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RESERVE MINING COMPANY

MILEPOST 7 PROJECT

PHASE II REPORT IV

CONSTRUCTION STATUS  
AND  
PROGRESS ANALYSIS REPORT

JUNE  
1978

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**Pullman Torkelson Co.**

A Subsidiary of Pullman Incorporated

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Pullman Torkelson Co.

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RESERVE MINING COMPANY

MILEPOST 7 PROJECT

CONSTRUCTION STATUS AND PROGRESS ANALYSIS REPORT

PHASE II REPORT IV  
(June Report)

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I. SUMMARY

For several months, Pullman Torkelson Company has been making reports that have stated that a more comprehensive study would be made on the June report when the new Critical Path Method (CPM) would be available after the first of July. The material that was received on July 25, 1978 was not that which PTC had expected nor is it a CPM as known in the construction field. What was received was a logic diagram showing the purchasing and construction sequence of separate elements of the project, but which cannot be used for tracking construction progress. The only documents available are the Facility Summary Schedule and Physical Progress Report to monitor construction progress. These reports show the progress of each of the separate areas but do not show the interrelation between them and the effect it will have on the project completion.

A detailed critical path method is needed to track construction progress of a project. In the development of a CPM the activities and events of a project are planned, their sequence established and the critical path (or path that controls completion) through the network is plotted. After the project starts it may be necessary to change the schedule and thereby change the critical path. This CPM would have to be updated monthly by Kaiser Engineers.

All of the necessary information appears to be available to load the computer and get a CPM computer run. The Logic Diagram, the Criticality Report and the Network Calculation that now exist provide all the necessary information required. Once the computer is programmed it would not be



difficult to load the computer with actual construction performed each month. A computer run showing the progress compared to the schedule could then be produced.

PTC is not aware of any existing CPM for this project that shows the critical path. The initial Network Schedule showed only activities, events and sequence, but no critical path. PTC has been unable to determine the method used by Kaiser Engineers to monitor the actual construction progress against a master schedule.

In our discussions with Kaiser they are knowledgeable about the procurement and construction details of the job but all of the information is not apparent from the reports. PTC does not require the details but must know what the progress is, based on a critical path. As previously stated the "Logic Diagram" provided to PTC cannot be used to track construction progress. Unless a CPM or some other usable schedule exists, accurate construction progress cannot be monitored.

The Facility Summary Schedule and Physical Progress bar charts now being used to check progress, have not been changed to show the correct early/late start envelope. This envelope has changed due to the percent weight factor for each phase having changed. The correct early/late start envelope is needed to show an accurate picture of the status of the actual work completed.

Based on our observations, PTC doubts that this project will be completed by April 15, 1980 unless a critical path can be shown that will demonstrate that the completion delays encountered to date will not affect



the total project. The following areas are behind the late start dates by the percentages shown: the Coarse Tailings Handling and Loadout Facility 22.3 percent; the Pelletizer Air Quality Facility 20.5 percent; the Tailings Pipeline and Roadgrade 41.6 percent; and the Tailings Dams and Diversions 5.4 percent.

The most critical area is the Pelletizer Air Quality which will miss its scheduled completion. It is now projected to be completed by November 15, 1978 instead of October 1, 1978. An additional slippage of 2.1 percent occurred in June.





II. KAISER DESIGN ENGINEERS

Apart from the Civil discipline improvements have generally been made in the engineering effort since the May report, continual monitoring must however be maintained to get all disciplines back on the baseline schedule, they are approximately 11,000 hours behind schedule based on equivalent drawing basis.

Kaiser Engineer's Drawing Status Report (Exhibit A) indicates that engineering drawings, based on equivalent percentage, are approximately 61.4 percent complete for the total drawing package. This is a net change of 6.9%, and a .3% variance improvement, from the previous report. The Design and Drawing Report (Exhibit C) indicates a total of 1,815 drawings are now required, an increase of 22 from the previous month, of which 1,018 (56.1%) have been issued for construction.

The equivalent percentage complete and manhours expended versus scheduled manhours forecast percentage complete for the various disciplines is tabulated as follows:

<u>Discipline</u>	<u>Reported Eqv. % Complete</u>	<u>% Manhours Expended</u>	<u>Scheduled Manhours Forecast % Complete</u>	<u>Difference (Report Eqv. V. % Complete</u>	<u>% Variance Based on Last Month (May)</u>
Structural	76.7	73.1	81	- 4.3	+ 2.1
Architectural	83.7	78	81	+ 2.7	- 4.5
Mechanical	93.7	92.6	95	- 1.3	- 0.2
Civil	78.0	82.2	96	-18.0	-10.7
Piping	66.8	71.1	71	- 4.2	+ 0.8
H & V	62.2	69.4	76	-13.8	+ 1.0
Electrical	45.0	47.1	46	- 1.0	+ 3.9
Instrumentation	48.8	59.2	61	-12.2	+ 6.3





Kaiser has changed their method of reporting (Exhibit B) i.e. percent complete is based on manhours expended versus forecasted total at completion, where as, prior to May 1, 1978, percent complete was on an equivalent drawing basis. As can be seen, the reported Equivalent Percentage Complete Column does not correlate with the percent manhours expended. The new reporting procedure more accurately indicates budget status rather than actual work completed. It is PTC's opinion that the method used prior to May 1, 1978, was a more reasonably accurate representation of the true status of the engineering drawings.

In PTC's above tabulation, the Difference Column compares the reported equivalent percentage complete (Exhibit A) versus schedule manhours forecast percent complete (Exhibit B, Top Line). Only the Architectural discipline is ahead of schedule. All other disciplines are behind in varying degrees, although the Structural, Piping, H & V, Electrical and Instrumentation disciplines all improved their deviations from the schedule in the past month. The Civil discipline had the most significant deviation from last months report, -10.7% for a total -18.0% behind schedule approximately 1,375 hours.

The Instrumentation discipline made significant improvement since last month but are still -12.2% behind schedule, approximately 2,734 hours. Again in PTC's opinion the project could be more realistically analysed and monitored if the number of equivalent drawings complete was used as the basis for scheduling. Exhibit B indicates the total engineering is only .2% behind schedule where as in fact all the disciplines, except Architectural are behind schedule from -1.3% to -18.0% or an approximate average of -4%.





### III. STATUS OF PROJECT PROCUREMENT PERFORMANCE

A. It appears the procurement of materials is in reasonably good shape.

However, vendors will have to be expedited to ensure they deliver on time.

The PSSR Report has been improved. For the most part the early start date agrees with the early start dates shown on the Project Master Schedule, the Network Calculations and the Criticality Report.

The report has been improved by indicating inside or outside storage and showing the actual float time.

The columns "Vendor Drawings" and "Release for Fab" still need to show the dates these events are to occur or have occurred.

B. The following chart compares the number of line items showing negative float for the months of April, May and June PSSR's. The instrumentation PSSR is not included in this chart.





DAYS OF NEGATIVE FLOAT												
Area	7-30 Days			31-90 Days			Over 90 Days			Total		
	April	May	June	April	May	June	April	May	June	April	May	June
161	15	17	20	13	13	19	1	0	2	29	30	41
170	6	9	20	6	4	26	5	4	5	17	17	51
171	5	7	6	6	5	10	0	0	0	11	12	25
240	1	0	1	1	1	15	1	1	4	3	6	20
290	5	9	7	4	22	10	2	4	5	11	35	22
291	1	1	0	3	2	1	3	1	0	7	4	1
292	1	0	1	1	1	1	1	3	2	3	3	3
293	0	1	0	1	0	1	1	2	2	2	3	3
Total	34	44	55	35	51	82	14	15	29	83	110	166

The above chart shows that there is an adverse trend developing in Procurement. Many items having negative float are not critical at this time, in that they are not affecting actual construction. These materials have been scheduled far in advance of the required use date. However, a continuing trend in this direction will begin to effect the schedule.





#### IV. MILEPOST 7 PROJECT (Total)

It should be noted that the (total) project as referred to by PTC includes only the data for those areas as shown on the Facility Summary Schedule and Physical Progress Report. There are many facilities not being monitored in this report that do not show early/late start dates; therefore, an accurate (total) percent complete relative to the late start date cannot be given. This figure shows only the average of all facilities which may be misleading in that that work not completed may be on the critical path.

The total project is now 5.3 percent ahead of the late start date. This is a decrease of .8 percent compared to last month's actual percent complete relative to the late start date.

##### Dry Cobbing

The Dry Cobbing Facility is now 22.3 percent behind the late start date. This is a .7 percent slippage over last month. This facility is falling behind more each month. This amount of slippage in all probability cannot be made up.

##### Coarse Tails Handling and Loadout

This area appears to be 17.9 percent ahead of the late start date. This is a positive increase over last month of 5.9 percent.

##### Concentrate Modifications

Last month this facility was 1.2 percent ahead of the late start date calculated on the figures provided on the Facility Summary Schedule and Physical Progress Report. This month the figures provided indicate this facility to be 1.2 percent behind the late start date.





In comparing this month's report with last month's report, some of the actual percents complete reported for the month of May on the June report have been changed. The May report indicates the "Excavation and Backfill" to be 2.1 percent complete on May 20. The June report for this area shows nothing has been done at all.

The May report indicates "Removal and Wrecking" to be 10.2 percent complete on May 20, while the June report indicates 2.1 percent complete on May 20,. The May report shows "Concrete" to be 0.7 percent complete on May 20, while the June report indicates 10.2 percent complete on May 20.

#### Concentrate Filtering

This facility appears to be 6.7 percent ahead of the late start date. This is a positive increase of 2.0 percent over last month's report.

#### Pelletizer Air Quality

PTC calculates this facility to be 20.5 percent behind the late start date. This is an increase slippage of 2.1 percent over last month. This area has slipped to such a degree that Kaiser has projected that the completion date will slip from the target completion date of October 1, 1978 to November 15, 1978. This new date may not be realistic if the present trend is not reversed.

#### Tailings Clarifiers

This facility is 3.4 percent ahead of the late start date. This is a positive increase over last month of 1.4 percent.

#### Tailings Pipeline and Roadgrade

PTC calculates this facility to be 41.6 percent behind the late start date. This is an increase slippage of 18.5 percent over last month. This area has slipped to such a degree that it is doubtful that it will be completed by the present target date of April 30, 1979.

#### Tailings Dams and Diversions

No late start date is provided for this facility; therefore, the completion status is relative to the early start date. PTC calculates this facility to be 5.4 percent behind the early start date. This is a positive increase of 1.6 percent.

#### Silver Bay Truck Repair Shop

PTC calculates this facility to be 2.4 percent behind the late start date. This is a 3.2 percent slippage over last month. This facility does not affect the completion of the more critical areas.

There are a number of reasons for the construction progress slippage. The following reasons have been given to PTC during visits to and telephone conversations with Reserve Mining, Kaiser Engineers and Minnesota Pollution Control Agency. All of the details behind these reasons are not known by PTC.

1. The decision regarding the start of the project was delayed in the courts six months. This delay caused the start of the project to occur at the worst time of the year weatherwise. Once permission was granted, Reserve Mining was directed to start the project immediately.
2. There has been a problem regarding the issuing of permits to Reserve Mining and Kaiser Engineers to commence the work.



3. Labor problems developed. Reliable supervisors were difficult to get; the required number of construction tradesmen were and are unavailable; some delays have occurred because of strikes and absenteeism.
4. Weather has caused delays.
5. It appears to PTC that when the start date was selected that construction was started and commitments made before adequate planning and scheduling could be completed.
6. Changing of the sequence of critical areas after start of construction.
7. Delay in getting land right-of-way and procurement of properties.
8. Lack of CPM or some concise method of tracking construction progress (related to Item 5).

The following table shows the actual percent complete for each facility and the percent complete using the late start date as the base. PTC calculated these percentages using the information provided on the Facility Summary Schedule and Physical Progress Report.



Area	Scheduled Percent Completion Based on Early Start Date	Actual Percent Completion	Scheduled Percent Completion Based on Late Start Date	Completion Status Relative to Late Start Date
Milepost 7 Project (Total)	28.3	17.8	12.5	+ 5.3
161 - Dry Cobbing	41.4	*19.8	42.1	-22.3
161 - Coarse Tailings Handling & Loadout	42.9	18.0	0.04	+17.9
170 - Concentrator Modifications	12.2	* 1.0	2.2	- 1.2
171 - Concentrate Filtering	33.2	20.0	13.3	+ 6.7
181 - Pelletizer Air Quality	80.4	*50.8	71.3	-20.5
290 - Tailings Clarifiers	12.8	4.8	0.0	+ 4.8
291 - Tailings Pipeline and Roadgrade	100.0	* 8.6	50.2	-41.6
292 - Tailings Dams & Diversions	25.2	*19.8	**	- 5.4
240 - Silver Bay Truck Repair Shop	92.1	*64.8	67.2	- 2.4

Note:        \*    Areas behind Late Start Date Schedule

             \*\*    No Late Start Date Reported



V. SARGENT AND LUNDY REPORT NO. 11

Mechanical

As has been stated in previous PTC reports, Sargent and Lundy's mechanical discipline does not indicate any scheduled completion dates or hours required, only percentage complete. Therefore, PTC cannot make any comment as to progress.

Electrical

Although the percentage completion and schedule release dates are given, the number of hours required per activity is not. Therefore, PTC cannot make valid comments regarding percentage complete e.g. synchronizing diagram is only 25% design complete - 25% of how many hours or drawings?

A meeting with representatives from Sargent and Lundy and PTC has been scheduled for September 13, 1978. It is anticipated a better reporting format will be generated as a result of this meeting.





# RESERVE MILE POST 7 PROJECT

75083-001

## DRAWING STATUS

EXHIBIT A

DATE: 6/30/78

DISCIPLINE	TOTAL DWGS AS OF 7/1/77	CURRENT # OF DWGS	DWGS NOT STARTED	DWGS IN PROGRESS	DWS ISSUED FOR APPROVAL	DWGS APPROVED FOR CONSTRUCTION	EQV DWGS COMP	EQV % COMP
STRUCTURAL	361	369	68	31	0	270	283.2	76.7
ARCHITECTURAL	44	58	8	2	2	46	48.6	83.7
MECHANICAL	142	147	7	16	1	123	137.8	93.7
CIVIL	49	51	10	3	1	37	39.8	78.0
PIPING	216	264	49	64	11	140	176.4	66.8
HEATING & VENTILATION	50	57	16	14	2	25	35.5	62.2
ELECTRICAL	575	794	403	67	17	307	357.8	45.0
INSTRUMENTATION	73	75	37	2	1	35	36.6	48.8
TOTAL	1,510	1,815	598	199	35	983	1,115.7	61.4
PREVIOUS REPORT TOTALS		1,793	693	246	30	824	976.7	54.5
NET CHANGE FROM PRIOR REPORT		22	(95)	(47)	5	159	139.0	6.9

REMARKS:

# DESIGN PROGRESS SCHEDULE 75083-001 RESERVE MILEPOST 7 PROJECT

PERIOD ENDING: 30 JUNE 78

EXHIBIT B

DISCIPLINE	1977												1978												1979												PERCENT COMPLETE	
	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J										
STRUCTURAL		2	5	10	15	21	28	36	44	52	59	67	77	81	91	94	96	97	98	99	100																	
				8.7	14.7	20.7	29.8	37.4	43.1	50.6	53.6	56.1	63.4	67.1	73.1																							
ARCHITECTURAL			3	6	15	24	33	42	51	59	63	60	67	74	81	88	92	96	100																			
				11.0	12.5	22.7	30.4	41.5	48.7	56.6	60.1	65.2	77.5	85.5	88.0																							
MECHANICAL		4	13	25	37	49	60	69	78	82	90	93	94	95	96	97	98	99	100																			
				23.7	37.7	44.4	53.6	65.5	72.3	69.4	77.2	87.8	93.6	93.4	92.6																							
CIVIL			8	16	24	32	40	48	56	59	66	75	82	89	96	98	100																					
				9.8	22.8	25.5	39.4	46.4	50.8	55.1	59.7	68.0	75.0	83.5	82.2																							
PIPING		1	3	6	10	15	21	27	33	39	45	52	59	65	71	77	83	88	93	96	97	98	99	100														
				2.4	6.1	8.8	14.9	20.7	27.6	30.3	35.2	42.1	49.5	62.8	71.1																							
HEATING & VENTILATING		3	6	11	19	27	35	43	51	41	48	55	62	69	76	83	90	97	100																			
				3.2	9.4	14.5	20.0	27.8	32.9	36.1	37.8	39.8	47.9	63.2	69.4																							
ELECTRICAL		1	2	4	7	11	16	21	27	21	26	31	36	41	46	51	56	61	66	71	76	81	86	90	94	98	99	100										
				2.8	3.8	7.8	14.0	17.3	21.8	19.7	23.7	29.4	31.2	40.7	47.1																							
INSTRUMENTATION			1	3	6	11	17	24	32	31	37	43	49	55	61	67	72	77	82	86	90	93	96	98	100													
				6.5	6.3	13.8	18.8	19.8	29.8	30.8	34.8	35.0	27.6	54.5	59.2																							
SPECIFICATIONS			4	8	12	21	30	39	48	48	51	54	57	61	64	67	70	74	77	80	83	87	90	93	96	100												
				9.4	14.7	19.5	26.6	33.6	38.1	50.3	56.5	63.1	68.8	74.7	79.0																							
MISC. SUPPORT		4	10	14	18	23	26	30	37	39	43	47	51	55	59	63	67	71	75	79	83	87	91	94	96	98	100											
				10.9	13.8	19.4	24.7	28.1	33.6	40.8	44.6	50.5	54.0	59.2	64.8																							
SUPERVISION		5	10	15	20	24	28	32	36	36	40	44	48	52	55	59	63	67	70	74	78	82	85	89	93	97	100											
				8.6	9.1	11.7	18.5	22.9	29.5	39.7	47.5	53.4	58.1	63.1	68.6																							
TOTAL DESIGN		1	4	8	13	19	25	32	39	35	41	47	53	59	65	71	76	80	84	87	90	93	95	96	97	98	99	100										
				6.7	11.1	16.3	23.4	29.1	35.2	36.2	40.6	46.0	50.1	58.9	64.8																							
LEGEND:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28										
SCHEDULED /																																						
ACTUAL																																						

\* NOTE: PERCENT COMPLETE IS BASED ON MANHOURS EXPENDED VERSUS FORECASTED TOTAL AT COMPLETION.  
PRIOR TO MAY 1<sup>ST</sup> 78, PERCENT COMPLETE WAS ON AN EQUIVALENT DRAWING BASIS.



\*\* K A I S E R E N G I N E E R S \*\*

Exhibit C

DESIGN & DRAWING REPORT  
JOB TITLE RESERVE MINING PROJECT SILVER BAY MINN  
JOB NO.75083-001

DEPARTMENT 2

SUMMARY

SUMMARY

JULY 1,1978

AREA NO	STRUCTURAL		ARCHITECT		MECHANICAL		CIVIL		PIPING		H * V		ELECTRICAL		INSTRUMENT	
	TOTL	ISSD	TOTL	ISSD	TOTL	ISSD	TOTL	ISSD	TOTL	ISSD	TOTL	ISSD	TOTL	ISSD	TOTL	ISSD
	DWGS	DWGS	DWGS	DWGS	DWGS	DWGS	DWGS	DWGS	DWGS	DWGS	DWGS	DWGS	DWGS	DWGS	DWGS	DWGS
15	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
22	10	9	4	4	0	0	21	21	24	13	6	4	19	13	5	4
240	6	6	6	6	0	0	0	0	0	0	7	7	11	11	0	0
161	134	115	19	19	96	76	1	1	29	15	11	6	102	58	12	6
170	96	66	6	6	34	31	0	0	148	77	5	5	427	160	38	19
171	58	57	6	6	17	17	1	1	28	28	3	3	79	50	4	4
290	44	17	5	2	0	0	3	3	21	17	4	2	92	18	10	3
291	16	0	6	0	0	0	12	9	14	1	6	0	51	13	6	0
292	0	0	1	0	0	0	8	0	0	0	3	0	2	0	0	0
293	5	0	5	5	0	0	3	1	0	0	12	0	11	1	0	0
TOTALS	369	270	58	48	147	124	51	38	264	151	57	27	794	324	75	36

GRAND TOTALS  
TOTAL DRAWINGS 1815  
TOTAL ISSUED 1018