: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0 cfs

	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
ata	surface water flow into PM-13	Q_s13 =	0.00	(cfs)
Ő	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
Ň	Area 5 Pit NW discharge	Q_spit =	0.00	(CfS)
Ĕ	LIVOIVIO Tallings Basin seepage	$Q_{IS} =$	1.90	(CIS)
rt	around water flow into PM-12	$0 a_{12} =$	0.00	(cis)
du	ground water flow into PM-13	$Q_{012} =$	4.21	(cfs)
		g·v		(0.0)
	concentration of surface water into PM-12	C_s12 =	13	(mg/l)
Data	concentration of surface water into PM-13	 C_s13 =	13	(mg/l)
tion	concentration of WWTP discharge	C_sBab =	13	(mg/l)
trat	concentration of Area 5 Pit NW discharge	C_spit =	95.4	(mg/l)
Sent	concentration of LTVSMC Tailings Basin seepage	C_fs =	59.78	(mg/l)
Conc	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out C	concentration of ground water flow into PM-12	C_g12 =	19	(mg/l)
Ing	concentration of ground water flow into PM-13	C_g13 =	19	(mg/l)
er nce	tiow in river at PM-12	Q_r12 =	1.51	(Cts)
∕at∈ ala	tlow in river at PM-13	Q_r13 =	7.30	(cfs)
S m	flow check	Q_ck =	7.30	(cfs)
				(
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
f	mass nux of surface water into PM-13	$\frac{WI_SI3}{M_SBab} =$	101	(mg/s)
L L	concentration of Area 5 Pit NW discharge	$M_{spit} =$	ı∠۱ ۱	(mg/s)
atio	concentration of LTVSMC Tailings Basin seepage	M_fs =	3214	(mg/s)
s P s	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc	mass flux of ground water into PM-12	M_g12 =	462	(mg/s)
UΣ	mass flux of ground water into PM-13	M_g13 =	2264	(mg/s)
		1		
ce	mass flux in river at PM-12	M_r12 =	584	(mg/s)
ass ılar				
Ba Ba	mass flux in river at PM-13	M_r13 =	6062	(mg/s)
<u>с</u>				
tion				
ltec	concentration in river at PM-12	C_r12 =	13.68	(mg/l)
ula cen				
alc				
00	concentration in river at PM-13	C_r13 =	29.34	(mg/l)
tior				
ed itra	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	18.80	(mg/l)
erv				
SdC	Observed concentration in vives at DM 10 for flows 10 of		00.00	(mc/l)
00	Observed concentration in river at PM-13 for flows < 10 cfs		29.60	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Calcium: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0.26 cfs

	surface water flow into PM-12	Q s12 =	0.00	(cfs)
ច្ច	surface water flow into PM-13	Q s13 =	0.00	(cfs)
Dat	Babbitt WWTP discharge	Q sBab =	0.33	(cfs)
>	Area 5 Pit NW discharge	Q spit =	0.26	(cfs)
<u>5</u>	LTVSMC Tailings Basin seepage	Q fs =	1.40	(cfs)
LL	Hydrometallurgical Residue Cells Liner Leakage	Q rrs =	0.00	(cfs)
ort I	ground water flow into PM-12	Q q12 =	0.86	(cfs)
Ĕ	ground water flow into PM-13	Q q13 =	4.21	(cfs)
				<u> </u>
	concentration of surface water into PM-12	C s12 -	13	(ma/l)
ata		0_012 =	10	(1119/1)
ő	concentration of surface water into PM-13	C_s13 =	13	(mg/l)
on D	concentration of WWTP discharge	C_sBab =	13	(mg/l)
rat	concentration of Area 5 Pit NW discharge	C_spit =	95.4	(mg/l)
ent	concentration of LTVSMC Tailings Basin seepage	C fs =	59.78	(mg/l)
DUC	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
Ŭ	concentration of ground water flow into PM-12	C g12 =	19	(mg/l)
ndr				(m c /l)
<u> </u>	concentration of ground water flow into PM-13	C_g13 =	19	(mg/I)
r Ce	flow in river at PM-12	Q_r12 =	1.47	(cfs)
ate alar	flow in river at PM-13	Q_r13 =	7.06	(cfs)
≥ 88	flow check	Q_ck =	7.06	(cfs)
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
	mass flux of surface water into PM-13	M_s13 =	0	(mg/s)
of	mass flux of Babbitt WWTP	M_sBab =	121	(mg/s)
Б×	concentration of Area 5 Pit NW discharge	M_spit =	702	(mg/s)
-In ati	concentration of LTVSMC Tailings Basin seepage	M_fs =	2368	(mg/s)
s F S	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc as	mass flux of ground water into PM-12	M_g12 =	462	(mg/s)
ŰΣ	mass flux of ground water into PM-13	M_g13 =	2264	(mg/s)
, and the second s	mass flux in river at PM-12	M_r12 =	584	(mg/s)
ass Ilar				
₿ B B B	mass flux in river at PM-13	M_r13 =	5918	(mg/s)
L L				
d ătic				
Itre	concentration in river at PM-12	C_r12 =	14.06	(mg/l)
ula Xen				
alcu				
ပိပိ	concentration in river at PM-13	C_r13 =	29.62	(mg/l)
	•	· —		/
L				
atio				
ed htra	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	18.80	(mg/l)
er Ser				
bse bnc				
ŌŎ	Observed concentration in river at PM-13 for flows < 10 cfs		29.60	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Calcium: Flows at PM-13 = 10 - 20 cfs, Pit 5NW Q = 0 cfs

			1 0 0	<i>((</i>)
	surface water flow into PM-12	Q_\$12 =	1.22	(CfS)
ita	surface water flow into PM-13	Q_s13 =	5.98	(cts)
Da	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
≥	Area 5 Pit NW discharge	Q_spit =	0.00	(cfs)
<u>e</u>	LTVSMC Tailings Basin seepage	Q_fs =	3.90	(cfs)
Ц Ц Т	Hydrometallurgical Residue Cells Liner Leakage	Q_rrs =	0.00	(cfs)
nd	ground water flow into PM-12	Q_g12 =	0.86	(cfs)
드	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
	·		-	
	concentration of surface water into PM-12	C s12 -	13	(ma/l)
ita		0_012 =	10	(119/1)
Da	concentration of surface water into PM-13	C_s13 =	13	(mg/l)
Ę	concentration of WWTP discharge	C_sBab =	13	(ma/l)
tic		0_0200		(
itra	concentration of Area 5 Pit NW discharge	C_spit =	95.4	(mg/l)
sen .	concentration of LTVSMC Tailings Basin seepage	C_fs =	59.78	(mg/l)
ou	concentration of Hydrometallurgical Residue Cells Liner Leakage	C rrs =	0	
ပိ		00		
t	concentration of ground water flow into PM-12	C_g12 =	19	(mg/l)
du	concentration of ground water flow into DM 12	0 ~12	10	(ma/l)
_	concentration of ground water now into FIV-13	0_g13 =	19	(IIIg/I)
e	flow in river at PM-12	Q_r12 =	3.06	(cfs)
an	flow in river at PM-13	0 r13 -	16 50	(cfs)
Vat Vat		Q_110 =	10.50	(013)
5 0	flow check	Q_ck =	16.50	(cts)
	mass flux of surface water into PM-12	M_s12 =	450	(mg/s)
	mass flux of surface water into PM-13	M_s13 =	2199	(mg/s)
Ę	mass flux of Babbitt W/W/TP	M aDah	101	(ma/c)
0		$M_SBab =$	121	(mg/s)
	concentration of Area 5 Pit NW discharge	M_SBAD = M_spit =	121 0	(mg/s) (mg/s)
ation c	concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage	M_spit = M_fs =	121 0 6598	(mg/s) (mg/s) (mg/s)
culation c s Flux	concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage	M_SBAD = M_spit = M_fs = M_rrs =	121 0 6598 0	(mg/s) (mg/s) (mg/s)
alculation c ass Flux	concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12	M_SBab = M_spit = M_fs = M_rrs = M_g12 =	121 0 6598 0 462	(mg/s) (mg/s) (mg/s) (mg/s)
Calculation c Mass Flux	concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13	M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 =	121 0 6598 0 462 2264	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Calculation o Mass Flux	concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13	M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 =	121 0 6598 0 462 2264	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Calculation c Mass Flux	concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13	M_SBAD = M_spit = M_fs = M_rrs = M_g12 = M_g13 =	121 0 6598 0 462 2264	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Calculation c Calculation c	concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12	M_SBAD = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 =	121 0 6598 0 462 2264 1034	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
ss Calculation c ance Mass Flux	concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12	M_SBAD = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 =	121 0 6598 0 462 2264 1034	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Mass Calculation c 3alance Mass Flux	mass flux of Dabbit WW11 concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13	M_SBAD = M_spit = M_fs = M_g12 = M_g13 = M_r12 = M_r12 =	121 0 6598 0 462 2264 1034	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Mass Calculation c Balance Mass Flux	mass flux of Dabbit wwwn concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13	M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 = M_r13 =	121 0 6598 0 462 2264 1034 12094	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Mass Calculation c Balance Mass Flux	Imass flux of Dabbit wwwfi concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13	M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 = M_r13 =	121 0 6598 0 462 2264 1034 12094	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Mass Calculation c Balance Mass Flux	Imass flux of Dabbit wwwfi concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13	M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 = M_r13 =	121 0 6598 0 462 2264 1034 12094	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
ed Mass Calculation c ration Balance Mass Flux	Imass flux of Dabbit wwwfi concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13	M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 = M_r13 =	121 0 6598 0 462 2264 1034 12094	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
ated Mass Calculation c intration Balance Mass Flux	Imass flux of Dabbit WW11 concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13	M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 = M_r13 = C_r12 =	121 0 6598 0 462 2264 1034 12094 11.93	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
calculation c calculation c icentration Balance Mass Flux	Imass flux of Dabbit WW11 concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13	M_sBab = M_spit = M_fs = M_g12 = M_g13 = M_r12 = M_r13 = C_r12 =	121 0 6598 0 462 2264 1034 12094	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
alculated Mass Calculation concentration Balance Mass Flux	Imass flux of Dabbit WW11 concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13	M_sBab = M_spit = M_fs = M_g12 = M_g13 = M_r12 = M_r13 = C_r12 =	121 0 6598 0 462 2264 1034 12094	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Calculated Mass Calculation c Concentration Balance Mass Flux	Imass flux of Dabbit WW11 concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13 concentration in river at PM-13	M_sBab = M_spit = M_fs = M_g12 = M_g13 = M_r12 = M_r13 = C_r12 = C_r13 =	121 0 6598 0 462 2264 1034 12094 11.93 25.90	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/l)
Calculated Mass Calculation c Concentration Balance Mass Flux	Image induction babbilit wwwnich concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13 concentration in river at PM-13	M_sBab = M_spit = M_fs = M_g12 = M_g13 = M_r12 = M_r13 = C_r12 = C_r13 =	121 0 6598 0 462 2264 1034 12094 11.93 25.90	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/l)
Calculated Mass Calculation c Concentration Balance Mass Flux	Image induction of Dabbit wwwnich concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13 concentration in river at PM-13	M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 = M_r13 = C_r12 = C_r13 =	121 0 6598 0 462 2264 1034 12094 11.93 25.90	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/l)
t Calculated Mass Calculation c ation Concentration Balance Mass Flux	Image induction of Dabbit wwwnich concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13 concentration in river at PM-13	<u>M_sBab =</u> <u>M_spit =</u> <u>M_fs =</u> <u>M_g12 =</u> <u>M_g13 =</u> <u>M_r12 =</u> <u>M_r13 =</u> <u>C_r12 =</u> <u>C_r13 =</u>	121 0 6598 0 462 2264 1034 12094 11.93 25.90	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/l)
red Calculated Mass Calculation concentration Balance Mass Flux	Image induction of Dabbit wwwnich concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13 concentration in river at PM-13 Observed concentration in river at PM-13 for flows at PM-13 of 10-	<u>M_sBab =</u> <u>M_spit =</u> <u>M_fs =</u> <u>M_g12 =</u> <u>M_g13 =</u> <u>M_r12 =</u> <u>M_r13 =</u> <u>C_r12 =</u> <u>C_r13 =</u> 20 cfs	121 0 6598 0 462 2264 1034 12094 11.93 25.90	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/l) (mg/l)
erved Calculated Mass Calculation concentration Balance Mass Flux	Image induction of Dabbit wwwnich concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13 concentration in river at PM-13 Observed concentration in river at PM-13	M_SBAD = M_spit = M_fs = M_g12 = M_g13 = M_r12 = M_r13 = C_r12 = C_r13 = 20 cfs	121 0 6598 0 462 2264 1034 12094 11.93 25.90	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/l) (mg/l)

Observed concentration in river at PM-13 for flows of 10-20 cfs

24.03 (mg/l)

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Embarra	ass River Model - Calibration of Tailings Basin Seepage
Parameter:	Calcium: Flows at PM-13 = 10 - 20 cfs, Pit 5NW Q = 0.26 cfs

	surface water flow into PM-12	Q_s12 =	1.26	(cfs)
ta	surface water flow into PM-13	Q_s13 =	6.18	(cfs)
Da	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
≥	Area 5 Pit NW discharge	Q_spit =	0.26	(cfs)
은	LTVSMC Tailings Basin seepage	Q_fs =	3.40	(cfs)
н Н	Hydrometallurgical Residue Cells Liner Leakage	Q_rrs =	0.00	(cfs)
ЪС Д	ground water flow into PM-12	Q_g12 =	0.86	(cfs)
	ground water flow into PM-13	Q_g13 =	4.21	(cts)
ក្ត	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	concentration of WWTP discharge	C_sBab =	13	(mg/l)
rati	concentration of Area 5 Pit NW discharge	C spit =	95.4	(mg/l)
ent	concentration of LTVSMC Tailings Basin seepage	C fs =	59.78	(mg/l)
onc	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
t Č	concentration of ground water flow into PM-12	C g12 =	19	(mg/l)
ndu	concentration of ground water flow into PM 12		10	(mg/l)
—	Iconcentration of ground water now INTO FINE 13	0_913 =	19	(119/1)
er nce	flow in river at PM-12	Q_r12 =	3.06	(cts)
/ate ala	flow in river at PM-13	Q_r13 =	16.50	(cfs)
5 0	flow check	Q_ck =	16.50	(cts)
		114 40	105	
	mass flux of surface water into PM-12	M_s12 =	465	(mg/s)
	Imass tilly of surface water into PM-13			(ma/s)
4	mass flux of Dahade Watchinto Fini To	M_310 =	101	(mg/c)
u of	mass flux of Babbitt WWTP	M_sBab =	121	(mg/s)
tion of ux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge	$M_sBab = M_spit = M_sfc$	121 702	(mg/s) (mg/s) (mg/s)
llation of Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage	M_sBab = M_spit = M_fs =	121 702 5752	(mg/s) (mg/s) (mg/s)
lculation of ss Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage	M_ST0 = M_SBab = M_spit = M_fs = M_rrs = M_g12 =	121 702 5752 0	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Calculation of Mass Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13	M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 -	121 702 5752 0 462 2264	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Calculation of Mass Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13	M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 =	121 702 5752 0 462 2264	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Calculation of Mass Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13	M_s10 = M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 =	121 702 5752 0 462 2264	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Calculation of Mass Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12	M_s10 = M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 =	121 121 702 5752 0 462 2264 1049	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
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Mass Calculation of Balance Mass Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13	M_s10 = M_sBab = M_spit = M_fs = M_g12 = M_g13 = M_r12 = M_r12 =	121 702 5752 0 462 2264 1049 12039	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
Mass Calculation of Balance Mass Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13	M_s10 = M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 = M_r12 =	121 121 702 5752 0 462 2264 1049 12039	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s)
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Calculated Mass Calculation of Concentration Balance Mass Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13	$M_{s}Bab = M_{s}Bab = M_{s}Bab = M_{f}s = M_{f}s = M_{g}12 = M_{g}13 = M_{f}r12 = M_{f}r12 = M_{f}r13 = C_{r}r12 = C_{r}r13 = C_{r}r13 = C_{f}r13 = C_{f$	121 702 5752 0 462 2264 1049 12039 12039	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/l)
Calculated Mass Calculation of Concentration Balance Mass Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-12 concentration in river at PM-13	M_s10 = M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 = M_r13 = C_r12 = C_r13 =	121 121 702 5752 0 462 2264 1049 12039 12039 12.10 25.78	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/l)
ion Concentration Balance Mass Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13	M_s10 = M_sBab = M_spit = M_fs = M_rrs = M_g12 = M_g13 = M_r12 = M_r13 = C_r12 = C_r13 =	121 121 702 5752 0 462 2264 1049 12039 12039 12.10 25.78	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/l)
d Calculated Mass Calculation of Iration Concentration Balance Mass Flux	mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-12 mass flux in river at PM-12 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13 Observed concentration in river at PM-13	M_s10 = M_sBab = M_spit = M_fs = M_g12 = M_g13 = M_r12 = M_r13 = C_r12 = C_r13 = 20 cfs	121 121 702 5752 0 462 2264 1049 12039 12039 12.10 25.78	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/l)
rved Calculated Mass Calculation of entration Concentration Balance Mass Flux	mass flux of Babbitt WWTP concentration of LTVSMC Tailings Basin seepage concentration of Hydrometallurgical Residue Cells Liner Leakage mass flux of ground water into PM-12 mass flux of ground water into PM-12 mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-13 Observed concentration in river at PM-13	$M_{s} Bab = M_{s} Bab = M_{s} Bab = M_{f} S = M_{f} S = M_{g} 12 = M_{g} 13 = M_{g} 13 = M_{r} 13 = M_{r} 13 = C_{r} 13 = C_{r} 13 = 20 cfs$	121 121 702 5752 0 462 2264 1049 12039 12039 122039 122.10 25.78	(mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/s) (mg/l) (mg/l)

O O Observed concentration in river at PM-13 for flows of 10-20 cfs

24.03

(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Chloride: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0 cfs

surface water flow into PM-12 Q s12 = 0.00 (cfs) Babbit WWTP discharge Q sBab = 0.33 (cfs) Area 5 Pit NW discharge Q spit = 0.00 (cfs) LTVSMC Tailings Basin seepage Q spit = 0.00 (cfs) LTVSMC Tailings Basin seepage Q spit = 0.00 (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 Q g13 = 4.21 (cfs) concentration of surface water into PM-13 Q g13 = 4.21 (cfs) concentration of surface water into PM-13 C g13 = 1.0 (mg/l) concentration of LTVSMC Tailings Basin seepage C fs = 21.54 (mg/l) concentration of LTVSMC Tailings Basin seepage C fs = 21.54 (mg/l) concentration of ground water flow into PM-12 C g12 = 1.8 (mg/l) concentration of Jround water flow into PM-13 C g13 = 1.3 (mg/l) concentration of LTVSMC Tailings Basin seepage C fs = 21.54 (mg/l) mass flux for undrace water into PM-12 Q g12 = 1.8 (mg/l)					
Bistrace water flow into PM-13 Q_s13 = Q_s8ab = Q_s9t	_	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
Q Babott WW IP discharge Q_sBab = 0.00 (cfs) West SPH IWW IP discharge Q_spli = 0.00 (cfs) = 0.00 (cfs) UPW Res SPH IWW IP discharge Q_rs = 0.00 (cfs) = 0.00 (cfs) ground water flow into PM-12 Q_g12 = 0.08 (cfs) 0.00 (cfs) ground water flow into PM-13 Q_g13 = 4.21 (cfs) concentration of surface water into PM-13 C_s13 = 10 (mg/l) concentration of Aurace water into PM-13 C_s13 = 10 (mg/l) concentration of Aurace water into PM-12 C_s13 = 10 (mg/l) concentration of LTVSMC Tailings Basin seepage C_fs = 21.54 (mg/l) concentration of LTVSMC Tailings Basin seepage C_fs = 21.54 (mg/l) concentration of Ground water flow into PM-12 C_g12 = 1.8 (mg/l) concentration of ground water flow into PM-13 C_g13 = 1.8 (mg/l) concentration of ground water flow into PM-13 Q_g13 = 1.40 (mg/l) concentration of area 5 Pi IWW discharge Q_s48 = 9.40 (cfs) mass flux of surface water into PM-12 M_s12 =	ata	Surface water flow into PM-13	Q_s13 =	0.00	(cfs)
Operation Operation Operation Operation Operation Operatio	Ö	Babbitt WW I P discharge	Q_sBab =	0.33	(Cts)
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	≥ S	I TVSMC Tailings Basin seenage	$Q_{splt} = 0$	0.00	(CIS) (cfe)
Image Construction	Ē	Hydrometallurgical Residue Cells Liner Leakage	$Q_{13} =$	0.00	(cfs)
E Ground water flow into PM-13 Q_g13 = 4.21 (cfs) concentration of surface water into PM-12 C_s12 = 10 (mg/l) concentration of surface water into PM-13 C_s13 = 10 (mg/l) concentration of surface water into PM-13 C_s13 = 10 (mg/l) concentration of WWTP discharge C_s8ab = 10 (mg/l) concentration of Area 5 Pit NW discharge C_spit = 5.95 (mg/l) concentration of LTVSMC Tallings Basin seepage C_fs = 21.54 (mg/l) concentration of ground water flow into PM-12 C_g12 = 1.8 (mg/l) concentration of ground water flow into PM-13 C_g13 = 1.8 (mg/l) concentration of ground water flow into PM-13 Q_g13 = 9.40 (cfs) mass flux of surface water into PM-12 Q r12 = 1.86 (cfs) mass flux of surface water into PM-13 Q_g13 = 0 (mg/s) mass flux of surface water into PM-12 M s12 = 0 (mg/s) mass flux of surface water into PM-13 M_g13 = 10 (mg/s) mass flux of surface water into PM-13 M_g13 = 2438 (mg/s) concentration of ITVSMC Tallings Basin seepage M s13	out	ground water flow into PM-12	Q g12 =	0.86	(cfs)
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	<u> </u>	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
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$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	tion Data	concentration of surface water into PM-12	C_s12 =	10	(mg/l)
SolutionC _ SBab =10 (mg/l)concentration of Area 5 Pit NW dischargeC _ spit =5.95 (mg/l)concentration of LVSMC Tailings Basin seepageC _ fs =21.54 (mg/l)concentration of Hydrometallurgical Residue Cells Liner LeakageC _ rrs =0concentration of ground water flow into PM-12C _ g12 =1.8 (mg/l)concentration of ground water flow into PM-13C _ g13 =1.8 (mg/l)concentration of ground water flow into PM-13C _ g13 =1.8 (mg/l)concentration of ground water flow into PM-13Q _ r12 =1.86 (cfs)flow in river at PM-12Q _ r13 =9.40 (cfs)flow checkQ _ ck =9.40 (cfs)mass flux of surface water into PM-12M _ s13 =0 (mg/s)mass flux of surface water into PM-13M _ s13 =0 (mg/s)mass flux of ground water into PM-13M _ s12 =0 (mg/s)mass flux of ground water into PM-13M _ s12 =0 (mg/s)mass flux of ground water into PM-13M _ s12 =0 (mg/s)mass flux of ground water into PM-13M _ s12 =0 (mg/s)mass flux of ground water into PM-13M _ s12 =0 (mg/s)mass flux of ground water into PM-13M _ s12 =0 (mg/s)mass flux in river at PM-12M _ r12 =137 (mg/s)mass flux in river at PM-13M _ r13 =2790 (mg/s)mass flux in river at PM-13M _ r13 =2790 (mg/s)mass flux in river at PM-13M _ s13 10.49 (mg/l)mass flux in river at PM-13M _ s13 10.49 (mg/l) <td>concentration of surface water into PM-13</td> <td>C_s13 =</td> <td>10</td> <td>(mg/l)</td>		concentration of surface water into PM-13	C_s13 =	10	(mg/l)
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		concentration of WWTP discharge	C_sBab =	10	(mg/l)
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Some intration of Hydrometallurgical Residue Cells Liner Leakage C_rrs = 0 concentration of ground water flow into PM-12 C_g12 = 1.8 (mg/l) concentration of ground water flow into PM-13 C_g13 = 1.8 (mg/l) flow in river at PM-12 Q_r12 = 1.86 (cfs) flow in river at PM-13 Q_r13 = 9.40 (cfs) flow in river at PM-13 Q_rk = 9.40 (cfs) mass flux of surface water into PM-12 M_s13 = 0 (mg/s) mass flux of surface water into PM-13 M_s13 = 0 (mg/s) mass flux of surface water into PM-12 M_s13 = 0 (mg/s) concentration of LTVSMC Tailings Basin seepage M_fs = 2438 (mg/s) concentration of LTVSMC Tailings Basin seepage M_fs = 2438 (mg/s) concentration of Hydrometallurgical Residue Cells Liner Leakage M_rrs = 0 (mg/s) mass flux of ground water into PM-13 M_g13 = 214 (mg/s) mass flux of ground water into PM-13 M_g13 = 214 (mg/s) mass flux in river at PM-13 M_r12 = 137 (mg/s) mass flux in river at PM-13 C_r12 = 2.60 (mg/l) concentration in river at PM-13 C_r13 = 10.49	cer	concentration of LTVSMC Tailings Basin seepage	C_fs =	21.54	(mg/l)
Top concentration of ground water flow into PM-12 C_g12 = 1.8 (mg/l) concentration of ground water flow into PM-13 C_g13 = 1.8 (mg/l) flow in river at PM-12 Q_r12 = 1.86 (cfs) flow in river at PM-13 Q_r13 = 9.40 (cfs) flow in river at PM-13 Q_ck = 9.40 (cfs) flow in river at PM-13 M_s12 = 0 (mg/s) mass flux of surface water into PM-12 M_s13 = 0 (mg/s) mass flux of surface water into PM-12 M_s13 = 0 (mg/s) concentration of Area 5 Pit NW discharge M_spit = 0 (mg/s) concentration of LTVSMC Tailings Basin seepage M_fs = 2438 (mg/s) concentration of LTVSMC Tailings Basin seepage M_fs = 0 (mg/s) mass flux of ground water into PM-12 M_g13 = 214 (mg/s) mass flux of ground water into PM-13 M_g13 = 214 (mg/s) mass flux in river at PM-12 M_g13 = 214 (mg/s) mass flux in river at PM-13 M_g13 = 214 (mg/s) mass flux in river at PM-13 M_g13 = 200 (mg/s) mass flux in river at PM-13	Con	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
E concentration of ground water flow into PM-13 C_g13 = 1.8 (mg/l) Image: Second	out O	concentration of ground water flow into PM-12	C_g12 =	1.8	(mg/l)
general Burgerflow in river at PM-12 flow in river at PM-13 flow in river at PM-13Q_r12 = Q_r13 = Q_r13 = Q_r13 = Q_r13 = Q_r13 =1.86 (cfs) Q_r13 = Q_r13 = Q_r13 = Q_r14 (cfs)mass flux of surface water into PM-12 mass flux of surface water into PM-13 mass flux of surface water into PM-13 mass flux of surface water into PM-13 mass flux of Babbitt WWTP concentration of Area 5 Pit NW discharge concentration of LTVSMC Tailings Basin seepage mass flux of ground water into PM-12 mass flux of ground water into PM-12 mass flux of ground water into PM-12 mass flux of ground water into PM-13 mass flux of ground water into PM-13 mass flux in river at PM-12 mass flux in river at PM-13M_r12 = L 137 (mg/s) mg/s)general mass flux in river at PM-13M_r13 = L 2790 (mg/s)mass flux in river at PM-13 concentration in river at PM-13 for flows at PM-13 of < 10 cfs5.33 (mg/l) L 0.49 (mg/l)general right operationQ_r12 = PA (mg/s) mg/s)mass flux in river at PM-12 operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operationQ_r12 = PA (mg/s) path (mg/s)mass flux in river at PM-13 operation operation operation operation operation operationQ_r12 = PA (mg/s) path (mg/s)mass	lnp	concentration of ground water flow into PM-13	C_g13 =	1.8	(mg/l)
Bit State C_r12 = 1.86 (cfs) Index in river at PM-12 Q_r13 = 9.40 (cfs) Index in river at PM-13 Q_r13 = 9.40 (cfs) Index in river at PM-13 Q_r13 = 9.40 (cfs) Index in river at PM-13 M_s12 = 0 (mg/s) mass flux of surface water into PM-12 M_s13 = 0 (mg/s) mass flux of surface water into PM-13 M_s13 = 0 (mg/s) mass flux of surface water into PM-12 M_s13 = 0 (mg/s) mass flux of surface water into PM-13 M_s13 = 0 (mg/s) concentration of Area 5 Pit NW discharge M_spit = 0 (mg/s) concentration of Hydrometallurgical Residue Cells Liner Leakage M_rrs = 0 (mg/s) mass flux of ground water into PM-12 M_g12 = 44 (mg/s) mass flux in river at PM-13 M_g13 = 214 (mg/s) mass flux in river at PM-13 M_g13 = 2790 (mg/s) mass flux in river at PM-13 M_gr13 = 2790 (mg/s) mass flux in river at PM-13 C_r13 = 10.49 (mg/l) mass flux in river at PM-13 C_r13 = 10.49 (mg/l) <td></td> <td>Ι</td> <td></td> <td></td> <td></td>		Ι			
The second se	ir Jce	flow in river at PM-12	Q_r12 =	1.86	(cfs)
S CO provide the check $Q_ck = 9.40$ (cfs) mass flux of surface water into PM-12 $M_s12 = 0$ (mg/s) mass flux of surface water into PM-13 $M_s13 = 0$ (mg/s) mass flux of Babbit WWTP $M_sBab = 93$ (mg/s) concentration of Area 5 Pit NW discharge $M_spit = 0$ (mg/s) concentration of LTVSMC Tailings Basin seepage $M_s fs = 2438$ (mg/s) concentration of Hydrometallurgical Residue Cells Liner Leakage $M_srs = 0$ (mg/s) mass flux of ground water into PM-12 $M_g12 = 444$ (mg/s) mass flux of ground water into PM-13 $M_g13 = 214$ (mg/s) mass flux of ground water into PM-13 $M_g13 = 214$ (mg/s) mass flux in river at PM-12 $M_sr13 = 2790$ (mg/s) mass flux in river at PM-13 $M_sr13 = 2790$ (mg/s) petitioned concentration in river at PM-13 $M_sr13 = 2790$ (mg/s) concentration in river at PM-13 $M_sr13 = 2790$ (mg/s) petitioned concentration in river at PM-13 $M_sr13 = 10.49$ (mg/l) petitioned concentration in river at PM-13 for flows at PM-13 of < 10 cfs 10.30 (mg/l)	/ate alar	flow in river at PM-13	Q_r13 =	9.40	(cfs)
$\frac{\text{mass flux of surface water into PM-12}{\text{mass flux of surface water into PM-13} & M_s12 = 0 (mg/s)}{\text{mass flux of surface water into PM-13} & M_s13 = 0 (mg/s)}{\text{mass flux of Babbit WWTP}} & M_sBab = 93 (mg/s) \\ \text{concentration of Area 5 Pit NW discharge} & M_spit = 0 (mg/s) \\ \text{concentration of LTVSMC Tailings Basin seepage} & M_fs = 2438 (mg/s) \\ \text{concentration of Hydrometallurgical Residue Cells Liner Leakage} & M_grit = 0 (mg/s) \\ \text{mass flux of ground water into PM-12} & M_grit = 44 (mg/s) \\ \text{mass flux of ground water into PM-13} & M_grit = 137 (mg/s) \\ \text{mass flux of ground water into PM-13} & M_grit = 214 (mg/s) \\ \text{mass flux in river at PM-12} & M_grit = 137 (mg/s) \\ \text{mass flux in river at PM-13} & M_grit = 2790 (mg/s) \\ \text{mass flux in river at PM-13} & M_grit = 2790 (mg/s) \\ \text{mass flux in river at PM-13} & C_rrit = 2.60 (mg/l) \\ \text{concentration in river at PM-13} & C_rrit = 10.49 (mg/l) \\ \text{observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ \text{observed concentration in river at PM-13 for flows < 10 cfs} \\ obser$	≤ ñ	flow check	Q_ck =	9.40	(cfs)
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		many flow of surface water into DM 40	M = 10		(
Image flux of Babbit WWTP M_s13 = 0 (fltg/s) Image flux of Babbit WWTP M_sBab = 93 (mg/s) concentration of Area 5 Pit NW discharge M_spit = 0 (mg/s) concentration of LTVSMC Tailings Basin seepage M_fs = 2438 (mg/s) concentration of Hydrometallurgical Residue Cells Liner Leakage M_rrs = 0 (mg/s) mass flux of ground water into PM-12 M_g12 = 44 (mg/s) mass flux of ground water into PM-13 M_g13 = 214 (mg/s) mass flux in river at PM-12 M_g13 = 214 (mg/s) mass flux in river at PM-13 M_r13 = 2790 (mg/s) mass flux in river at PM-13 M_r13 = 2790 (mg/s) mass flux in river at PM-13 C_r12 = 2.60 (mg/l) mass flux in river at PM-13 C_r13 = 10.49 (mg/l) mass flux in river at PM-13 for flows at PM-13 of < 10 cfs		mass flux of surface water into PM-12	IVI_S12 =	0	(mg/s)
Image mark the end of t	of	mass flux of Babbitt WWTP	$M_sBab =$	93	(mg/s)
Image: Concentration of LTVSMC Tailings Basin seepage M_fs = 2438 (mg/s) Concentration of Hydrometallurgical Residue Cells Liner Leakage M_rrs = 0 (mg/s) mass flux of ground water into PM-12 M_g12 = 44 (mg/s) mass flux of ground water into PM-13 M_g13 = 214 (mg/s) mass flux of ground water into PM-13 M_g13 = 214 (mg/s) mass flux in river at PM-12 M_r12 = 137 (mg/s) mass flux in river at PM-13 M_r13 = 2790 (mg/s) concentration in river at PM-13 C_r12 = 2.60 (mg/l) concentration in river at PM-13 C_r13 = 10.49 (mg/l) Observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs	с К	concentration of Area 5 Pit NW discharge	M spit =	0	(mg/s)
Image: Concentration of Hydrometallurgical Residue Cells Liner Leakage M_rrs = 0 (mg/s) mass flux of ground water into PM-12 M_g12 = 44 (mg/s) mass flux of ground water into PM-13 M_g13 = 214 (mg/s) mass flux of ground water into PM-13 M_rr12 = 137 (mg/s) mass flux in river at PM-12 M_r13 = 2790 (mg/s) mass flux in river at PM-13 M_r13 = 2790 (mg/s) mass flux in river at PM-13 C_r12 = 2.60 (mg/l) mass flux in river at PM-13 C_r13 = 10.49 (mg/l) mass flux in river at PM-13 for flows at PM-13 of < 10 cfs	atic	concentration of LTVSMC Tailings Basin seepage	M_fs =	2438	(mg/s)
The second se	sula Sula	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
O \geq mass flux or ground water into PM-13 M_g13 = 214 (mg/s) mass flux in river at PM-12 M_r12 = 137 (mg/s) mass flux in river at PM-13 M_r13 = 2790 (mg/s) patername concentration in river at PM-13 C_r12 = 2.60 (mg/l) patername concentration in river at PM-13 C_r13 = 10.49 (mg/l) patername Observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs	alc Jas	mass flux of ground water into PM-12	M_g12 =	44	(mg/s)
M_r12 =137 (mg/s)M_r13 =2790 (mg/s)M_r13 =2790 (mg/s)M_r13 =2790 (mg/s)Concentration in river at PM-12C_r12 =Concentration in river at PM-13C_r13 =Observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs5.33 (mg/l)Observed concentration in river at PM-13 for flows < 10 cfs10.30 (mg/l)	02	Imass flux of ground water into PM-13	IM_g13 =	214	(mg/s)
$\frac{1}{10.49} \frac{1}{10.49} \frac{1}$					
SolutionM_r13 =2790 (mg/s)M_r13 =2790 (mg/s)M_r13 =2790 (mg/s)Concentration in river at PM-12C_r12 =2.60 (mg/l)Concentration in river at PM-13C_r13 =10.49 (mg/l)Observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs5.33 (mg/l)Observed concentration in river at PM-13 for flows < 10 cfs10.30 (mg/l)	Jce	mass flux in river at PM-12	M_r12 =	137	(mg/s)
\ge \overrightarrow{m} mass flux in river at PM-13M_r13 =2790 (mg/s)pattern concentration in river at PM-12C_r12 =2.60 (mg/l)concentration in river at PM-13C_r13 =10.49 (mg/l)concentration in river at PM-13C_r13 =10.49 (mg/l)pattern concentration in river at PM-13 for flows at PM-13 of < 10 cfs5.33 (mg/l)concentration in river at PM-13 for flows < 10 cfs10.30 (mg/l)	ass ılar				
Description C_r12 = 2.60 (mg/l) concentration in river at PM-12 C_r13 = 10.49 (mg/l) concentration in river at PM-13 C_r13 = 10.49 (mg/l) Observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs	Ba Ba	mass flux in river at PM-13	M_r13 =	2790	(mg/s)
Description C_r12 = 2.60 (mg/l) Concentration in river at PM-12 C_r13 = 10.49 (mg/l) Concentration in river at PM-13 C_r13 = 10.49 (mg/l) Concentration in river at PM-12 for flows at PM-13 of < 10 cfs	-	1			
Operation C_r12 = 2.60 (mg/l) C_r12 = 2.60 (mg/l) C_r13 = 10.49 (mg/l) C_r13 = 10.49 (mg/l) Observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs	tio_				
Observed concentration in river at PM-13 C_r13 = 10.49 (mg/l) Observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs	ted	concentration in river at PM-12	C_r12 =	2.60	(mg/l)
View O C_r13 = 10.49 (mg/l) C_r13 = 0.49 (mg/l) Observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs	ula cen				
O O concentration in river at PM-13 IC_r13 = 10.49 (mg/l) Image: Concentration in river at PM-13 Image: Concentration in river at PM-12 for flows at PM-13 of < 10 cfs	alc		0		<i>,</i>
Observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs 5.33 (mg/l)	00	concentration in river at PM-13	C_r13 =	10.49	(mg/l)
Observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs 5.33 (mg/l)					
Observed concentration in river at PM-12 for flows at PM-13 of < 10 cfs 5.33 (mg/l)	atio				
O O Observed concentration in river at PM-13 for flows < 10 cfs	/ed ntra	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	5.33	(mg/l)
ÖÖÖ Observed concentration in river at PM-13 for flows < 10 cfs	sen				
	Cor	Observed concentration in river at PM-13 for flows < 10 cfs		10.30	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Chloride: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0.26 cfs

_	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
ata	Isurface water flow into PM-13	Q_s13 =	0.00	(cfs)
Ö	Babbilt WWIP discharge	Q_sBab =	0.33	(CfS)
Ň	I TVSMC Tailings Basin seenage	u_spit =	0.26	(CIS) (cfe)
Ē	Hydrometallurgical Residue Cells Liner Leakage	Q rrs =	0.00	(cfs)
out	ground water flow into PM-12	Q_g12 =	0.86	(cfs)
<u> </u>	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
tion Data	concentration of surface water into PM-12	C_s12 =	10	(mg/l)
	concentration of surface water into PM-13	C_s13 =	10	(mg/l)
	concentration of WWTP discharge	C_sBab =	10	(mg/l)
trat	concentration of Area 5 Pit NW discharge	C_spit =	5.95	(mg/l)
ien i	concentration of LTVSMC Tailings Basin seepage	C_fs =	21.54	(mg/l)
ouo	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out C	concentration of ground water flow into PM-12	C_g12 =	1.8	(mg/l)
lnp	concentration of ground water flow into PM-13	C_g13 =	1.8	(mg/l)
			_	
	flow in river at PM-12	Q_r12 =	1.89	(cfs)
ate alan	flow in river at PM-13	Q_r13 =	9.56	(cfs)
≥ m	flow check	Q_ck =	9.56	(cfs)
				,
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
Ę	mass flux of surface water into PM-13	IVI_S13 = M_sRab	0	(mg/s)
0 2	concentration of Area 5 Pit NW discharge	M spit -	93	(mg/s) (mg/s)
ttio Iux	concentration of LTVSMC Tailings Basin seepage	M_fs =	2377	(mg/s)
s T s	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc	mass flux of ground water into PM-12	M_g12 =	44	(mg/s)
ÚΣ	mass flux of ground water into PM-13	M_g13 =	214	(mg/s)
e	mass flux in river at PM-12	M_r12 =	137	(mɑ/s)
lan				
Ma Ba	mass flux in river at PM-13	M_r13 =	2773	(mg/s)
uo				
ed rati	concentration in river at PM-12	C r12 -	2.57	(ma/l)
ulate		0_112 =	2.07	(119/1)
nc				
ပိပိ	concentration in river at PM-13	C_r13 =	10.25	(mg/l)
uo.				
irati	Observed concentration in river at PM-12 for flows at PM-13 of - 1	0 cfs	5.33	(ma/l)
ent		0.010	0.00	(····9/1)
ose				
ŏŏ	Observed concentration in river at PM-13 for flows < 10 cfs		10.30	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Chloride: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0 cfs

	surface water flow into PM-12	Q_s12 =	1.63	(cfs)
ata	Surface water flow into PM-13	Q_s13 =	7.97	(cfs)
D	Babbitt WW I P discharge	Q_sBab =	0.33	(cts)
Ň	Area 5 Mit NW discharge	$Q_spit =$	0.00	(CIS)
Ĕ	Hydrometallurgical Residue Cells Liner Leakage	Q_IS = 0 rre -	0.00	(Cfe)
ŗ	ground water flow into PM-12	$Q_{a12} =$	00.0 AR ()	(cfs)
du	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
				· · ·
D.	concentration of surface water into PM-12	C_s12 =	10	(mg/l)
Dat	concentration of surface water into PM-13	C_s13 =	10	(mg/l)
ion	concentration of WWTP discharge	C_sBab =	10	(mg/l)
trat	concentration of Area 5 Pit NW discharge	C_spit =	5.95	(mg/l)
Sen	concentration of LTVSMC Tailings Basin seepage	C_fs =	21.54	(mg/l)
Sond	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
ut C	concentration of ground water flow into PM-12	C_g12 =	1.8	(mg/l)
dul	concentration of ground water flow into PM-13	C_g13 =	1.8	(mg/l)
	1	Ţ		
r Jce	flow in river at PM-12	Q_r12 =	2.98	(cfs)
/ate alar	flow in river at PM-13	Q_r13 =	16.00	(cfs)
<u>ة ></u>	tiow check	Q_ck =	16.00	(cfs)
	Image flux of ourface water into DM 40	M -10	400	(meta)
	mass flux of surface water into PM-12	$\frac{ V _S ^2}{ M _{c12}}$	462	(mg/s)
of	mass flux of Babbitt WWTP	$M_sBab =$	2200 Q2	(mg/s) (mg/s)
Ľ,	concentration of Area 5 Pit NW discharge	M spit =		(ma/s)
atic	concentration of LTVSMC Tailings Basin seepage	M_fs =	610	(mg/s)
s T s	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc	mass flux of ground water into PM-12	M_g12 =	44	(mg/s)
UΣ	mass flux of ground water into PM-13	M_g13 =	214	(mg/s)
	T	1		
ce	mass flux in river at PM-12	M_r12 =	599	(mg/s)
ass Ilan				
R Ba	mass flux in river at PM-13	M_r13 =	3678	(mg/s)
	Т	1		
L tior				
utec	concentration in river at PM-12	C_r12 =	7.11	(mg/l)
sula cer				
Calc	concontration in river at PM 12	C r12	0.40	(mc/l)
00	Loncentration in river at PM-13	∪_ri3 =	8.12	(mg/i)
ç				
Jatio				,
vec	Observed concentration in river at PM-12 for flows at PM-13 of 10-	20 cfs	5.23	(mg/l)
ser nce				
S S	Observed concentration in river at PM-13 for flows of 10-20 cfs		5.27	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Chloride: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0.26 cfs

-				
	surface water flow into PM-12	Q_s12 =	1.59	(cfs)
ate	surface water flow into PM-13	Q_s13 =	7.75	(cfs)
Ö	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
Ň	Area 5 Pit NW discharge	Q_spit =	0.26	(CIS)
Ĕ	LTVSMC Tallings Basin seepage	$Q_{1S} =$	0.00	(CIS)
t	around water flow into PM 12	$Q_{12} = 0$	0.00	(CIS)
du	ground water flow into PM-13	$Q_{g12} = 0$	4 21	(cfs)
		<u>~_</u> 9∶0		(0.0)
đ	concentration of surface water into PM-12	C_s12 =	10	(mg/l)
Dati	concentration of surface water into PM-13	C_s13 =	10	(mg/l)
– uo	concentration of WWTP discharge	C_sBab =	10	(mg/l)
trati	concentration of Area 5 Pit NW discharge	C_spit =	5.95	(mg/l)
cent	concentration of LTVSMC Tailings Basin seepage	C_fs =	21.54	(mg/l)
ouo	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
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)
_ e	flow in river at PM-12	Q_r12 =	2.98	(cfs)
ate alar	flow in river at PM-13	Q_r13 =	16.00	(cfs)
≥ ä	flow check	Q_ck =	16.00	(cfs)
	mass flux of surface water into PM-12	M_s12 =	449	(mg/s)
Ę.	mass flux of surface water into PM-13	M_\$13 =	2194	(mg/s)
	concentration of Area 5 Pit NW discharge	M_SDAD =	93	(mg/s)
lr tio	concentration of LTVSMC Tailings Basin seepage	$M_spit =$	610	(mg/s)
ла Т	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	010	(mg/s) (mg/s)
alcu	mass flux of ground water into PM-12	M g12 =	44	(mg/s)
υŝ	mass flux of ground water into PM-13	M_g13 =	214	(mg/s)
			•	
e.	mood flux in river at DM 10	M -10	E07	(ma/s)
s	mass flux in river at PM-12	M_r12 =	587	(mg/s)
Mass 3alance	mass flux in river at PM-12	M_r12 =	3648	(mg/s)
Mass Balance	mass flux in river at PM-12 mass flux in river at PM-13	M_r12 = M_r13 =	587 3648	(mg/s) (mg/s)
Mass Dn Balance	mass flux in river at PM-12 mass flux in river at PM-13	M_r12 = M_r13 =	587 3648	(mg/s) (mg/s)
d Mass ation Balance	mass flux in river at PM-12 mass flux in river at PM-13	M_r12 = M_r13 =	587 3648	(mg/s) (mg/s)
ated Mass intration Balance	mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-12	M_r12 = M_r13 = C_r12 =	587 3648 <u>6.96</u>	(mg/s) (mg/s) (mg/l)
culated Mass crentration Balance	mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-12	M_r12 = M_r13 = C_r12 =	587 3648 6.96	(mg/s) (mg/s) (mg/l)
Calculated Mass Concentration Balance	mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-12 concentration in river at PM-13	M_r12 = M_r13 = C_r12 = C_r13 =	587 3648 6.96	(mg/s) (mg/s) (mg/l)
Calculated Mass Concentration Balance	mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-12 concentration in river at PM-13	M_r12 = M_r13 = C_r12 = C_r13 =	587 3648 6.96 8.06	(mg/s) (mg/s) (mg/l)
Calculated Mass on Concentration Balance	mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-12 concentration in river at PM-13	M_r12 = M_r13 = C_r12 = C_r13 =	587 3648 6.96 8.06	(mg/s) (mg/s) (mg/l) (mg/l)
d Calculated Mass ration Concentration Balance	mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-12 concentration in river at PM-13	M_r12 = M_r13 = C_r12 = C_r13 =	587 3648 6.96 8.06	(mg/s) (mg/s) (mg/l) (mg/l)
ved Calculated Mass entration Concentration Balance	mass flux in river at PM-12 mass flux in river at PM-13 concentration in river at PM-12 concentration in river at PM-13 Observed concentration in river at PM-12 for flows at PM-13 of 10-	M_r12 = M_r13 = C_r12 = C_r13 = 20 cfs	587 3648 6.96 8.06	(mg/s) (mg/s) (mg/l) (mg/l)

Observed concentration in river at PM-13 for flows of 10-20 cfs

5.27 (mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Copper: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0 cfs

	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
ata	surface water flow into PM-13	Q_s13 =	0.00	(cfs)
õ	Babbitt WWTP discharge	Q_sBab =	0.33	(cts)
Ň	Area 5 Pit NW discharge	$Q_spit =$	0.00	(CfS)
Ĕ	LTVSMC Tallings Basin seepage	$Q_{1S} =$	0.00	(CIS)
ort	around water flow into PM-12	$Q_{13} = 0.012 = 0.012$	0.00	(cfs)
du	ground water flow into PM-13	Q_g12 =	4.21	(cfs)
				\ /
ធុ	concentration of surface water into PM-12	C_s12 =	1.5	(µg/l)
n Dat	concentration of surface water into PM-13	C_s13 =	1.5	(µg/l)
tion	concentration of WWTP discharge	C_sBab =	1.5	(µg/l)
itrat	concentration of Area 5 Pit NW discharge	C_spit =	3.5	(µg/l)
cen	concentration of LTVSMC Tailings Basin seepage	C_fs =	4.55	(µg/l)
uo O	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out 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)
jr Nce	flow in river at PM-12	Q_r12 =	1.19	(cfs)
/at∈ alaı	flow in river at PM-13	Q_r13 =	5.40	(cfs)
2 2	flow check	Q_ck =	5.40	(cfs)
	langes flow of surface under inte DM 40	M = 10	0	(
	mass flux of surface water into PM-12	M_\$12 =	0	(µg/s)
of	mass flux of Sunace water into FM-13	$M_SIS =$ M_sBab -	14	(µg/s) (µg/s)
ц Ц	concentration of Area 5 Pit NW discharge	M_spit =	0	(µg/s) (µa/s)
atio	concentration of LTVSMC Tailings Basin seepage	M fs =	0	(µg/s)
s F	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(µg/s)
alc ass	mass flux of ground water into PM-12	M_g12 =	97	(µg/s)
ΰΣ	mass flux of ground water into PM-13	M_g13 =	477	(µg/s)
e	mass flux in river at PM-12	M_r12 =	111	(µg/s)
ass Ilan				
Ba Ba	mass flux in river at PM-13	M_r13 =	588	(µg/s)
tio_				
ted	concentration in river at PM-12	C_r12 =	3.32	(µg/l)
ula Sen				
alc				
00	concentration in river at PM-13	C_r13 =	3.85	(µg/l)
–				
ttion				
red ntra	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	1.19	(µg/l)
erv cer				
SdC	Observed espectation in river at DM 12 for flows a 10 of		1.20	(ug/l)
00	Observed concentration in river at PNI-13 for nows < 10 CIS		1.30	(µg/I)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Copper: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0.26 cfs

	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
ata	Surface water flow into PM-13	Q_s13 =	0.00	(cfs)
õ	Babbitt WWIP discharge	Q_SBab =	0.33	(CfS)
Š	I TVSMC Tailings Basin seenage	$\alpha_{spit} = 0$	0.26	(CIS)
Ē	Hydrometallurgical Residue Cells Liner Leakage	Q rrs =	0.00	(cfs)
out	ground water flow into PM-12	Q_g12 =	0.86	(cfs)
L L	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
	r			
ה ניס	concentration of surface water into PM-12	C_s12 =	1.5	(µg/l)
Dat	concentration of surface water into PM-13	C_s13 =	1.5	(µg/l)
tion	concentration of WWTP discharge	C_sBab =	1.5	(µg/l)
ıtrat	concentration of Area 5 Pit NW discharge	C_spit =	3.5	(µg/l)
Cen	concentration of LTVSMC Tailings Basin seepage	C_fs =	4.55	(µg/l)
ono	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
ut C	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)
, jo	flow in river at PM-12	Q_r12 =	1.23	(cfs)
/ate alar	flow in river at PM-13	Q_r13 =	5.66	(cfs)
≥ ¤	flow check	Q_ck =	5.66	(cfs)
	mass flux of surface water into PM-12	M_s12 =	0	(µg/s)
Ę	mass flux of surface water into PM-13	$IVI_S13 =$	0	$(\mu g/s)$
	concentration of Area 5 Pit NW discharge	M spit =	26	(µg/s) (µg/s)
ilux Iux	concentration of LTVSMC Tailings Basin seepage	M_fs =	0	(µg/s)
s F	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(µg/s)
alc las	mass flux of ground water into PM-12	M_g12 =	97	(µg/s)
ΟΣ	mass flux of ground water into PM-13	M_g13 =	477	(µg/s)
		<u> </u>	,	
e	mass flux in river at PM-12	M_r12 =	111	(µg/s)
ass Ian			()	
Ma Ba	mass flux in river at PM-13	M_r13 =	614	(µg/s)
		-		
ion				
ed trat	concentration in river at PM-12	C r12 =	3.20	(µa/l)
ulat		<u></u>	0.20	\r°∵''/
alci				
00	concentration in river at PM-13	C_r13 =	3.83	(µg/l)
-				i
tior				
ed	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	1.19	(µg/l)
erv				
SdC	Observed concentration in view at DM to faulty at 10. f		1.00	(11~/1)
00	Observed concentration in river at PM-13 for flows < 10 cfs		1.30	·(μg/I)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Copper: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0 cfs

	surface water flow into PM-12	Q_s12 =	1.89	(cfs)
ata	surface water flow into PM-13	Q_s13 =	9.21	(cfs)
ä	Babbitt WWIP discharge	Q_sBab =	0.33	(cts)
Ň	Area 5 Pit NW discharge	$Q_spit =$	0.00	(CIS)
Ĕ	LTVSMC Tallings Basin seepage	$Q_{IS} =$	0.00	(CIS) (cfs)
prt	around water flow into PM-12	$Q_{13} = 0$	0.00	(cfs)
du	ground water flow into PM-13	Q q13 =	4.21	(cfs)
		0		\/
ធុ	concentration of surface water into PM-12	C_s12 =	1.5	(µg/l)
Dati	concentration of surface water into PM-13	C_s13 =	1.5	(µg/l)
tion	concentration of WWTP discharge	C_sBab =	1.5	(µg/l)
ıtrat	concentration of Area 5 Pit NW discharge	C_spit =	3.5	(µg/l)
Ser	concentration of LTVSMC Tailings Basin seepage	C_fs =	4.55	(µg/l)
Conc	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out O	concentration of ground water flow into PM-12	C_g12 =	4	(µg/l)
lup	concentration of ground water flow into PM-13	C_g13 =	4	(µg/l)
Jce Jce	flow in river at PM-12	Q_r12 =	3.06	(cfs)
/ate alaı	flow in river at PM-13	Q_r13 =	16.50	(cfs)
≥ ¤	flow check	Q_ck =	16.50	(cfs)
	mass flux of surface water into PM-12	M_s12 =	08	(µg/s)
Ę	mass flux of Surface water Into PM-13	$M_SI3 =$	391	(µg/s)
u v	concentration of Area 5 Pit NW discharge	$M_spit =$	0	(µg/s) (µg/s)
itio	concentration of LTVSMC Tailings Basin seepage	M_spit = $M fs =$	0	(µg/s) (µa/s)
ula s F	concentration of Hydrometallurgical Residue Cells Liner Leakage	M rrs =	0	(µg/s)
alc ass	mass flux of ground water into PM-12	 Mg12 =	97	(µg/s)
ΰΞ	mass flux of ground water into PM-13	M_g13 =	477	(µg/s)
e S	mass flux in river at PM-12	M_r12 =	191	(µg/s)
ass Ian				
Ma Ba	mass flux in river at PM-13	M_r13 =	1059	(µg/s)
_				
tio				
tra	concentration in river at PM-12	C r12 =	2.21	(µg/l)
ula: Sen				
alci				
ÖÖ	concentration in river at PM-13	C_r13 =	2.27	(µg/l)
~	I			
tior				
ed tra	Observed concentration in river at PM-12 for flows at PM-13 of 10-	20 cfs	2.06	(µg/l)
er v				
bsd				
00	Observed concentration in river at PM-13 for flows of 10-20 cfs		1.88	(µg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Copper: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0.26 cfs

	surface water flow into PM-12	Q_s12 =	1.84	(cfs)
ata	surface water flow into PM-13	Q_s13 =	9.00	(cfs)
Ő	Babbitt WWIP discharge	Q_sBab =	0.33	(CfS)
Ň	Area 5 Pit NW discharge	$Q_spit =$	0.26	(CIS)
Ē	Hydrometallurgical Residue Cells Liner Leakage	$Q_{1S} = 0$ rrs =	0.00	(cfs)
put	ground water flow into PM-12	$Q_{a12} =$	0.86	(cfs)
d L	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
ង	concentration of surface water into PM-12	C_s12 =	1.5	(µg/l)
חם ח	concentration of surface water into PM-13	C_s13 =	1.5	(µg/l)
tion	concentration of WWTP discharge	C_sBab =	1.5	(µg/l)
itrat	concentration of Area 5 Pit NW discharge	C_spit =	3.5	(µg/l)
Ser	concentration of LTVSMC Tailings Basin seepage	C_fs =	4.55	(µg/l)
Sone	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
nt O	concentration of ground water flow into PM-12	C_g12 =	4	(µg/l)
dul	concentration of ground water flow into PM-13	C_g13 =	4	(µg/l)
	flow in river at PM-12	Q_r12 =	3.06	(cfs)
/ate alar	flow in river at PM-13	Q_r13 =	16.50	(cfs)
≥ ä	flow check	Q_ck =	16.50	(cfs)
	mass flux of surface water into PM-12	M_s12 =	78	(µg/s)
Ę	mass flux of surface water into PM-13	$M_sBab =$	382	(µg/s)
с	concentration of Area 5 Pit NW discharge	M spit -	26	(µg/s) (µg/s)
lux Tux	concentration of LTVSMC Tailings Basin seebage	M_spit = $M = 1$	0	(µg/s)
л Ia л Па	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(µg/s)
alci ass	mass flux of ground water into PM-12	 Mg12 =	97	(µg/s)
ΰĔ	mass flux of ground water into PM-13	M_g13 =	477	(µg/s)
e	mass flux in river at PM-12	M r12 =	190	(µg/s)
lan				(r-3, -)
Ma Bal	mass flux in river at PM-13	M_r13 =	1074	(µg/s)
on				
ed rati	concontration in river at PM 12	C r12	2.10	(ug/l)
llaté enti		0_112 =	2.19	(µg/I)
llcu				
ပိပိ	concentration in river at PM-13	C_r13 =	2.30	(µg/l)
uo				
id rati	Observed concentration in river at PM-12 for flows at PM-13 of 10-	20 cfs	2.06	(ua/l)
ent		20 013	2.00	(P9/1)
onc				
ŏŏ	Observed concentration in river at PM-13 for flows of 10-20 cfs		1.88	(µg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Fluoride: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0 cfs

	surface water flow into PM-12	Q s12 =	0.00	(cfs)
ង	surface water flow into PM-13	Q s13 =	0.00	(cfs)
Dat	Babbitt WWTP discharge	Q sBab =	0.33	(cfs)
>	Area 5 Pit NW discharge	Q spit =	0.00	(cfs)
<u>م</u>	LTVSMC Tailings Basin seepage	Q fs =	1.70	(cfs)
L L	Hydrometallurgical Residue Cells Liner Leakage	Q rrs =	0.00	(cfs)
pri	ground water flow into PM-12	Q g12 =	0.86	(cfs)
Ē	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
ď	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)
io.	concentration of WWTP discharge	C_sBab =	0.2	(mg/l)
trat	concentration of Area 5 Pit NW discharge	C_spit =	0.125	(mg/l)
eni	concentration of LTVSMC Tailings Basin seepage	C_fs =	1.55	(mg/l)
Conc	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out C	concentration of ground water flow into PM-12	C_g12 =	0.385	(mg/l)
Inp	concentration of ground water flow into PM-13	C_g13 =	0.385	(mg/l)
			·	
lce Jce	flow in river at PM-12	Q_r12 =	1.47	(cfs)
ate alaı	flow in river at PM-13	Q_r13 =	7.10	(cfs)
B ≪	flow check	Q_ck =	7.10	(cfs)
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
	mass flux of surface water into PM-13	M_s13 =	0	(mg/s)
of	mass flux of Babbitt WWTP	M_sBab =	2	(mg/s)
u S ≥	concentration of Area 5 Pit NW discharge	M_spit =	0	(mg/s)
Flu	concentration of LTVSMC Tailings Basin seepage	M_fs =	75	(mg/s)
l s	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc las	mass flux of ground water into PM-12	M_g12 =	9	(mg/s)
O≥	mass flux of ground water into PM-13	M_g13 =	46	(mg/s)
		1		
Ð	mass flux in river at PM 12	M r10	4.4	(ma/a)
ss anc		IVI_I I ∠ =	11	(mg/s)
Ma: 3ala	mass flux in river at PM-13	M r13 –	132	(ma/s)
		<u>[M_110 -</u>	102	(119/3)
_ ۲				
tio –				
tra	concentration in river at PM-12	C r12 =	0.27	(mg/l)
ulai en				、 U /
nc tlo				
ပိပိ	concentration in river at PM-13	C_r13 =	0.66	(mg/l)
	·			
n				
J atic				
/ec ntr	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	0.17	(mg/l)
cel				
sdo			0.00	, m
00	Observed concentration in river at PM-13 for flows < 10 cfs		0.63	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Fluoride: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0.26 cfs

		-		
	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
ata	surface water flow into PM-13	Q_s13 =	0.00	(cfs)
Ö	Babbitt WWTP discharge	Q_sBab =	0.33	(cts)
Ň	Area 5 Mit NW discharge	$Q_spit =$	0.26	(CIS)
비	LIVSINU Tallings Basin seepage	Q_IS =	1./0	(CIS)
Ę	around water flow into PM 12	$Q_{12} = 0$	0.00	(CIS)
du	ground water flow into PM-13	$Q_{g12} = 0$	4 21	(cfs)
		<u>u_910</u> =		(0.0)
ŋ	concentration of surface water into PM-12	C_s12 =	0.2	(mg/l)
Dati	concentration of surface water into PM-13	C_s13 =	0.2	(mg/l)
ion	concentration of WWTP discharge	C_sBab =	0.2	(mg/l)
trat	concentration of Area 5 Pit NW discharge	C_spit =	0.125	(mg/l)
Sen	concentration of LTVSMC Tailings Basin seepage	C_fs =	1.55	(mg/l)
Sono	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
ut C	concentration of ground water flow into PM-12	C_g12 =	0.385	(mg/l)
lnp	concentration of ground water flow into PM-13	C_g13 =	0.385	(mg/l)
ar Nce	flow in river at PM-12	Q_r12 =	1.52	(cfs)
/ate alaı	flow in river at PM-13	Q_r13 =	7.36	(cfs)
2 m	flow check	Q_ck =	7.36	(cfs)
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
÷	mass flux of surface water into PM-13	M_\$13 =	0	(mg/s)
	mass nux of Babbill WWTP	M_SBab =	<u> </u>	(mg/s)
lux lio	concentration of LTVSMC Tailings Basin seenage	$M_{spit} =$	75	(mg/s)
л Т П	concentration of Hydrometallurgical Besidue Cells Liner Leakage	M_rrs =	,0	(mg/s)
alct	mass flux of ground water into PM-12	M g12 =	9	(mg/s)
ΰË	mass flux of ground water into PM-13	M_g13 =	46	(mg/s)
				_ /
Φ		M . 40		(()
ss anc	mass flux in river at PM-12	M_r12 =	11	(mg/s)
Ma: Bali	mass flux in river at PM-13	M_r13 =	133	(mg/s)
u				
∋d rati	concentration in river at DM 12	0 112	0.00	(ma/l)
lat(0_112 =	0.20	(III <u>Y</u> /I)
licu				
ပိပိ	concentration in river at PM-13	C_r13 =	0.64	(mg/l)
u o				
od Trati	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	0.17	(mg/l)
ent			0.17	\···ˈ9/ '/
ose				
öö	Observed concentration in river at PM-13 for flows < 10 cfs		0.63	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Fluoride: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0 cfs

	surface water flow into PM-12	Q_s12 =	0.87	(cfs)
ata	surface water flow into PM-13	Q_s13 =	4.23	(cfs)
Ö	Babbitt WWIP discharge	Q_SBab =	0.33	(CIS)
Ň	I TVSMC Tailings Basin seenage	$\Omega_{spil} = 0$	6.00	(cfs)
Ē	Hydrometallurgical Residue Cells Liner Leakage	$Q_{rrs} =$	0.00	(cfs)
out	ground water flow into PM-12	Q_g12 =	0.86	(cfs)
<u> </u>	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
ធ	concentration of surface water into PM-12	C_s12 =	0.2	(mg/l)
Dat	concentration of surface water into PM-13	C_s13 =	0.2	(mg/l)
tion	concentration of WWTP discharge	C_sBab =	0.2	(mg/l)
trat	concentration of Area 5 Pit NW discharge	C_spit =	0.125	(mg/l)
Cen	concentration of LTVSMC Tailings Basin seepage	C_fs =	1.55	(mg/l)
Sone	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out C	concentration of ground water flow into PM-12	C_g12 =	0.385	(mg/l)
lnp	concentration of ground water flow into PM-13	C_g13 =	0.385	(mg/l)
	1			
ar Jce	flow in river at PM-12	Q_r12 =	3.06	(cfs)
/ate alar	flow in river at PM-13	Q_r13 =	16.50	(cfs)
≤ ä	flow check	Q_ck =	16.50	(cfs)
	man flux of surface water into DM 40	M -10	-	(
	mass flux of surface water into PM-12	$IVI_S12 =$	5	(mg/s)
of	mass flux of Babbitt WWTP	$M_sBab =$	24	(mg/s) (mg/s)
с К	concentration of Area 5 Pit NW discharge	M_spit =	0	(mg/s)
atic	concentration of LTVSMC Tailings Basin seepage	M_fs =	263	(mg/s)
suls F S	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc las	mass flux of ground water into PM-12	M_g12 =	9	(mg/s)
0≥	Imass flux of ground water into PM-13	M_g13 =	46	(mg/s)
Jce	mass flux in river at PM-12	M_r12 =	16	(mg/s)
ass ılar				
Ba Ba	mass flux in river at PM-13	M_r13 =	349	(mg/s)
- -				
tio_				
Ited	concentration in river at PM-12	C_r12 =	0.19	(mg/l)
ula cen				
alc		010	0.77	(II)
00	concentration in river at PM-13	U_r13 =	0.75	(mg/l)
2				
- atio				
ved ntra	Observed concentration in river at PM-12 for flows at PM-13 of 10-	20 cfs	0.11	(mg/l)
sen				
Cor Cor	Observed concentration in river at PM-13 for flows of 10-20 cfs		0.76	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Fluoride: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0.26 cfs

	surface water flow into PM-12	Q_s12 =	0.82	(cfs)
ata	surface water flow into PM-13	Q_s13 =	4.02	(cfs)
Ő	Babbitt WWIP discharge	Q_sBab =	0.33	(CfS)
× 0	Area 5 Mil NW discharge	$Q_spit =$	0.26	(CIS)
Ĕ	Hydrometallurgical Residue Cells Liner Leakage	$Q_{1S} =$	0.00	(cfs)
put	around water flow into PM-12	$Q_{q12} =$	0.86	(cfs)
	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
		· · ·		
ង	concentration of surface water into PM-12	C_s12 =	0.2	(mg/l)
Dat	concentration of surface water into PM-13	C_s13 =	0.2	(mg/l)
tion	concentration of WWTP discharge	C_sBab =	0.2	(mg/l)
ıtrat	concentration of Area 5 Pit NW discharge	C_spit =	0.125	(mg/l)
cen	concentration of LTVSMC Tailings Basin seepage	C_fs =	1.55	(mg/l)
Sone	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
ut C	concentration of ground water flow into PM-12	C_g12 =	0.385	(mg/l)
lnp	concentration of ground water flow into PM-13	C_g13 =	0.385	(mg/l)
	1			
ir Jce	flow in river at PM-12	Q_r12 =	3.06	(cfs)
/ate alar	flow in river at PM-13	Q_r13 =	16.50	(cfs)
≥ ä	flow check	Q_ck =	16.50	(cfs)
				(
	mass flux of surface water into PM-12	M_s12 =	5	(mg/s)
Ę	mass nux of surface water into PM-13	$\frac{ V _S J}{M_SBab} =$	23	(mg/s)
L L	concentration of Area 5 Pit NW discharge	$M_{spit} =$	2	(mg/s)
ttio Tux	concentration of LTVSMC Tailings Basin seepage	M fs =	263	(mg/s)
s T a	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc ass	mass flux of ground water into PM-12		9	(mg/s)
ΰË	mass flux of ground water into PM-13	M_g13 =	46	(mg/s)
		1		
ce	mass flux in river at PM-12	M_r12 =	16	(mg/s)
iss Ian		_		, y -/
Ma Ba	mass flux in river at PM-13	M_r13 =	349	(mg/s)
ion				
trat	concentration in river at PM-12	C r12 =	0.18	(mg/l)
ulat			00	\`` ` .''
alci onc				
ΟÖ	concentration in river at PM-13	C_r13 =	0.75	(mg/l)
tior				
red ntra	Observed concentration in river at PM-12 for flows at PM-13 of 10-	20 cfs	0.11	(mg/l)
erv cer				
Obs	Observed concentration in river at PM-13 for flows of 10-20 cfs		0.76	(ma/l)
			0.70	\····ອ/ ·/

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Iron: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0 cfs

	surface water flow into DM 12	0.012	0.00	(ofc)
м	Surface water flow into PM 13	$\Box_{312} =$	0.00	(ofe)
ata	Dabbitt M/M/TD disabarga	$Q_{313} =$	0.00	(ofc)
	Aroa 5 Dit NIM discharge	$Q_sdu =$	0.33	(cfc)
Ň	Area 5 Fillinge Basin soonage	$Q_spit =$	0.00	(cfs)
Ē	Li volvo Tallings Dasiri seepage	$Q_{1S} =$	2.00	(CIS)
t	around water flow into DM 12	$Q_{15} =$	0.00	(cfc)
du	ground water flow into PM-12	$Q_y z = 0$ a13 -	0.00	(cfs)
—	Iground water now into 1 M-15	<u>v_</u> gib =	4.21	(015)
				<i>(</i>
ក្ន	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)
tion	concentration of WWTP discharge	C_sBab =	2.9	(mg/l)
itrat	concentration of Area 5 Pit NW discharge	C_spit =	0.038	(mg/l)
Ser Cert	concentration of LTVSMC Tailings Basin seepage	C_fs =	4.594	(mg/l)
ono	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
ut C	concentration of ground water flow into PM-12	C_g12 =	0.035	(mg/l)
lnp	concentration of ground water flow into PM-13	C_g13 =	0.035	(mg/l)
		1		
r eo	flow in river at PM-12	Q_r12 =	1.66	(cfs)
/ate alar	flow in river at PM-13	Q_r13 =	8.20	(cfs)
N N B	flow check	Q_ck =	8.20	(cfs)
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
	mass flux of surface water into PM-13	M_s13 =	0	(mg/s)
of	mass flux of Babbitt WWTP	M_sBab =	27	(mg/s)
ы	concentration of Area 5 Pit NW discharge	M_spit =	0	(mg/s)
atic Flu	concentration of LTVSMC Tailings Basin seepage	M_fs =	364	(mg/s)
s H s	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc las	mass flux of ground water into PM-12	M_g12 =	1	(mg/s)
υΣ	mass flux of ground water into PM-13	M_g13 =	4	(mg/s)
Ð	and a final in viscou at DM 10	M =10		(
ss anc	mass flux in river at PM-12	IVI_112 =	28	(mg/s)
/las Sala	mean flux in viver at DM 10	M =10	000	(magu/=)
2 ₫	Imass nux in river at PM-13	IVI_13 =	396	(mg/s)
-				
ior				
ed rat	concontration in river at PM 12	C r12	0.50	(ma/l)
lat(0_112 =	0.59	(mg/l)
noe Cr				
Cal	concentration in river at PM-13	C r13 -	1 71	(ma/l)
		0_115 =	1.71	(mg/l)
- -				
tion				
iral d	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	2.41	(ma/l)
enți e				\ 3 ''/
se				
ဗိဝိ	Observed concentration in river at PM-13 for flows < 10 cfs		1.52	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Iron: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0.26 cfs

	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
ata	surface water flow into PM-13	Q_s13 =	0.00	(cfs)
õ	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
Ň	Area 5 Pit NW discharge	Q_spit =	0.26	(cfs)
Ĕ	LTVSMC Tallings Basin seepage	$Q_{1S} =$	2.90	(CIS)
ort	around water flow into PM-12	$Q_{15} = 0.012 - 0.012$	0.00	(cfs)
du	ground water flow into PM-13	Q_g12 =	4.21	(cfs)
		_ 9 · ·		()
ŋ	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)
<u>o</u>	concentration of WWTP discharge	C_sBab =	2.9	(mg/l)
itrat	concentration of Area 5 Pit NW discharge	C_spit =	0.038	(mg/l)
Cen	concentration of LTVSMC Tailings Basin seepage	C_fs =	4.594	(mg/l)
one	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out C	concentration of ground water flow into PM-12	C_g12 =	0.035	(mg/l)
Inp	concentration of ground water flow into PM-13	C_g13 =	0.035	(mg/l)
	1			
er nce	flow in river at PM-12	Q_r12 =	1.72	(cfs)
/ate alaı	flow in river at PM-13	Q_r13 =	8.56	(cfs)
2 m	flow check	Q_ck =	8.56	(cfs)
			_	
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
f	mass flux of surface water into PM-13	M_\$13 =	0	(mg/s)
	mass nux of Babbill WWTP	M_SBab =	27	(mg/s)
lux tio	concentration of LTVSMC Tailings Basin seepage	$M_spit =$	377	(mg/s) (mg/s)
ula л	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0,11	(mg/s)
alci	mass flux of ground water into PM-12	M_g12 =	1	(mg/s)
ΰË	mass flux of ground water into PM-13	M_g13 =	4	(mg/s)
e	mass flux in river at PM-12	M r12 =	28	(ma/s)
ss and			20	(<u>9</u> , 0)
Ma Bal	mass flux in river at PM-13	M_r13 =	409	(mg/s)
u.				
ed	concentration in river at DM 10	0 110	0.57	(mc/l)
late		0_f12 =	0.57	(mg/i)
no.				
Cal	concentration in river at PM-13	C r13 =	1.69	(ma/l)
			1.00	\···ອ·'/
L L				
y atic				
vec	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	2.41	(mg/l)
ser				
să c	Observed concentration in river at PM-13 for flows < 10 cfs		1.52	(ma/l)
				······

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Iron: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0 cfs

	surface water flow into PM-12	Q_s12 =	1.89	(cfs)
ata	Surface water flow into PM-13	Q_s13 =	9.21	(cfs)
D	Babbitt WW I P discharge	Q_sBab =	0.33	(cts)
Ň	Area 5 Mit NW discharge	Q_spit =	0.00	(CIS)
드	Hydrometallurgical Residue Cells Liner Leakage	ບ_15 = () rre –	0.00	(CIS) (Cfe)
ŗ	ground water flow into PM-12	Q a12 =	00.0 AR ()	(cfs)
du	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
				· · ·
ה מ	concentration of surface water into PM-12	C_s12 =	2.9	(mg/l)
Dati	concentration of surface water into PM-13	C_s13 =	2.9	(mg/l)
ion	concentration of WWTP discharge	C_sBab =	2.9	(mg/l)
trat	concentration of Area 5 Pit NW discharge	C_spit =	0.038	(mg/l)
Sent	concentration of LTVSMC Tailings Basin seepage	C_fs =	4.594	(mg/l)
ond	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
ut 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)
	1		· · · · ·	
r Jce	flow in river at PM-12	Q_r12 =	3.06	(cfs)
/ate alar	flow in river at PM-13	Q_r13 =	16.50	(cfs)
≤ mã	tlow check	Q_ck =	16.50	(cfs)
	Image flow of environmental star DNA do	M - 10		(m; ; /)
	mass nux or surface water Into PM-12	$\frac{ V _S 2}{M_{c12}} =$	155	(mg/s)
f	mass flux of Babbitt WWTP	ໜ_ຣ≀ວ = M_sRah –	/56 27	(mg/s) (mg/s)
E V	concentration of Area 5 Pit NW discharge	M spit =	<u>د م</u>	(ma/s)
ilux ilux	concentration of LTVSMC Tailings Basin seepage	 M_fs =	0	(mg/s)
e la s H	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc as:	mass flux of ground water into PM-12	M_g12 =	1	(mg/s)
UΣ	mass flux of ground water into PM-13	M_g13 =	4	(mg/s)
	1			
ce	mass flux in river at PM-12	M_r12 =	183	(mg/s)
ass lan				
Má Ba	mass flux in river at PM-13	M_r13 =	943	(mg/s)
	1			
tior				
Itec	concentration in river at PM-12	C_r12 =	2.11	(mg/l)
ula cen				
alc	concentration in time at DM 10	0 -10	0.00	(me = //)
00	concentration in river at PM-13	U_113 =	2.02	(mg/l)
C	1			
H atio				
veo ntra	Observed concentration in river at PM-12 for flows at PM-13 of 10-	20 cfs	3.43	(mg/l)
sen				
Co Co	Observed concentration in river at PM-13 for flows of 10-20 cfs		1.75	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Iron: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0.26 cfs

Real Property lies and the second sec				
	surface water flow into PM-12	Q_s12 =	1.84	(cfs)
ata	surface water flow into PM-13	Q_s13 =	9.00	(cfs)
ä	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
Ň	Area 5 Pit NW discharge	Q_spit =	0.26	(cfs)
Ц Ц	LIVSING Tallings Basin seepage		0.00	(CIS)
rt	ryurometanurgical Residue Cells Liner Leakage	$Q_{IIS} =$	0.00	(CIS)
du	ground water flow into PM-12	Q_gi∠ = 0_g13 =	0.86	(CIS)
	Iground water now into t M-10	<u>v_</u> gio =	4.21	(013)
	concentration of surface water into PM-12	C s12 =	2.9	(mg/l)
Data	concentration of surface water into PM-13	 C_s13 =	2.9	(mg/l)
on [concentration of WWTP discharge	C_sBab =	2.9	(mg/l)
trati	concentration of Area 5 Pit NW discharge	C_spit =	0.038	(mg/l)
ent	concentration of LTVSMC Tailings Basin seepage	C_fs =	4.594	(mg/l)
onc	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
ut O	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)
	I contraction of the second seco			
L L L L L L L L L L L L L L L L L L L	flow in river at PM-12	Q_r12 =	3.06	(cfs)
/ate alar	flow in river at PM-13	Q_r13 =	16.50	(cfs)
ž K	flow check	Q_ck =	16.50	(cfs)
	mass flux of surface water into PM-12	M_s12 =	151	(mg/s)
<u>т</u>	mass flux of surface water into PM-13	M_s13 =	738	(mg/s)
0	mass flux of Babbitt WWTP	M_sBab =	27	(mg/s)
ux u	concentration of Area 5 Pit NW discharge	IVI_Spit =	0	(mg/s)
Fl	concentration of LIVSIVIC Tallings Basin seepage	IVI_IS =	0	(mg/s)
ss	mass flux of ground water into PM-12	$M_{012} =$	1	(mg/s)
Cal Va	mass flux of ground water into PM-13	$M_{013} =$	4	(mg/s)
<u> </u>		<u></u>	7	(····9/3)
s nce	mass flux in river at PM-12	M_r12 =	179	(mg/s)
las: ala				
Σä	mass flux in river at PM-13	M_r13 =	922	(mg/s)
-				
tio				
trat	concentration in river at PM-12	C r12 =	2.07	(mg/l)
ulat ent			,	\ ··· ·· /
alct				
ပိပိ	concentration in river at PM-13	C_r13 =	1.97	(mg/l)
on				
d rati	Observed concentration in river at PM-12 for flows at PM 13 of 10-	20 cfs	3 / 3	(ma/l)
rve ent		20 013	0.40	(''' <u>9</u> /'')
) Se				
ວິວິ	Observed concentration in river at PM-13 for flows of 10-20 cfs		1.75	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Magnesium: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0 cfs

E C	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
ata	Surface water flow into PM-13	Q_s13 =	0.00	(cfs)
Ö	Babbitt WW I P discharge	Q_sBab =	0.33	(Cts)
Ň	I TVSMC Tailings Rasin seenage	$Q_spit = 0$	0.00	(CIS)
Ĕ	Hydrometallurgical Residue Cells Liner Leakage	Q_is = 0_rrs =	0.00	(cfs)
put	ground water flow into PM-12	Q q12 =	0.86	(cfs)
	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
				·
ង	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)
ntrat	concentration of Area 5 Pit NW discharge	C_spit =	271	(mg/l)
Ce L	concentration of LTVSMC Tailings Basin seepage	C_fs =	69.97	(mg/l)
Cone	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out O	concentration of ground water flow into PM-12	C_g12 =	10.65	(mg/l)
lnp	concentration of ground water flow into PM-13	C_g13 =	10.65	(mg/l)
	 I			
ir Jce	flow in river at PM-12	Q_r12 =	1.49	(cfs)
/ate alar	flow in river at PM-13	Q_r13 =	7.20	(cfs)
ڭ <	Itlow check	Q_ck =	7.20	(cfs)
	Impose flux of outpose water into DM 10	M -10	~	(meta)
	mass flux of surface water into PM-12	$\frac{ V _S 2}{M_{c12}} =$	0	(Ing/S)
of	mass flux of Babbitt WWTP	M_sBab =	56	(ma/s)
E V	concentration of Area 5 Pit NW discharge	M_spit =	0	(mg/s)
atic	concentration of LTVSMC Tailings Basin seepage	M_fs =	3564	(mg/s)
s F s	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc las	mass flux of ground water into PM-12	M_g12 =	259	(mg/s)
ΟŽ	Imass flux of ground water into PM-13	M_g13 =	1269	(mg/s)
	Γ	1		
lce	mass flux in river at PM-12	M_r12 =	315	(mg/s)
ass Ilan				
Ba Ba	mass flux in river at PM-13	M_r13 =	5148	(mg/s)
	1	<u> </u>		
tior				
ted	concentration in river at PM-12	C_r12 =	7.47	(mg/l)
ula: Sen				
alconc				,
00	Iconcentration in river at PM-13	C_r13 =	25.27	(mg/l)
C.	Γ			
tion				
/ed	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	6.90	(mg/l)
erv cer				
sdC	Observed concentration in river at PM-13 for flows < 10 cfs		24 53	(ma/l)
			21.00	\

Observed concentration in river at PM-13 for flows < 10 cfs

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Magnesium: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0.26 cfs

-				
	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
ita	surface water flow into PM-13	Q_s13 =	0.00	(cfs)
Ö	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
Ň	Area 5 Pit NW discharge	Q_spit =	0.26	(cfs)
臣	LTVSMC Tailings Basin seepage	$Q_{ts} =$	0.30	(CfS)
t t	Hydrometallurgical Residue Cells Liner Leakage	$Q_{rrs} =$	0.00	(CIS)
du	ground water flow into PM-12	$Q_{g12} = 0.013 =$	0.00 4 21	(CIS) (cfs)
_		&_g10 =	7.21	(013)
æ	concentration of surface water into PM-12	C_s12 =	6	(mg/l)
Data	concentration of surface water into PM-13	C_s13 =	6	(mg/l)
on [concentration of WWTP discharge	C_sBab =	6	(mg/l)
rati	concentration of Area 5 Pit NW discharge	C_spit =	271	(mg/l)
cent	concentration of LTVSMC Tailings Basin seepage	C_fs =	69.97	(mg/l)
ond	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
O Tr	concentration of ground water flow into PM-12	C_g12 =	10.65	(mg/l)
Inpl	concentration of ground water flow into PM-13	C_g13 =	10.65	(mg/l)
_ e	flow in river at PM-12	Q_r12 =	1.28	(cfs)
ate alan	flow in river at PM-13	Q_r13 =	5.96	(cfs)
≥ ¤	flow check	Q_ck =	5.96	(cfs)
				, , , , ,
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
Ę	mass mux of surface water into PM-13	$IVI_S13 =$	0	(mg/s)
о Ц	concentration of Area 5 Pit NW discharge	M spit -	0C 1001	(mg/s)
tio lux	concentration of LTVSMC Tailings Rasin seepage	$M_{fs} =$	1994 594	(mg/s)
ла: Да	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
tlct	mass flux of ground water into PM-12	M g12 =	259	(mg/s)
υS	mass flux of ground water into PM-13	M_g13 =	1269	(mg/s)
	· · · · · · · · · · · · · · · · · · ·		I	/
Φ		M .:10	0.15	(
ss anc	Inass nux in river at PWI-12	IVI_12 =	315	(mg/s)
Mas Bala	mass flux in river at PM-13	M_r13 =	4172	(mg/s)
ion				
ed rat	concentration in river at PM-12	C r12 -	8 60	(ma/l)
at		5_112 -	0.09	(119/1)
lou				
ပ် ပိ	concentration in river at PM-13	C_r13 =	24.74	(mg/l)
uo				
d ation	Observed concentration in vivor at DM 40 for flours at DM 40 of a	0 efe	6.60	(ma/l)
ved	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	6.90	(mg/l)

24.53 (mg/l)

Observed concentration in river at PM-13 for flows < 10 cfs

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Magnesium: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0 cfs

	surface water flow into PM-12	Q s12 =	1.33	(cfs)
ក្ន	surface water flow into PM-13	Q s13 =	6.47	(cfs)
Dat	Babbitt WWTP discharge	Q sBab =	0.33	(cfs)
	Area 5 Pit NW discharge	Q spit =	0.00	(cfs)
<u>م</u>	LTVSMC Tailings Basin seepage	Q fs =	3.30	(cfs)
<u>ш</u>	Hydrometallurgical Residue Cells Liner Leakage	Q rrs =	0.00	(cfs)
DU	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 =	6	(ma/l)
Data	concentration of surface water into PM-13	C_s13 =	6	(mg/l)
on [concentration of WWTP discharge	C_sBab =	6	(mg/l)
ati	concentration of Area 5 Pit NW discharge	C spit =	271	(ma/l)
uti	concentration of LTV/SMC Tailings Basin accords	C fo	60.07	(mg/l)
lce		0_IS =	69.97	(mg/i)
Cor	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
oute	concentration of ground water flow into PM-12	C_g12 =	10.65	(mg/l)
	concentration of ground water flow into PM-13	C_g13 =	10.65	(mg/l)
	1			
lce Jce	flow in river at PM-12	Q_r12 =	3.06	(cfs)
/ate alar	flow in river at PM-13	Q_r13 =	16.50	(cfs)
≥ ä	flow check	Q_ck =	16.50	(cfs)
	mass flux of surface water into PM-12	M_s12 =	225	(mg/s)
	mass flux of surface water into PM-13	M_s13 =	1099	(mg/s)
of	mass flux of Babbitt WWTP	M_sBab =	56	(mg/s)
ы Б	concentration of Area 5 Pit NW discharge	M_spit =	0	(mg/s)
E afi	concentration of LTVSMC Tailings Basin seepage	M_fs =	6534	(mg/s)
s l s	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc as	mass flux of ground water into PM-12	M_g12 =	259	(mg/s)
ΩΣ	mass flux of ground water into PM-13	M_g13 =	1269	(mg/s)
0				
ů č	mass flux in river at PM-12	M_r12 =	540	(mg/s)
ase Mai				
Äя	mass flux in river at PM-13	M_r13 =	9443	(mg/s)
uo				
ati				
ate	concentration in river at PM-12	C_r12 =	6.23	(mg/l)
cei xuls				
alc				
00	concentration in river at PM-13	C_r13 =	20.22	(mg/l)
uo				
ط ati		00 -1-	0.00	(
vec	Observed concentration in river at PM-12 for flows at PM-13 of 10-	20 CIS	6.06	(mg/I)
ser				
ğğ	Observed concentration in vivor at DM 40 for flows of 40,00 st		00.00	(m m //)
00	Observed concentration in river at PM-13 for flows of 10-20 cfs		20.33	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Magnesium: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0.26 cfs

				(()
	surface water flow into PM-12	Q_s12 =	1.47	(Cts)
Data	surface water flow into PM-13	Q_\$13 =	7.17	(Cts)
	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
≥ S	Area 5 Pit NW discharge	Q_spit =	0.26	(cfs)
음	LTVSMC Tailings Basin seepage	Q_fs =	2.20	(cfs)
т 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)
_	concentration of surface water into PM-12	C s12 =	6	(mg/l)
ate	concentration of ourface water into DM 12		0	(m m/l)
<u> </u>		$0_{13} =$	0	(mg/i)
ч	concentration of WWTP discharge	C_sBab =	6	(mg/l)
ati	concentration of Area 5 Pit NW discharge	C spit =	271	(ma/l)
ut.	concentration of J TVONO Tolling David concerns	0_6pit =	00.07	(
ce	concentration of LTVSWC Tailings Basin seepage	U_IS =	69.97	(mg/I)
lon	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out 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)
e e	flow in river at PM-12	Q_r12 =	3.06	(cfs)
ater Jane	flow in river at PM-13	Q_r13 =	16.50	(cfs)
Ba	flow check	Q ck =	16.50	(cfs)
				. /
	mass flux of surface water into PM-12	M s12 -	249	(ma/s)
	mass flux of surface water into PM-13	M_s13 -	1218	(mg/s)
of	mass flux of Babbitt WWTP	M_sBab =	56	(mg/s)
L L	concentration of Area 5 Pit NW discharge	M_spit -	1994	(mg/s)
lux tio	concentration of LTVSMC Tailings Basin seepage	M fs =	4356	(mg/s)
л Па	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs –	-000 0	(mg/s)
lct ISS	mass flux of ground water into PM-12	M_no_	259	(mg/s)
A Ca	mass flux of ground water into PM-13	M g13 =	1269	(mg/s)
02		g i 0 =	1200	(119/3)
e e	mass flux in river at PM-12	M r12 -	565	(ma/c)
sis and		IVI_I I Z =	005	(iiig/s)
las ala				, , , ,
2 8	mass flux in river at PM-13	M_r13 =	9402	(mg/s)
		1		
uo				
ati				
ate	concentration in river at PM-12	C_r12 =	6.51	(mg/l)
uls cer				
alc				
ÖÖ	concentration in river at PM-13	C_r13 =	20.13	(mg/l)
uc				
atio				,
€ E Observed concentration in river at PM-12 for flows at PM-13 of 10-20 cfs			6.06	(mg/l)
600				
sdion				
00	Observed concentration in river at PM-13 for flows of 10-20 cfs		20.33	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Sodium: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0 cfs

ow Data	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
	surface water flow into PM-13	Q_s13 =	0.00	(cfs)
	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
	Area 5 Mit NW discharge	$Q_spit =$	0.00	(CIS)
Ĕ	Hydrometallurgical Residue Cells Liner Leakage	$Q_{1S} =$	4.20	(cfs)
put	ground water flow into PM-12	Q g12 =	0.86	(cfs)
l du	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
ŋ	concentration of surface water into PM-12	C_s12 =	3.5	(mg/l)
Data	concentration of surface water into PM-13	C_s13 =	3.5	(mg/l)
ion Ion	concentration of WWTP discharge	C_sBab =	3.5	(mg/l)
Itrat	concentration of Area 5 Pit NW discharge	C_spit =	120	(mg/l)
cen	concentration of LTVSMC Tailings Basin seepage	C_fs =	44.31	(mg/l)
Oon	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out C	concentration of ground water flow into PM-12	C_g12 =	4.9	(mg/l)
Inp	concentration of ground water flow into PM-13	C_g13 =	4.9	(mg/l)
eo	flow in river at PM-12	Q_r12 =	1.90	(cfs)
ate alan	flow in river at PM-13	Q_r13 =	9.60	(cfs)
≥ ä	flow check	Q_ck =	9.60	(cfs)
		1		
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
Ę	mass flux of surface water into PM-13	M_\$13 =	0	(mg/s)
с	concentration of Area 5 Pit NW discharge	M spit -	33	(mg/s)
ttio Iux	concentration of LTVSMC Tailings Basin seepage	M fs =	5267	(mg/s)
s E Lla	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc	mass flux of ground water into PM-12	M_g12 =	119	(mg/s)
ΰΣ	mass flux of ground water into PM-13	M_g13 =	584	(mg/s)
e C	mass flux in river at PM-12	M_r12 =	152	(mg/s)
ass Ilan				
Ba Ba	mass flux in river at PM-13	M_r13 =	6002	(mg/s)
tion				
trat	concentration in river at PM-12	C r12 =	2.83	(mg/l)
ula: Sen				
alci				
ΟŌ	concentration in river at PM-13	C_r13 =	22.09	(mg/l)
tior				
ed	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	3.20	(mg/l)
er v				
sq				,
00	Observed concentration in river at PM-13 for flows < 10 cfs		22.20	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Sodium: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0.26 cfs

ow Data	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
	surface water flow into PM-13	Q_s13 =	0.00	(cfs)
	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
	Area 5 Mit NW discharge	$Q_spit =$	0.26	(CIS)
Ĕ	Hydrometallurgical Residue Cells Liner Leakage	Q_is = 0 rrs =	0.00	(cfs)
put	ground water flow into PM-12	Q g12 =	0.86	(cfs)
l du	ground water flow into PM-13	Q_g13 =	4.21	(cfs)
, D	concentration of surface water into PM-12	C_s12 =	3.5	(mg/l)
Dat	concentration of surface water into PM-13	C_s13 =	3.5	(mg/l)
tion	concentration of WWTP discharge	C_sBab =	3.5	(mg/l)
ıtrat	concentration of Area 5 Pit NW discharge	C_spit =	120	(mg/l)
cer	concentration of LTVSMC Tailings Basin seepage	C_fs =	44.31	(mg/l)
Cone	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out C	concentration of ground water flow into PM-12	C_g12 =	4.9	(mg/l)
lnp	concentration of ground water flow into PM-13	C_g13 =	4.9	(mg/l)
eo	flow in river at PM-12	Q_r12 =	1.75	(cfs)
ate alan	flow in river at PM-13	Q_r13 =	8.76	(cfs)
≥ ä	flow check	Q_ck =	8.76	(cfs)
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
Ę	mass flux of surface water into PM-13	M_\$13 =	0	(mg/s)
с	concentration of Area 5 Pit NW discharge	M spit -	33 883	(mg/s)
ttio Iux	concentration of LTVSMC Tailings Basin seepage	M fs =	3887	(mg/s)
s E Lla	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc	mass flux of ground water into PM-12	M_g12 =	119	(mg/s)
ΰΣ	mass flux of ground water into PM-13	M_g13 =	584	(mg/s)
	1	1		
e	mass flux in river at PM-12	M_r12 =	152	(mg/s)
ass Ian				
Ma Ba	mass flux in river at PM-13	M_r13 =	5506	(mg/s)
_		1		
lon				
trat	concentration in river at PM-12	C r12 =	3.06	(mg/l)
ulat Sen				
alci				
ÖÖ	concentration in river at PM-13	C_r13 =	22.21	(mg/l)
	1			
tion				
ed trai	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	3.20	(mg/l)
ervi Sen				- /
bre onc				
00	Observed concentration in river at PM-13 for flows < 10 cfs		22.20	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Sodium: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0 cfs

	surface water flow into PM-12	Q_s12 =	1.46	(cfs)
Data	surface water flow into PM-13	Q_s13 =	7.14	(cfs)
	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
ž	Area 5 Pit NW discharge	Q_spit =	0.00	(CIS)
Ĕ	LTVSMC Tallings Basin seepage	$Q_{fs} =$	2.50	(CIS)
nt	around water flow into PM-12	$Q_{15} = 0.012 - 0.012$	0.00	(cfs)
du	ground water flow into PM-13	Q_g12 =	4.21	(cfs)
		g : •		(0.0)
ŋ	concentration of surface water into PM-12	C_s12 =	3.5	(mg/l)
Dat	concentration of surface water into PM-13	C_s13 =	3.5	(mg/l)
ion	concentration of WWTP discharge	C_sBab =	3.5	(mg/l)
ıtrat	concentration of Area 5 Pit NW discharge	C_spit =	120	(mg/l)
Ser	concentration of LTVSMC Tailings Basin seepage	C_fs =	44.31	(mg/l)
ono	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
ut O	concentration of ground water flow into PM-12	C_g12 =	4.9	(mg/l)
lnp	concentration of ground water flow into PM-13	C_g13 =	4.9	(mg/l)
	I contraction of the second seco			
jr Jce	flow in river at PM-12	Q_r12 =	3.06	(cfs)
/ate alaı	flow in river at PM-13	Q_r13 =	16.50	(cfs)
2 2	flow check	Q_ck =	16.50	(cfs)
				<i>, ,</i> , ,
	mass flux of surface water into PM-12	M_s12 =	145	(mg/s)
đ	mass flux of Surface water into PM-13	$M_SIJ = M_SBab =$	707	(mg/s)
E V	concentration of Area 5 Pit NW discharge	$M_spit =$	0	(mg/s)
itio	concentration of LTVSMC Tailings Basin seepage	M_spit = $M fs =$	3135	(mg/s)
s F ula	concentration of Hydrometallurgical Residue Cells Liner Leakage	M rrs =	0	(mg/s)
alcass	mass flux of ground water into PM-12	M_g12 =	119	(mg/s)
ŰΣ	mass flux of ground water into PM-13	M_g13 =	584	(mg/s)
e	mass flux in river at PM-12	M r12 =	297	(mg/s)
lss lan				
Ma Bai	mass flux in river at PM-13	M_r13 =	4723	(mg/s)
uo.				
ed rati	concentration in river at PM 12	C r12	2.40	(ma/l)
llat(ent		0_112 =	3.42	(119/1)
licu				
ပိပိ	concentration in river at PM-13	C_r13 =	10.11	(mg/l)
on				
d	Observed concentration in river at PM-12 for flows at PM-13 of 10-	20 cfs	2 70	(ma/l)
rve ent	Costruct concentration in fiver at 1 W-12 for hows at 1 W-13 01 10-	20 013	2.70	(119/1)
) Se				
5 S	Observed concentration in river at PM-13 for flows of 10-20 cfs		9.90	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Sodium: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0.26 cfs

		1		
	surface water flow into PM-12	Q_s12 =	1.54	(cfs)
ata	surface water flow into PM-13	Q_s13 =	7.50	(cfs)
ä	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
Ň	Area 5 Pit NW discharge	Q_spit =	0.26	(Cts)
Ĕ	LIVSMC Tailings Basin seepage	$Q_{ts} =$	1.80	(CIS)
Ĕ	Hydrometallurgical Residue Cells Liller Leakage	$Q_rrs =$	0.00	(CIS)
du	ground water flow into PIVI-12	$Q_g z =$	0.00 4 21	(CIS)
_	ground water now into rive to	Q_yıə =	۲. ۲. ۲	(05)
đ	concentration of surface water into PM-12	C s12 =	3.5	(mg/l)
Data	concentration of surface water into PM-13	C_s13 =	3.5	(mg/l)
u I I	concentration of WWTP discharge	C_sBab =	3.5	(mg/l)
itrat	concentration of Area 5 Pit NW discharge	C_spit =	120	(mg/l)
Gen	concentration of LTVSMC Tailings Basin seepage	C_fs =	44.31	(mg/l)
Conc	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out C	concentration of ground water flow into PM-12	C_g12 =	4.9	(mg/l)
Inp	concentration of ground water flow into PM-13	C_g13 =	4.9	(mg/l)
	T	1	r	
nce Dr	flow in river at PM-12	Q_r12 =	3.06	(cfs)
/ate	flow in river at PM-13	Q_r13 =	16.50	(cfs)
<u>م <</u>	flow check	Q_ck =	16.50	(cfs)
	I de la forma de la DM 40	11.40	150	(
	mass flux of surface water into PM-12	$M_{S12} =$	152	(mg/s)
đ	mass flux of Surface water Into Pivi-13	$M_sBab =$	/4J 23	(mg/s)
с	mass mux or dapping www.rr	IVI_SDau = M_spit_	883	(IIIY/S) (ma/s)
lux I	concentration of LTVSMC Tailings Basin seepage	$M_{fe} =$	2257	(mq/s)
щ	concentration of Hydrometallurgical Residue Cells Liner Leakage	M rrs =	0	(mq/s)
dict. Ass	mass flux of around water into PM-12	M_n12 =	119	(mg/s)
ΰĔ	mass flux of ground water into PM-13	M a13 =	584	(mg/s)
		···==		(
Φ				
ano	mass flux in river at PM-12	M_r12 =	304	(mg/s)
Mas Bali	man flux in river at DM 12	M r12 _	4771	(ma/e)
	ITIASS IIUX III IIVei al FIVI-15	IVI_I I J =	4777	(IIIy/s)
5	Γ			
atic				
ntr:	concentration in river at PM-12	C_r12 =	3.51	(mg/l)
cer		T		
on				l
00	concentration in river at PM-13	C_r13 =	10.22	(mg/l)
	1			
tio				
tra	Observed concentration in river at PM-12 for flows at PM-13 of 10-	20 cfs	2.70	(ma/l)
en en				(· 3· ,
ose				
ΟŬ	Observed concentration in river at PM-13 for flows of 10-20 cfs		9.90	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Sulfate: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0 cfs

	surface water flow into PM-12	Q s12 =	0.00	(cfs)
b	surface water flow into PM-13	Q_s13 =	0.00	(cfs)
Dat	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
	Area 5 Pit NW discharge	Q spit =	0.00	(cfs)
<u>0</u>	LTVSMC Tailings Basin seepage	Q fs =	1.60	(cfs)
LL	Hydrometallurgical Residue Cells Liner Leakage	Q rrs =	0.00	(cfs)
put	ground water flow into PM-12	Q a12 =	0.86	(cfs)
<u>du</u>	ground water flow into PM-13	Q q13 =	4.21	(cfs)
_	concentration of surface water into PM-12	C s12 =	4	(mg/l)
Data	concentration of surface water into PM-13	 C_s13 =	4	(mg/l)
u	concentration of WWTP discharge	C_sBab =	4	(mg/l)
rati	concentration of Area 5 Pit NW discharge	C_spit =	1046	(mg/l)
ent	concentration of LTVSMC Tailings Basin seepage	C_fs =	152.4	(mg/l)
onc	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)
lnp	concentration of ground water flow into PM-13	C_g13 =	8.5	(mg/l)
ir Joe	flow in river at PM-12	Q_r12 =	1.46	(cfs)
ate alar	flow in river at PM-13	Q_r13 =	7.00	(cfs)
≥ ä	flow check	Q_ck =	7.00	(cfs)
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
	mass flux of surface water into PM-13	M_s13 =	0	(mg/s)
of	mass flux of Babbitt WWTP	M_sBab =	37	(mg/s)
ы	concentration of Area 5 Pit NW discharge	M_spit =	0	(mg/s)
atio	concentration of LTVSMC Tailings Basin seepage	M_fs =	6901	(mg/s)
s F S F	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc as	mass flux of ground water into PM-12	M_g12 =	207	(mg/s)
ΰΣ	mass flux of ground water into PM-13	M_g13 =	1013	(mg/s)
D				
s Ince	mass flux in river at PM-12	M_r12 =	244	(mg/s)
las ala				, , ,
2 10	mass flux in river at PM-13	M_r13 =	8158	(mg/s)
-				
<u>io</u>				
ed rat	concentration in river at PM-12	C r12 -	5.00	(ma/l)
lat(0_112 =	0.92	(119/1)
D S				
C al	concontration in river at PM 13	C r13	/1 10	(ma/l)
00		0_113 =	41.18	(III <u>9</u> /I)
C				
tion				
ed tra	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	3.06	(mg/l)
) Se				
ŏč	Observed concentration in river at PM-13 for flows < 10 cfs		41.30	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Sulfate: Flows at PM-13 < 10 cfs, Pit 5NW Q = 0.26 cfs

	surface water flow into PM-12	Q_s12 =	0.00	(cfs)
Data	surface water flow into PM-13	Q_s13 =	0.00	(cfs)
	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
Ň	Area 5 Pit NW discharge	Q_spit =	0.26	(cfs)
임	LIVSMC Tailings Basin seepage	Q_ts =	0.00	(CfS)
rt	Hydrometallurgical Residue Cells Liner Leakage	$Q_rrs =$	0.00	(CIS)
du	ground water flow into PM-12	$Q_{g12} =$	0.86	(CIS)
_	Bionina mater now into Fivi-13	<u>v_</u> yıs =	4.21	(015)
	and the second	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)
itrat	concentration of Area 5 Pit NW discharge	C_spit =	1046	(mg/l)
Cen	concentration of LTVSMC Tailings Basin seepage	C_fs =	152.4	(mg/l)
one	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out C	concentration of ground water flow into PM-12	C_g12 =	8.5	(mg/l)
ln	concentration of ground water flow into PM-13	C_g13 =	8.5	(mg/l)
		T		
ir Ice	flow in river at PM-12	Q_r12 =	1.23	(cfs)
/ate alaı	flow in river at PM-13	Q_r13 =	5.66	(cfs)
≥ ä	flow check	Q_ck =	5.66	(cfs)
	mass flux of surface water into PM-12	M_s12 =	0	(mg/s)
	mass flux of surface water into PM-13	M_s13 =	0	(mg/s)
ō	mass flux of Babbitt WWTP	M_sBab =	37	(mg/s)
jo Xn	concentration of Area 5 Pit NW discharge	M_spit =	7696	(mg/s)
Flu	concentration of LIVSMC Tailings Basin seepage	IVI_1S =	0	(mg/s)
ss	concentration of Hydrometallurgical Residue Cells Liner Leakage	$IVI_rrs =$	0	(mg/s)
Cal Va:	mass flux of ground water into PM-12	$M_{013} =$	207 1013	(mg/s)
02		y i 0 =	1013	(mg/s)
ce	mass flux in river at PM-12	M_r12 =	244	(mg/s)
uss lan				<i>i</i>
Ma Ba	mass flux in river at PM-13	M_r13 =	8953	(mg/s)
	·	• =		
L U				
d atic				
ate	concentration in river at PM-12	C_r12 =	7.01	(mg/l)
sula				
alc				
00	concentration in river at PM-13	C_r13 =	55.90	(mg/l)
_				
ion				
sd rrat	Observed concentration in river at PM-12 for flows at PM-13 of < 1	0 cfs	3.06	(ma/l)
rve ent			0.00	(···ˈɡ/ ·/
) Se				
čč	Observed concentration in river at PM-13 for flows < 10 cfs		41.30	(mg/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Sulfate: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0 cfs

	surface water flow into PM-12	Q_s12 =	1.12	(cfs)
lta	surface water flow into PM-13	Q_s13 =	5.49	(cfs)
Da	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
≥	Area 5 Pit NW discharge	Q_spit =	0.00	(cfs)
음	LTVSMC Tailings Basin seepage	Q_fs =	4.00	(cfs)
Lt F	Hydrometallurgical Residue Cells Liner Leakage	Q_rrs =	0.00	(cfs)
ומר	ground water flow into PM-12	Q_g12 =	0.86	(cfs)
<u> </u>	ground water flow into PM-13	Q_g13 =	4.21	(cts)
-		1		
ъ	concentration of surface water into PM-12	C_s12 =	4	(mg/l)
Dat	concentration of surface water into PM-13	C_s13 =	4	(mg/l)
tion	concentration of WWTP discharge	C_sBab =	4	(mg/l)
tra	concentration of Area 5 Pit NW discharge	C_spit =	1046	(mg/l)
en	concentration of LTVSMC Tailings Basin seepage	C_fs =	152.4	(mg/l)
onc	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out C	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)
		1		
ar Jce	flow in river at PM-12	Q_r12 =	2.98	(cfs)
ate alai	flow in river at PM-13	Q_r13 =	16.01	(cfs)
≥ ფ	flow check	Q_ck =	16.01	(cfs)
		-		
	mass flux of surface water into PM-12	M s12 =	127	(ma/s)
	mass flux of surface water into PM-13	M s13 =	621	(mg/s)
of	mass flux of Babbitt WWTP	M_sBab =	37	(mg/s)
ы Бх	concentration of Area 5 Pit NW discharge	M_spit =	0	(mg/s)
-In atic	concentration of LTVSMC Tailings Basin seepage	M_fs =	17252	(mg/s)
s l s	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc las	mass flux of ground water into PM-12	M_g12 =	207	(mg/s)
O≥	mass flux of ground water into PM-13	M_g13 =	1013	(mg/s)
۵ س				
s UC	mass flux in river at PM-12	M_r12 =	371	(mg/s)
as: ìlai				
ž a	mass flux in river at PM-13	M_r13 =	19257	(mg/s)
n				
atio				
ate	concentration in river at PM-12	C_r12 =	4.40	(mg/l)
ula Ser				
alc				
ÖÖ	concentration in river at PM-13	C_r13 =	42.50	(mg/l)
n				
atic				
ed	Observed concentration in river at PM-12 for flows at PM-13 of 10-	20 cfs	5.03	(mg/l)
er Vie				
) SC				
öŏ	Observed concentration in river at PM-13 for flows of 10-20 cfs		45.33	(ma/l)

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Embarrass River Model - Calibration of Tailings Basin Seepage Parameter: Sulfate: Flows at PM-13 of 10-20 cfs, Pit 5NW Q = 0.26 cfs

ow Data	surface water flow into PM-12	Q_s12 =	1.35	(cfs)
	surface water flow into PM-13	Q_s13 =	6.60	(cfs)
	Babbitt WWTP discharge	Q_sBab =	0.33	(cfs)
	Area 5 Pit NW discharge	$Q_spit =$	0.26	(CIS)
Ĕ	LTVSMC Tallings Basin seepage	$Q_{IS} =$	2.40	(CIS)
ort	ground water flow into PM-12	$Q_{13} = 0.012 = 0.012 = 0.012 = 0.012 = 0.001$	0.00	(cfs)
du	ground water flow into PM-13	$Q_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{$	4.21	(cfs)
		3 -		()
ធុ	concentration of surface water into PM-12	C_s12 =	4	(mg/l)
Dat	concentration of surface water into PM-13	C_s13 =	4	(mg/l)
tion	concentration of WWTP discharge	C_sBab =	4	(mg/l)
ntrai	concentration of Area 5 Pit NW discharge	C_spit =	1046	(mg/l)
cer	concentration of LTVSMC Tailings Basin seepage	C_fs =	152.4	(mg/l)
Cone	concentration of Hydrometallurgical Residue Cells Liner Leakage	C_rrs =	0	
out C	concentration of ground water flow into PM-12	C_g12 =	8.5	(mg/l)
lnp	concentration of ground water flow into PM-13	C_g13 =	8.5	(mg/l)
	1			
er nce	flow in river at PM-12	Q_r12 =	2.98	(cfs)
/ate alaı	flow in river at PM-13	Q_r13 =	16.01	(cfs)
2 2	flow check	Q_ck =	16.01	(cfs)
	Income flow of environmentary into DM 40	M = 10	150	(
	mass flux of surface water into PM-12	M_\$12 =	153	(mg/s)
Ę	mass flux of Surface water into PM-13	$M_SIS =$ M_sBab -	747 37	(mg/s)
u u	concentration of Area 5 Pit NW discharge	$M_{spit} =$	7696	(mg/s)
ilu)	concentration of LTVSMC Tailings Basin seepage	M fs =	10351	(mg/s)
ula s F	concentration of Hydrometallurgical Residue Cells Liner Leakage	M_rrs =	0	(mg/s)
alc as:	mass flux of ground water into PM-12	M_g12 =	207	(mg/s)
ΰΣ	mass flux of ground water into PM-13	M_g13 =	1013	(mg/s)
e	mass flux in river at PM-12	M_r12 =	397	(mg/s)
ass Ilan				- /
Ba Ba	mass flux in river at PM-13	M_r13 =	20204	(mg/s)
_				
tio				
tra	concentration in river at PM-12	C r12 =	4.71	(mg/l)
ulai Sen				、
alci				
ΰŭ	concentration in river at PM-13	C_r13 =	44.59	(mg/l)
_				
tion				
ed trai	Observed concentration in river at PM-12 for flows at PM-13 of 10-	20 cfs	5.03	(mg/l)
en c				
bse				
ŌŎ	Observed concentration in river at PM-13 for flows of 10-20 cfs		45.33	(mg/l)