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RESERVE MINING COMPANY

MILEPOST 7 PROJECT

CONSTRUCTION STATUS

AND

PROGRESS ANALYSIS REPORT

MAY 1978

TD 899 .M5 P8x



A Subsidiary of Pullman Incorporated

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TABLE OF CONTENTS

SECTION	TITLE		PAGE NO.	
			*	
1.	INTR	ODUCTION	1	
II.	SUM	MARY AND RECOMMENDATIONS	4	
III.	EVAL	UATION OF REPORTS	7	
	Α.	ENGINEERING REPORTS	7	
	В.	PROCUREMENT REPORTS	12	
	С.	CONSTRUCTION REPORTS	14	
IV.	ANAL	YSIS OF DATA	12	
	Α.	ENGINEERING	12	
		 Kaiser Engineers Sargent & Lundy 		
	В.	PROCUREMENT STATUS	20	
	C.	CONSTRUCTION STATUS	24	
		 Dry Cobbing Coarse Tails Handling and Loadout Concentrate Filtering Pelletizer Air Quality Truck Repair Shop Tailings Clarifiers Tailings Pipeline and Road Grade Comments 		
V.	EXHI	BITS		
	Α.	DRAWING STATUS REPORT		
	В.	DESIGN PROGRESS SCHEDULE		
	C.	DESIGN & DRAWING REPORT		
	D.	REPORT SCHEDULE		

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- E. PROJECT ORGANIZATION CHART
- F. CRITICAL CONTROL DATES
- G. FACILITY SUMMARY & PHYSICAL PROGRESS
- H. PROJECT MASTER SCHEDULES (Sheets 1-20)

1, 1



I. INTRODUCTION

Pullman Torkelson Company (PTC) was engaged by the Minnesota Pollution Control Agency to provide the State with information and reports which evaluate the construction progress of Reserve Mining Company (Reserve) at the E. W. Davis Works in Silver Bay, Minnesota. PTC was requested to evaluate the construction progress through an analysis of procurement reports, engineering reports, construction reports, critical path schedules, and on-site inspections. The work was to be accomplished in two phases. The first phase was to consist of a review of information provided by Reserve Mining through the Agency and any additional information requested by PTC, to determine the present status of the construction as it relates to Reserve's ability to complete the individual components and the total project by April 15, 1980. Phase Two was to consist of an ongoing analysis of monthly reports and physical completion of the project in order to identify any existing or potential variances from the schedule, and their impact on Reserve's ability to complete the project by the established deadline dates.

This report documents PTC's activities, analysis, conclusions, and recommendations as a result of the Phase One effort.

On March 15, 1978, PTC personnel met with representatives of the Minnesota Pollution Control Agency and established parameters and procedures for completion of the inital work phase. During the meeting PTC received copies of all information which the Agency had received to date.

A preliminary review of the information indicated that the type of reports currently being received by the Agency are comprehensive and complete enough to review the construction schedule status on an ongoing basis. The adequacy of the reports with respect to accuracy, however, would need to be established as a result of the more detailed review during the initial phase of work.

Subsequently it was determined that a visit to Kaiser Engineer's facilities in Oakland, California would be necessary to determine the adequacy of the engineering and procurement reports, and the CPM schedule. On April 6, 1978, Mr. Robert C. Teel, Project Manager for Pullman Torkelson Co., met with Mr. Al Wallach, Project Manager at Kaiser, and Dana Anderson, Cost and Schedule Control Engineer. The various reports and controls which Kaiser uses to plan and control their work, review status and revise schedules were reviewed. The results of this meeting are contained in Section III of this report. In summary, However, Kaiser's methods and procedures for generating and updating the reports, and controlling the various project activities, were found to be adequate for the purpose and in keeping with good engineering practice. A major problem, however, is the use of the CPM which was submitted by Reserve in January 1978 which needs to be updated to reflect current planning. Kaiser Engineers is in the process of updating the CPM which is scheduled to be available by June 30, 1978.

A visit to the construction site was arranged by the Agency. This

meeting was attended by Mr. R. C. Teel, Pullman Torkelson Project
Manager, John Stegmeier, Pullman Torkelson Construction Manager,
Loren Voigt, MPCA, C. J. Nohlecheck, and L. J. Molinaro of Reserve
Mining, and Hugh Fulton, the Resident Construction Manager for
Kaiser Engineers. During this meeting the various reports which are
generated monthly by Reserve Mining Company which indicate the status
of the construction were reviewed. In addition, the various methods of
planning and control for day-to-day field scheduling and operations were
discussed. A site inspection tour followed the completion of the meeting
during which the status of physical completion of the plant was verified.

PTC has reviewed the information provided through the Agency and evaluated its format and content. The extent to which the information provides a means of monitoring Reserve's construction program as it relates to Reserve's ability to complete the total project by April 15, 1980 was assessed. With the exception of the CPM schedule and the Sargent & Lundy reports the data was determined to be adequate for the purposes for which it was intended. For a discussion of the various reports see Section III of this report.

Data submitted through the Agency was compared with previously submitted scendules and infromation to determine the existence and magnitude of schedule variances. A summary of results of this analysis is presented in Section II.

II. SUMMARY AND RECOMMENDATIONS

Pullman Torkelson's analysis indicated that the new facilities can be operational by April 15, 1980. Reasonable construction progress has been maintained to date in spite of unusually adverse weather through the preceding winter, and adverse soil conditions discovered during the excavation of the dry cob building. Reserve Mining has indicated they plan to significantly increase their construction forces as weather permits. With an intensive effort in construction through the spring and summer months it should be possible to make significant progress in all areas of construction. This would contribute significantly toward ensuring that future deviations in construction activities or equipment deliveries would have a diminshing effect on the completion date.

In the absence of up-to-date critical path method scheduling information the conclusions in this report are based on the remaining information provided by Reserve and visits to the site and Kaiser Engineer's facility.

Availability of an updated CPM Schedule will allow more precise identification of the critical activities and equipment deliveries, and will permit a more comprehensive and accurate analysis to be performed.

Conclusions arrived at on the basis of this analysis will greatly increase the confidence that the project will be complete on schedule.

It appears that the engineering drawing work is progressing at a



satisfactory rate and to this point has been able to keep pace with the construction requirements. The major concern which we have at the present time is the procurement activity.

In our judgement the procurement activity has the highest potential of causing a delay which would adversely affect the completion date and be beyond Reserve's ability to correct. It is imperative that procurement documents and approvals for all equipments are completed in a timely fashion, and that as purchase orders are awarded, all critical items of equipment are closely followed and expedited up to the time of delivery to the site. Lead times on some critical items can be rather volatile and can change significantly over a period of a few months.

The various Sargent & Lundy reports left questions as to the true status of their effort. They seem to be inconsistent with one another and should be corrected to accurately report the present job status.

Reserve Mining and Kaiser Engineers personnel have been very cooperative in providing information for analysis. We have found their personnel to be competent, well qualified, and well informed about the specific activities over which they have responsibilities. In general the reports are of a high quality and reflect a reasonably accurate picture of the job status.

The most recent CPM Schedule (January 1978 submittal) is somewhat out of date and planning has changed significantly in the interim. Kaiser Engineers is in the process of updating the CPM to more accurately reflect



the current planning. Availability of this data is scheduled for June 30, 1978.

Adequate control of the project can be maintained in the absence of the updated CPM by other means such as bar charts, etc., as long as reasonable adherence to this schedule is achieved. This seems to be true in the case of the engineering and construction activities. However, the procurement activities seem to have deviated significantly from the originally planned schedules. Therefore, the procurement activities should receive careful attention and the preparation of a revised CPM and in the future status evaluations.

III. EVALUATION OF REPORTS

This section of the report presents Pullman Torkelson's findings with respect to the completeness and accuracy of reports and reporting system used by Kaiser Engineers, Sargent & Lundy, and Reserve Mining in monitoring progress on the job. The reports are classified into two categories. First, engineering and procurement reports and second, construction reports.

The engineering and procurement status is reported in the progress reports, which are prepared by Kaiser Engineers for Reserve Mining Company. The construction reports are entitled "Construction Progress Reports" and are prepared by Reserve Mining Company for submittal to the Federal Court, The Minnesota Pollution Control Agency, when the Minnesota Department of Natural Resources.

A. <u>Engineering Reports</u>

1. <u>Progress Reports</u>

a. Status Reports

The narrative status report section of this report is generally well done and presents a concise description of the current status of the project. However, we suggest that a statement be included whenever a significant schedule deviation is reported to explain the impact on critical dates. For example, on page III-4 of Progress Report No. 8 the following comment is offered for the status of the dam site service building, Area 293: "The drawing for site grading has been completed but no further work is presently being accomplished in this facility." This statement leaves the

reader with a question as to whether or not the lack of work on this area is affecting the schedule or not. An additional comment which may indicate that this is according to the plan would solve this problem. Or, in the event that this was not according to plan, a statement should be made regarding the impact of the activity on facility completion.

b. Three exhibits are used to summarize the status of engineering progress. They are the Drawing Status, the Design Progress Schedule, and the Man-Month Schedule.

(1) <u>Drawing Status Report</u>

The Drawing Status Report (Exhibit A) is an overview of the current status of the engineering activities. It does not include project or support functions in this reporting. PTC reviewed the methodology used by Kaiser Engineers to compute the equivalent drawings complete and the equivalent percent complete in order to establish the accuracy of the reporting. The equivalent drawings complete is computed by taking the estimated percent complete for each drawing on a monthly basis which is estimated by the supervisor of the various disciplines, and weighting that by the number of hours budgeted for each drawing to determine an equivalent percent complete for the drawing package as a whole. This is a valid and effective way of determining the actual percent



complete. It is PTC's opinion that the percent complete as indicated on this report is a reasonably accurate representation of the true status of the engineering drawings.

(2) <u>Design Progress Schedule</u>

The design progress schedule lists the various engineering disciplines along with specifications, miscellaneous support, and supervision. The planned percent complete by month is listed along the top of each line adjacent to the listing for the various disciplines. The planned percent complete is based on planned manhour expenditures for each month as a percentage of the total manhours for that discipline, and is an accepted method for establishing a baseline plan. The equivalent percent complete for each discipline is indicated below the planned percent complete in the space opposite each discipline. Comparison of the equivalent percent complete with the planned expenditures is a good indication of the overall schedule status for the project by discipline.

It should be noted, however, that the percent complete for specifications, miscellaneous support, and supervision are not statused in the same way. Percent complete for these functions is calculated by comparing the number of hours expended with those budgeted. This method is generally used in areas such as supervision and miscellaneous support

where specific tasks are not identifiable for budgeting purposes. (It is questionable as to whether specifications should fall in the same category.) This is about the only reasonable way to status level-of-effort tasks. However, it more accurately indicates budget status rather than schedule status. Progress for these level-of-effort tasks is not truly equivalent to progress for the various disciplines. In order to properly evaluate the actual engineering progress, only those items which are statused based on the physical percent complete should be used.

PTC is not recommending a change in reporting since the total progress indicator used in this report is undoubtedly of value to Kaiser. For our analysis purposes, however, we will not include reported progress in supervision and miscellaneous support.

A percent complete curve is superimposed on the design progress schedule. This curve was revised in January of 1978 to reflect a replanning in the manpower loading. PTC will always reference its analysis to the original expenditure plan which we refer to as the baseline.

When manpower expenditures are running below planned, it indicates that 1) they are running under budget, or 2) they are running behind schedule, or 3) a combination of these two.

(3) <u>Man Month Schedule</u>

The man-month schedule indicates the planned equivalent number of men per month required to be working on the project in order to complete the work in accordance with the schedule. Manpower planning versus actual equivalent man month expended is indicated. This report can be used to help determine whether the cause of a variance in percent complete in the design progress schedule resulted from schedule or budget variances.

(4) Progress Sketches

The progress sketches contain a colored overlay of completed construction on sketches of the facilities and are somewhat useful for correlating the physical progress with the status reports. However, they cannot substitute for site visits for this purpose.

(5) Sargent & Lundy Reports

There appears to be inconsistencies between the various reports submitted by Sargent & Lundy. It is PTC's opinion that the Sargent & Lundy Reports are not accurately prepared and do not reflect the true status of the progress. In order for these reports to be of value in our analysis they must be complete and up to date.

(6) Arthur G. McKee Engineering Status Report

The January 31, 1978, status report indicated the following:

- A. Total number of drawings (all = 484 disciplines)
- B. Total number of drawings issued for = 470 (97%) construction (all disciplines)
- C. Total number of specification/ = 147 requisitions (E/R's & EPS's)
- D. Total number of E/R's and EPS's = 145 (99%) issued for construction

Overall engineering, including checking vendor drawings, and other coordinated work is 98.3% complete. Since this report is based on January 31, 1978, status it appears that McKee's engineering activities are close to 100% complete with the possible exception of miscellaneous items. At that time there were only 14 drawings and two specifications remaining to be released.

B. PROCUREMENT REPORTS

1. Procurement Schedule and Status Report (PSSR)

The procurement schedule and status report or PSSR lists all of the equipment as it will be grouped on purchase orders. If a portion of the equipment listed on the proposed purchase order is to be expedited for earlier delivery, then the remainder of the order is listed as a separate item on the subsequent report. In this way the schedule for the expedited equipment will be different than that for the remainder of the order.

Each item is assigned a schedule code when it is entered into the report. This schedule code determines the duration times of various activities required during the total procurement cycle. When the report was finally generated these times were estimated based on experience and current anticipated lead times for the various items. Actual dates for completing each activity associated with the items are indicated by an "A" preceeding the date. An "F" preceeding the date for any item indicates that is a forecast date based on a committment from a vendor.

The difference column indicates the number of days' difference between the date that the equipment is required on site, and the date that it is scheduled to be delivered to the site. A negative number in the difference column would indicate a number of days the item would be late getting to the site.

In discussions with Kaiser Engineers it was indicated that the "required-at-site" date will always be taken from the earliest start scheduled. Thereby, assuring that any schedule slippages will be noted before they impact end dates. Therefore, a negative number in the difference column will not necessarily indicate that a slip is anticipated in the completion of the construction work, but will serve to flag potential problem areas.

In many instances the required-at-site date listed on the PSSR does not correspond to the required at-site date on the project master schedule. Therefore, PTC's analysis compared the forecast arrival date of the equipment from the PSSR to the required start of construction date on the schedule.

The Kaiser Engineering personnel also indicated that an intensive effort is underway to eliminate all errors which currently exist in the report, and to get firm committment dates from vendors into the report. Both of these actions are necessary in order for the report to be truly meaningful. When this point is reached the report will be an extremely valuable tool for accessing the true schedule status of the project.

2. Sargent & Lundy Reports

See comments under Paragraph A.1.a.(5).

C. CONSTRUCTION REPORTS

1. Facility Summary and Physical Completion Progress Report

The facility summary schedule and physical progress report is an excellent tool for following the progress of construction. Reported progress is estimated by the field staff based on on-site inspection. The early start, and late start cumulative percent complete curves provide good visibility of the construction progress on a total basis.

However, in reviewing these reports we were unable to determine the method by which the "total" completed percentage of a given area was derived. The usual method of calculation is to multiply reported percent complete for each work activity by its respective weight percentage, and total these figures to obtain the total percent complete. However, in using this method our calculations agreed with only two* of the reported total percentage complete. Several comparisons are within very close range, others differ considerably. The following is a comparison of



Reserve Mining's reported versus our figures for the total percent complete.

Area	Reported % Complete	PTC Calculated % Complete
Area	% Complete	% Complete
Dry Cobbing	8.5	5.5
Coarse Tails Handling &	6.2	6.0
Loadout		
Concentrate Filtering	3.0	2.6
Pelletizer Air Quality	23.3	22.2
Truck Repair Shop	31.9	25.0
*Tailings Clarifiers	1.7	1.7
*Tailings Pipeline and	.9	.9
Roadgrade		
Tailings Dams & Diversions	10.7	13.9
Townsite	0	_0
Milepost 7 Project	9.2	6.7

Reserve Mining was contracted through the Agency and indicated that the element weightings have changed since the beginning of the project as a result of work changes. The scope changes have not been reflected in the reports as yet, however, they are used for statusing purposes. Reserve indicated the weightings will be updated for the May reports. Also, we note that the following areas of interest to us are not scheduled on this report, and should be added as information becomes available.

Concentrator Modifications Powerhouse Modifications Delta Stabilization Additive Building



<u>Discipline</u>	Reported % Complete	Scheduled % Complete	Difference
Structura1	53.6%	53%	0.6%
Architectural	60.1%	53%	7.1%
Mechanical	77.2%	82%	-4.8%
Civil	59 .7 %	66%	-6.3%
Piping	35.2%	45%	-9.8%
Heating, Ventilating	37.8%	48%	-10.2%
Electrical	23.7%	26%	-2.3%
Instrumentation	34.8%	37%	-2.2%

Of the group, only the Structural and Architectural disciplines are on or ahead of schedule. All other disciplines are somewhat behind schedule. Analysis of this data provides a more accurate assessment of the design progress than the total design progress reported in Exhibit B as 40.6% versus 41% planned. Those areas where there is a significant deviation from the planned percent complete are Civil, Piping, and Heating & Ventilating.

The design and drawing report (Exhibit C) indicates that there are only a total of 47 drawings in the total Civil package. 26 of these are completed. Therefore, the deviation in drawing completion for the Civil discipline is not considered to be a serious problem since the remainder of the drawings in this package could be completed in a short period of time.

There are a planned 250 drawings in the piping package, 52 of which have been completed. Because of the large number of drawings yet to be completed, the 10% deviation is significant. Piping is usually one of the more difficult areas to complete and therefore, this

area should be watched closely, particularly in light of the fact that progress has fallen progressively behind each month for the past three months.

The heating and ventilating drawing package consists of only 56 drawings and is therefore not considered to be a major problem at this point.

The Electrical and Instrumentation disciplines are generally of great concern in any project, because they are some of the latest packages to be completed, and equipment lead times are generally the longest. Because of this and the large number of drawings involved in this package, it is extremely important that work in this area not be allowed to fall further behind than it is presently reported to be.

Although there are some significant deviations from the schedules, with respect to some of the engineering disciplines, this does not seem to be a serious problem at this point based on discussions with the site construction personnel. They reported that engineering has thus far been able to provide those drawings required by construction to maintain their schedules. However, as the pace of construction increases during the warm months, this situation could change.

2. Sargent Lundy

There appears to be several schedule deviations in the various Sargent Lundy Reports.

An attempt was made to analyze all of the reports and cover each discrepancy individually. It readily became evident this approach would create a cumbersome report filled with cross references and difficult to comprehend. A summary type approach was therefore chosen. The item references below refer to the reports listed at the end of this section.

PTC's comments are as follows:

Reference No. 2 shows no progress made on 12 of the 14 items reported on since the last report. The remarks on the last two reports are the same word-for-word, thereby rendering the validity of the report questionable. Comparing Reference Nos. 2 through 6 with Reference No. 7 and 8, several schedules in design, specifications, bid releases and award of purchase orders have not been met. Reference No. 6 shows delivery of material required in September-October 1977 time frame but does not indicate this material was received. However, Reference No. 1 states Sargent and Lundy work in this area is complete. In some of these cases, the report does not indicate the purchase order has been awarded yet. Reference No. 4 indicates some action may be needed on various long lead times to ensure they are on site when required. Reference No. 5 indicates several drawings did not make their schedule completion dates and others are in jeopardy of missing theirs.

Reference No. 8 indicates a large amount of float for most of the activities and thereby may nullify some of the "completion required" dates on the other reports. PTC feels this is probably the case, however, the reports should be updated to show the latest completion or required dates for material, designs, etc., thereby not giving the appearance that the project is behind schedule. Report accuracy should be investigated to determine the actual status of this effort.

References:

- 1. Monthly Engineering Report, dated January 20, 1978.
- 2. Mechanical Drawing Release Schedule, dated January 15, 1978.
- 3. Procurement Progress Report, Job No. 5121, 5492 and 5493, dated January 15, 1978.
- 4. Procurement Progress Report, Job No. 5121-13, revised January 15, 1978.
- 5. Electrical Drawing Release Schedule, Job No. 5121-13, revised January 15, 1978.
- 6. Procurement Progress Report, Job No. 5121-15 & 16, revised January 15, 1978.
- 7. Project Master Schedule Power Plant Modifications, Sheet 19 of 20, approved June 1977.
- 8. Project Master Schedule Electrical Modifications, Sheet 20 of 20, approved June 1977.

B. Procurement Status

The March 1978 Procurement Schedule and Status Report indicates a general improvement from the February 1978 issue. However, many line items still are listed with significant negative floats in the DIFF column as the result to one of the following:

- 1. Failure to complete specifications as scheduled.
- 2. Specification completion scheduled too far in future.
- 3. Time lapse between completion of specifications and requisition to purchasing to obtain bids.
- 4. Time lapse between receipt of bids in-house and issuing of recommendation for purchasing.
- 5. Bids not received in-house as scheduled on the PSSR.
- 6. Time lapse between recommendation for purchase and award of purchase order.
- 7. Time lapse between award of purchase order and vendor supplying his drawings for approval.
- 8. Time lapse between receipt of vendor drawings and approval and release for fabrication.
- 9. Vendor requiring more time to supply item than originally planned.

Items 1, 2, 3, 4, 5, 6 and 8 above are in-house activities. Every possible effort should be made to maintain the schedule on in-house activities. For once a purchase order has been awarded, Kaiser Engineers' control over the scheduled activities is significently deminished. When a vendor commits to a given delivery date it is extremely difficult to get him to improve on that date. In many cases, the vendor will not even meet his projected shipping date.

The PSSR is a very useful management tool. However, it must be closely evaluated each month. A vigorous effort should be made to remove

all erroneous data and add all information which is available. For example, the PSSR DIFF column shows an 0 float for Equipment No. 161-044M, Purchase Order 40242, 50 HP Motors. However, the required on-site date is Nov. 15, 1978, while ship date is forecast as March 1, 1979, an actual negative float of -105 days. This may be a bad forecast date that was put into the computer. In any event, the report should be reviewed for accuracy of data and corrected as required.

The following table gives the breakdown of the number of items on the March 15, 1978 PSSR that show a negative float in the DIFF column

	Days of Negative Slack			
AREA	7-30	31-90	Over 90	Total
161	2	11	4	17
170	3	3	4	10
171	1	4	5	10
240	0	2	0	2
290	4	9	7	20
291	4	4	3	11
292	2	1	0	3
293	0	2	10	12
TOTAL	16	36	33	85

The following is a detailed analysis and recommendations for most of the items showing a negative float on the March 16, 1978 PSSR. An asterisk



has been placed in front of the Equipment Number of each item which appears to be critical. A recommended action is listed in the comment column where appropriate.

The Project Master Schedule Summary charts (Exhibit H) were used to evaluate the impact of the schedule deviations in the absence of the CPM Schedule.

Equipment Number & Description	Critical Date	Site Delivery Slack
022-101 Vertical Pumps	June 15, 1979 (PSSR Site arrival	-318
161-043A Riffle Chutes - West Plant	Dec. 29, 1978 (PSSR Site arrival	-123

Comments

The P.M.S. indicates installation does not start until Apr. 1, 1979, a -75 day slip. However, installation is from April-September 1979, so the -75 day slip does not appear to be critical.

P.M.S. indicates installation starts Oct. 1, 1978; therefore, a 90 day slip. Expedite since there appears to be minimum float in the activity chain for completion of dry cobbing facility.

Four riffle chutes were deleted from the 3-16-78 PSSR. Unless these items were deliberately deleted, they should be checked to ensure they are not omitted on the purchase order. Riffle Chutes-west plant #043, 053, 063, 073, 083, 093, and 103 (Purchase Order 40257) were omitted from the 3-16-78 PSSR.

Since the February PSSR the DIFF on these items has increased from 3 to -123 and 34 to -92 respectively.

It is understood that the east plant of the dry cobbing is to be completed first. If this is in fact true, then emphasis should be placed on the equipment/material required for the east plant. According to the 3-16-78 PSSR this is not the case as it shows the purchase order awarded for the west plant but not yet for the east plant. Over the duration of this project this could become a very meaningful factor and requires close surveillance.

While it appears from the project master schedule that the 90 day slip in the completion of the dry cobbing facility will not impact the facility complete event, (which is scheduled for mid-November 1979), it is

PSSR/Schedule Analysis Page Two

Equipment Number & Description	Critical Date	Site Delivery Slack	Comments
022-101 continued			possible that it may impact the availability of dry cobbing material for the fill at the dam site.
*161-043B Riffle Chutes - East Plant	Dec. 29, 1978 (PSSR Site arriva	-92 1)	Riffle Chutes - east plant $\#123$, 133 , 143 , 153 , 163 , 173 and 183 (Purchase Order 40257) were omitted from the $3-16-78$ PSSR.
			P.M.S. indicates installation starts Oct. 1, 1978; therefore, a 90 day slip. Expedite since there appears to be minimum float in the activity chain for completion of dry cobbing facility.
*161-044A Double Drum Dry Cobber-West Plant	Dec. 9, 1978 (PSSR Site arriva	-5 <i>7</i> 1)	Double Drum Dry Cobbers $\#044$, 054, 064, 074, 084 and 094 (Purchase Order 40273). Since the February PSSR the DIFF on these critical items has increased from -24 to -57 .
			P.M.S. indicates installation starts Dec. 1, 1978; therefore, only -9 day slip. Expedite since there appears to be zero float in activity chain.
*161-044B Double Drum Dry Cobber-East Plant	Dec. 9, 1978 (PSSR Site arrival	-84 L)	Double Drum Dry Cobbers #124, 134, 144 [and 154, 164, 174, and 184 (Purchase Order 40273) were omitted on the 3-16-78 PSSR]. Since the February PSSR the DIFF on these items has increased from -23 to -84. Turnaround time on approval of vendor drawings should be cut to the minimum to achieve the earliest possible start date of fabrication. The companies supplying components to the Falk Corp. for the dry cobbers may need expediting also.

PSSR/Schedule Analysis Page Three

Equipment Number & Description	Critical	Site Delivery Slack	Comments
*161-044B continued			P.M.S. indicates installation starts Dec. 1, 1978; therefore, only -9 day slip. Expedite since there appears to be zero float in activity chain.
161-272 Underhung Crane	June 29, 1978 (PSSR Site arrival)	-56	P.M.S. indicates installation starts Aug.1, 1978; therefore, +32 days float does not appear to be critical.
161-274 Monorail Hoist	Dec. 13, 1978 (PSSR Site arrival)	-29	P.M.S. indicates installation starts Feb. 1, 1979; therefore, +49 days float does not appear critical.
161–337A Dust Collector Fans	Nov. 21, 1978 (PSSR Site arrival)	-67	P.M.S. indicates installation starts Dec. 1, 1978; therefore, +9 days float does not appear critical.
161–337B thru F Dust Collector Fans	Dec. 8, 1978 (PSSR Site arrival)	-84	P.M.S. indicates installation starts Dec. 1, 1978; therefore, -8 days slip. However, since there is a 5-month installation scheduled, DecApril 1979, the -8 days slip should not be too critical providing

Except for Item A, all of the dust collector fans (Purchase Order 40231) are awaiting vendor drawings according to the PSSR. The purchase order was awarded January 13, 1978. The vendor should be expedited to supply the drawings. 119 days between award of purchase order and release for fabrication as projected on the PSSR seems excessive and it may be possible to reduce the time span between these activities.

the present delivery schedule is met. The purchase order has been awarded but an actual forecast date has

not been reported for delivery.

PSSR/Schedule Analysis Page Four

Equipment Number & Description	Critical Date	Site Delivery Slack	Comments
*161-377 Vacuum Valves	April 13, 1979 (PSSR Site arrival	-210	P.M.S. indicates installation starts Dec. 1, 1978; therefore, -134 days slip.
			Possibly a wrong date may have been entered on PSSR? Vacuum valves are not usually this long a delivery item.
			Vacuum valves #377, 381, 382, 383, 389, 391, 392 and 393 (Purchase Order not awarded). The PSSR shows no action taken to date. If the time projections given in the PSSR are at all accurate immediate action is indicated to begin procurement of these items.
161-460 Condensate Receivers	Sept. 8, 1978 (PSSR Site arrival	-7 .)	Could not identify on P.M.S. network.
161–501 Indoor Load Centers	Aug. 15, 1978 (PSSR Site arrival	-96 L)	Indoor Load Centers #501, 502, 512, 513 and 514 (Purchase Order 40204). The PSSR shows the vendor drawings were submitted January 26, 1978; yet as of March 16, 1978, the items have not been released for fabrication. The time lapse of vendor drawings and release for fabrication should be closely monitored.
*161-506 Motor Control Centers -480V	Jan. 26, 1979 (PSSR Site arriva	-80 L)	Motor Control Centers-480V - #506, 507, 508, 509, 517, 518, 519, 520, 547, 548, 549, 526 and 527 (Purchase Order 40252). There appears to be an internal delay on these items. The requisition to purchasing for the obtaining of bids was Dec. 18, 1977; yet, the PSSR shows no bids received in-house.

PSSR/Schedule Analysis
Page Five

Equipment Number & Description	Critical <u>Date</u>	Site Delivery Slack	Comments
*161-506 continued			P.M.S. indicates installation starts Dec. 1, 1978; therefore, -57 days slip. Coarse tailings area MCC's starts installation Sept. 1, 1978; therefore, -148 days slip. Expedite, since there appears to be only a minimal amount of float in the activity chain.
161–523 Indoor Load Center			Indoor Load Centers #523, 524, and 525 (Purchase Order 40204). Equipment number 524 on the PSSR is not on the Equipment List of January 1977. Equipment 161-504, 161-505, 161-515 and 161-516 appear on the Equipment List; they were on the 2-2-78 PSSR but are not on the 3-16-78 PSSR. These items are all 480 V switchgear. Unless the need for these items has been omitted from the project, a check should be made to determine their status.
161-546 Dry Type Transformer	June 15, 1979 (PSSR Site arrival)	-35	DryType Tran sformer (Purchase Order 40232). The purchase order was awarded 1-24-78. The vendor has not yet submitted drawings for approval. Expedite the vendor for the drawings. P.M.S. indicates installation starts Sept. 1, 1978; therefore, +77 days float (does not appear critical).
*170-021C thru F Pumps - Slurry	Jan. 15, 1979 (PSSR Site arrival)	-15 3 (worst case)	(Purchase Order 40220). These pumps show a change in negative float from a -27 to a -153. The PSSR shows the purchase order awarded Dec. 27, 1977. The vendor should be expedited to supply the required drawings and the release for fabrication should be given as soon as possible thereafter.

PSSR/Schedule Analysis Page Six

Equipment Number & Description	CriticalDate	Site Delivery Slack	Comments
*170-021C thru F continued			P.M.S. network calls for a Dec. 1, 1978 delivery completion for all slurry pumps. PSSR gives various dates pumps are "required at site" but all are scheduled to arrive Jan. 15, 1979. This is probably adequate since installation completion is scheduled for March 1980; hence, a minimum of +15 days float.
*170-063D thru F Magnetic Separator Flot. Feed	Jan. 31, 1979 (late) Nov. 12, 1978 (early) (PSSR Site arrival)	-131 (worst case)	(Purchase Order 40213). These items show a change in negative float from a -3 to -131. The PSSR shows the purchase order awarded Dec. 20, 1977. The vendor should be expedited to supply the required drawings and fabrication release should occur as soon as possible thereafter.
			It appears from the P.M.S. network that the magnetic separators could be delivered through June 1979 without delaying installation, since installation is scheduled through March 1980. However, Sections 1 & 2 require installation to be completed by Aug. 1978 with float time through Nov. 1978. Delivery of first units is Nov. 1978, which is marginal and so, therefore, Sections 1 & 2 should be expedited.
170-137A Pumps - Slurry	Sept. 15, 1978 (PSSR Site arrival)	-62	From the P.M.S. network the transfer slurry pumps for Sections 1-6 have a scheduled installation of first week of Aug. 1978; therefore, a slip of -45 days. However, the activity has a float of +105 days, hence the -62 diff. should not be critical.

PSSR/Schedule Analysis Page Seven

Equipment Number & Description	Critical Date	Site Delivery Slack	Comme
*170-501B thru C Motor Control Centers 480 V	Jan. 26, 1979 (PSSR Site arrival)	-137 (worst case)	(Purchase Order 40252). Treceived but shows a forecaction should be taken to a lift the PSSR is in error it should be taken to a lift the
			From the P.M.S. the MCC date is Feb. 1980; therefore MCC's would appear not to this should be reviewed.
171-008 Demagnetizing Coil	Aug. 1, 1978 (PSSR Site arrival)		Demagnetizing Coil #008 a 40216). The Feb. 2, 1978 with a DIFF of -99 and a re 7, 1978. What was the ra on-site date to Aug. 1, 19
171-011 Slurry Pumps	Jan. 15, 1979 (PSSR Site arrival)	-207	P.M.S. indicates installat therefore, -76 days slip. float before next activity s slip does not appear to be

ents

The PSSR shows no bids ecast date of Feb. 6, 1978. resolve any problem here. hould be corrected.

C's installation completion ore, Jan. 1979 delivery of to be critical; however,

and 009 (Purchase Order 8 PSSR showed these items required on-site date of April ationale for changing the required 978, on the March 16, 1978 PSSR?

ation starts Nov. 1, 1978; However, there is 120 days starts, hence the -76 days not appear to be critical.

Slurry Pumps #011, 012, 013, 021, 022 and 023 (Purchase Order 40220). These items changed from a DIFF of -43 on the 2-2-78 PSSR to a -207 on the 3-16-78 PSSR. This is a six months change in the shipping date.

Because of the large change between the previous month's PSSR and the current PSSR, there is a 6-month difference in the shipping date for the equipment. While it appears that the result is a -76 days the schedule information that we have is too general to be sure. Therefore, we feel that the impact of this change on other items should be investigated.

PSSR/Schedule Analysis Page Eight

Equipment Number & Description	Critical Si Date	te Delivery Slack	Comments
171-011 continued			It is noted that most of, if not all, of the slurry pumps are being procured from Warman of Madison, Wisconsin. Many of these pumps show large negative float times. It is recommended that it be considered that some of these pumps be procured from other vendors if Warman cannot handle the volume of these orders or provided acceptable delivery dates.
*171-123A thru C Filtrate Pumps	Jan. 15, 1979 (PSSR Site arrival)	-198	P.M.S. indicates installation starts Nov. 1, 1978; therefore, -76 days slip. Installation completion is scheduled for May 1, 1979 (pumps 1-6) and Oct. 1, 1979 (pumps 7-10). The -76 days slip does not appear to be too critical at this time but pumps 1-6 should be expedited.
			Pumps listed under 171-123A (Purchase Order 40220) have increased from a -13 to a -198 while pumps listed under 171-123B have changed from 18 to a -184. Pumps listed under 171-123C have changed from 140 to a -167; a slippage of 10 months. This purchase order was also awarded on Dec. 27, 1977, to Warman of Madison, Wisconsin. They have not supplied their drawings according to the PSSR.
171-211 Jib Crane	Sept. 6, 1978 (PSSR Site arrival)	-36	Purchase Order not yet awarded.
			P.M.S. indicates installation starts July 1, 1978; therefore, -69 days slip. However, from P.M.S. indicates there are 90 days float; hence, the -69 days slip does not appear to be too critical. The grant is maked.

not appear to be too critical. The crane is probably

not essential to operation of the facility.

PSSR/Schedule Analysis Page Nine

Equipment Number & Description	Critica l Date	Site Delivery Slack	Comments
& Description	Date	DIGCK	Comments
171-311	Dec. 4, 1978 (PSSR Site arrival)	-80	Purchase Order not yet awarded. Could not identify ventilator on P.M.S. network; however, it should be expedited for an Oct. 1978 installation to correspond with roofing and siding activity.
*171-501 Outdoor Load Center	Aug. 15, 1978 (PSSR Site arrival)	-71	Purchase Order 40204. Could not identify Load Centers on P.M.S. network. This could be a serious problem.
*171-506 Motor Control Center -480 V	Jan. 26, 1979 (PSSR Site arrival)	-81	Purchase Order 40252. PSSR indicates no bids received. P.M.S. indicates installation starts Nov. 6, 1978; hence, a slip of -81 days. MCC's are classically a potential problem because of deliveries. This should be reviewed.
*171-514 Transformer	July 14, 1978 (PSSR Site arrival)	-29	Purchase Order 40202. Expedite vendor for drawings and minimize time for approval and release for fabrication.
			P.M.S. indicates installation starts June 15, 1978; hence, a slip of -29 days. However, a float of 60 days exists before the next activity starts. Therefore the -29 days slip is probably not too critical. This should be watched carefully to ensure forecast delivery date is met.
171–526 Control Panel Filters	March 5, 1979 (PSSR Site arrival)	-94	Purchase Order not awarded. P.M.S. indicates installation starts Dec. 1, 1978; hence, a slip of -94 days. Panels 1-6 should be expedited as a minimum.

PSSR/Schedule Analysis Page Ten

Equipment Number & Description	Critica l Date	Site DeliverySlack	Comments
171-526 continued			NOTE: In changing the various panel filters that were listed under these equipment numbers between the two previous PSSR's it appears that No. 527 was omitted from the March 16, 1978 PSSR. Check for accuracy.
240 SERIES (NO	OT A CRITICAL PATH F.	ACILITY)	
240-116 Finned Pipe Cab.	Aug. 15, 1978 (PSSR required at site)		Purchase Order not awarded.
240-117 Truck Repair Shop	Sept. 1, 1978 (PSSR required at site)		Purchase Order 40241. Although these items are not on the critical path, they warrant some attention as their negative float has increased more than 30 days.
AREA 290 Additive Building	varies	-158 (max.)	Negative floats for all of the items 290-265 through 290-538 listed on the 3-16-78 PSSR increased from the 2-2-78 PSSR with the exception of two that decreased and one that remained the same. These increases in negative float range from 4 to 75 days and involve 15 different line items. In most of these cases it appears that the specification approval date was not met or the schedule for specification approval is too far in the future. It is PTC's understanding that this facility is not on the critical path to plant completion. However, with schedule variances of this magnitude, this should be investigated.
AREA 291	varies	-188 (max.)	The following equipment number listings on the 3-16-78 PSSR indicate a change in requirement on

site date as indicated.

Equipment Number & Description		Delivery llack	Cor	mments
AREA 291 continued			Equipment Number	Amount of Change (Slippage)
			291-033 291-034 291-038 291-133	3 months 4 months 8 months 4 months
			The reason for the above and action taken if nec	ve changes should be determined essary.
*291-033 Reclaim Water Fill Pump	Sept. 1, 1978 (PSSR required at site)	-42	Could not identify on P	.M.S. network. Review.
*291-034 Seal Water Pump	Oct. 1, 1978 (PSSR required at site)	-12	Same as above.	
291-038	April 1, 1979 (PSSR required at site)	-14	since pump house $\sharp 1$ er	.M.S. network; however, rection is scheduled from May- ys slip does not appear to be
291-041 Unit Heaters	Feb. 5, 1979 (PSSR Site arrival)	-188	decreased significantly possibly due to a previputer. However, in-ho	arded. These items have from the 2-2-78 PSSR, ous input error to the compuse action may be required cations to allow the remaining eduled.
			since pump house #1 en Sept. 1979, the -188 d critical for unit heater	r.M.S. network. However, rection is scheduled from May-day slip does not appear to be delivery. "Required at site" to be consistent with other

scheduled activities.

PSSR/Schedule Analysis Page Twelve

Equipment Number & Description	Critical Date	Site Delivery Slack	Comments
291-050 Power Roof Ventilators	Jan. 5, 1979 (PSSR Site arrival)	-157	Purchase Order not awarded. Could not identify on P.M.S. network; however, since pump house #1 erection is scheduled from May - Sept. 1979, the -157 day slip does not appear to be critical for the delivery of ventilators. PSSR "required at site" date does not appear to be realistic.
291-103 Stand Pipes	Jan. 15,1979 (PSSR Site arrival)	-7 5	Purchase Order not awarded. P.M.S. indicates a Jan. 1, 1979 installation date; therefore, only -14 days slip. Since activity has 120 days of float time, there should be no problem with 14 day late delivery of the stand pipes.
291-126 Fuel Oil Pump	Sept. 15, 1978 (PSSR Site arrival)	-45	Purchase Order not awarded. Specification approval has slipped 3 months on 291-103 and a lesser degree on 291-126. In-house action is indicated. Could not identify fuel oil pump on P.M.S. network; however, since pump house #2 erection is scheduled from Sept Nov. 1978, the -45 days slip does not appear to be critical.
291-131 Sump Pumps	Aug. 25, 1978 (PSSR Site arrival)	-24	(Purchase Order 40248). In-house action required to release purchase order. There is a 35 day slippage due to lack of this event.
			Could not identify sump pumps on P.M.S. network; however, since pump house #2 erection is scheduled from Sept Nov. 1978, the -24 days slip does not appear to be critical.
291-138 Vertical Lift Doors	Aug. 15, 1978 (PSSR Site arrival	-14	(Purchase Order 40209). The vendor drawings were forecast for Nov. 16, 1977. This event is four months late.
			Could not identify vertical lift door on P.M.S. network;

critical.

however, since pump house #2 erection is scheduled from Sept.-Nov. 1978, the -14 days slip does not appear to be

Equipment Number & Description	Critical Date	Site Delivery Slack	<u>Comments</u>
291-150 Ventilators	Jan. 5, 1979 (PSSR Site arriva l)	-157	Pump house #2 erection is scheduled from Sept Nov. 1978. The -157 days slip could be a problem for the delivery of the ventilators and should be expedited. However, there is float time available for completion of pump house #2 with ventilators in the activity chain.
*291-516	Jan. 26, 1979 (PSSR Site arrival)	-86	(Purchase Order 40252). The PSSR indicates bids not received.
			P.M.S. indicates installation starts Feb. 1, 1979; therefore, +5 days float, MCC's delivery does not seem to be critical but should be watched to ensure no further slippages are incurred.
*291-552 Motor Starter - 2.4 KV	Feb. 23, 1979 (PSSR Site arrival)	-114	(Purchase Order 40215). P.M.S. indicates installation starts Jan. 1, 1979; therefore, -53 days slip. Motor starters should be expedited. However, installation time is from Jan May 1979, so Feb. 23 delivery may not be too critical.
291-602			Purchase Order not awarded.
Control Panel			This item appears on the $2-2-78$ PSSR but not on the $3-16-78$ PSSR. Check reason for deletion.
291–605 Motor Control Panel			Purchase Order not awarded.
			This item appears on the $2-2-78$ PSSR but not on the $3-16-78$ PSSR. Check reason for deletion.
292-006 Roof Ventilator	Aug. 18, 1978 (PSSR Site arrival	-17	Purchase order not awarded. Not a critical item but needs some attention.

PSSR/Schedule Analysis Page Fourteen

Equipment Number & Description	Critical Date	Site Delivery Slack
292-008 Fuel Oil Pump	Sept. 15, 1978 (PSSR Site arrival)	-46
292-563 Transformer	Feb. 14, 1979	-13
AREA 293	varies	varies

Comments

Purchase Order not awarded. In-house completion of specifications needed and remaining events accelerated.

Purchase Order not awarded. Expedite in-house completion of specifications and accelerate remaining events.

This area may not be on the critical path; however, the PSSR indicates many items with over 200 days of negative float and several with 82 to 191 days of negative float.

The major reason for the negative float is due to specifications not being completed as scheduled or scheduled too far in the future.

C. Construction Status

The facility summary schedule and physical progress report provides an excellent overview of the construction status. A copy of this report is included as Exhibit G for references purposes. In reviewing this report, PTC checked the reported percent complete reported for each area. It was found that weighing percentages represented the original or baseline planning. Therefore, PTC's calculated percent completes did not correspond with those reported by reserve. Reserve has subsequently updated the weighing percentages to reflect the current status. The following comments pertain to the various areas for which a summary sheet is contained in this report.

1. <u>Dry Cobbing</u>

Progress on excavation is ahead of the early start schedule in spite of problems which were encountered as a result of large amounts of underground rock which was not anticipated.

Concrete placement, which is now behind schedule, can be accelerated and should be able to be completed on time. It is important at this point, however, to make sure that the footings for structural steel which is scheduled to start in mid-March become priority so as not to delay the structural steel erection.

2. Coarse Tails Handling and Loadout

Work in both excavation and placement of concrete for this area are behind the early start schedule. However, there is a considerable amount of slack in the schedule for the completion of

this facility as indicated by the wide envelope between early start/late start schedules.

3. Concentrate Filtering

Excavation is proceeding ahead of the early start schedule.

Although concrete placement did not maintain pace with the early start schedule, progress for the total area remains well ahead of the late start schedule.

4. Pelletizer Air Quality

Total Progress for this area is well within the early start Aate start envelope. The only element in which work progress is behind the late start schedule is in pumps and piping. This is not a serious deviation and lost time can probably be made up now that the warmer months are approaching.

5. <u>Truck Repair Shop</u>

Construction progress in every element of this area is proceeding well ahead of the late start schedule. Completion of this facility is not critical to the completion of the total project.

6. <u>Tailings Clarifiers</u>

The only work scheduled for completion to this date is 5% of the excavation on the early start schedule. Reported excavation progress stands at 3.8%. This deviation is not deemed significant at this stage of construction. Total completion for this area as calculated by PTC is 1.7%, which corresponds with Reserve's reported percent complete.



7. Tailings Pipeline and Road Grade

Although progress to date in this area has been limited to the clearing and grubbing, and total progress is approaching the late start schedule, the magnitude of the effort required to complete work in this area is small. Work required to be completed this summer should be able to be accomplished on schedule and allow the installation of the pipeline starting in February of 1979. PTC's calculated percent complete is .9% and is consistent with Reserve's reported figure.

8. Comments

Scheduling information for a number of the areas is not included in this report. Scheduling information for the following areas has been omitted. Fine crusher air concentrator modifications, powerhouse air, powerhouse modifications, delta stabilization, additive building, tailings pumping system, return line system, dam site service building, and seepage reclaim equipment.

Inclusion of scheduling information for these areas on this report would be extremely useful and helpful in monitoring the construction progress. It is recommended that this information be added to this report if data is available.

required, etc. An attempt was made to analyze all of the reports and cover each discrepancy individually. It readily became evident this approach would create a cumbersome report filled with cross references and difficult to comprehend. A summary type approach was therefore chosen. The item references below refer to the reports listed at the end of this section.

PTC's comments are as follows:

Reference No. 2 shows no progress made on 12 of the 14 items reported on since the last report. The remarks on the last two reports are the same word-for-word, thereby rendering the validity of the report questionable. Comparing Reference Nos. 2 through 7 with Reference No. 8 and 9, many schedules in design, specifications, bid releases and award of purchase orders have not been met. Reference No. 7 shows delivery of material required in September-October 1977 time frame but does not indicate this material was received. In some of these cases the report does not indicate the purchase order has been awarded yet. Reference No. 4 indicates some action may be needed on various long lead times to ensure they are on site when required. Reference No. 5 indicates several drawings did not make their schedule completion dates and others are in jeopardy of missing theirs.

Reference No. 8 indicates a large amount of float for most of the activities and thereby may nullify some of the completion or required dates on the other reports. If this is the case, the other reports should

be updated to show the latest completion or required dates for material designs, etc., thereby not giving the appearance that the project is way behind schedule. This should be investigated thoroughly to determine the actual status of this effort.

References:

- 1. Monthly Engineering Report, dated January 20, 1978.
- 2. Mechanical Drawing Release Schedule, dated January 20, 1978.
- 3. Procurement Progress Report, Job No. 5121, 5492 and 5493, dated January 15, 1978.
- 4. Electrical Drawing Release Schedule, Job No. 5121-13, revised January 15, 1978.
- 5. Procurement Progress Report, Job No. 5121-13, revised January 15, 1978.
- 6. Electrical Drawing Release Schedule, Job No. 5121-15 & 16, revised January 15, 1978.
- 7. Procurement Progress Report, Job No. 5121-15 & 16, revised January 15, 1978.
- 8. Project Master Schedule Power Plant Modifications, Sheet 19 of 20, approved June 1977.
- 9. Project Master Schedule Electrical Modifications, Sheet 20 of 20, approved June 1977.

B. Procurement Status

The March 1978 Procurement Schedule and Status Report indicates a general improvement from the February 1978 issue. However, many line items still are listed with significant negative floats in the DIFF column as the result to one of the following:

RESERVE MILE FOST 7 FROSECT

75083-001

DRAWING STATUS

EXHIBIT A

DATE: 2/28/78

DISCIPLINE	TOTAL DWGS AS OF 7/1/77	CURRENT # OF DWGS	DWGS NOT STARTED	DWGS IN PROGESS	DWS ISSUED FOR APPROVAL	DWGS APPROVED FOR CONSTRUCTION	EQV DWGS COMP	EQV %
STRUCTURAL	361	322	115	60	0	147	172.9	53.6
ARCHITECTURAL	44	54	19	5	h	26	32.5	60.1
MECHANICAL	142	148	15	66	11	56	114.4	77.2
CIVIL	49	47	16	5	6	20	28.1	59.7
PIPING	216	250	97	101	26	26	88.2	35.2
HEATING & VENTILATION	50	56	27	10	11	8	21.2	37,8
ELECTRICAL	575	785	551	106	84	ЦЦ	186.6	23.7
INSTRUMENTATION	73	62	34	9	10	9	21,6	34.8
TOTAL	1510	1724	874	362	152	336	665.5	38.6
PREVIOUS REPORT TOTALS		1708	952	337	155	264	582.9	34.1
NET CHANGE FROM PRIOR REPORT		16	(78)	25	(3)	72	82.6	4.5

REMARKS:

PERIOD ENDING: 28 FEB 78

DESIGN PROGRESS SCHEDULE 75083-001 RESERVE MILEPOST 7 PROJECT

DISCIPLINE	1977							1978								1979						PERCENT							
DISCIPLINE	А	М	J	J	A	S	0	N		J	F	М	А	М	J	J	R	S	a	N	D	J	F	М	T A	М	J	J	COMPLET
STRUCTURAL ²			5	/0 8.7		2.7	28 7 29.8	37.	4 43.	50	53.6 53.6	61	69	7.7.	81	.9.7.	24	.‱.	.9.7.	2.2	.99.	100							
ARCHITECTURAL ²			. 3						4 43. 2 <i>51</i> 5 48.				67	74.	8!	88	92	96	100										
MECHANICAL 2		H.	/3	25	37	49	60	69	78 5 7 2.	71	82	90	93	94	95	96	9.7.	98	99	100									
CIVIL			. 8.	9.8	24	32	39.4	46	56 50.	59 355	66	75.	.82.	8 .9.	96	98	100												-100%
PIPING ²			3	6	10	15	2/	27	33	38	45	52	59	65	71	77	23	88	93	96	97	98	95	100	2				
HEATING & VENTILATING ²		3.	4	3.2	9.4	27	35	927.	7 27.0 5 51 8 32.5	.4.L	48 37.8	55	62	69	76	83	90	97:	100				-						-80%
ELECTRICAL ²		/	2	4	7	1//	16	2	1 27	121	26	3/	36	41	46	5.5	56	61	66	71	76	81	86	.90	-94	?₽.	99	100	
INSTRUMENTATION 2°				6.5	6.3	13.8	/7	25 19.	3 21.8 1 32 8 29	31 301	37 34.8	43	49	55	61	67	72	77	82	36	90	.5.3.	96	.98	100	2			-60 %
SPECIFICATIONS 3			Н.	8	147	21	30	39	430	48	51	54	İ		1						1	1					1		40 %
MISC. SUPPORT ³		4.		14.	13.8	3 19.1	24.	29.	231 2 34	1740	. 43 9 44.(4.7.	.51.	55	59	63	67	71.	.7.5	7.9	.83.	\$7.	9.1.	. 94	96	28	100		-
SUPERVISION ³		5	70	75 80	2Q 9.1	117.	28	22.	2.36 9 29.	36 39	47.5	44	49	52	57	59	63	67	70.	7.4.	.7.8.	82	8.5	89	93	97	100		-20%
				-	ننننذ						400																		-0
TOTAL DESIGN 4			4.	6.7	!.3. !!.1	16.	35. 3 234	1 29	239 .1 35.	35	2 40.0	47	53	59	65	7!.	76.	80	84	27	90	1.93	95	96	.,.97	98	.99.	100	
LEGEND: SCHEDULED'	1	2	3	4	5 197	6	7	8	9	10	11	12	13	14		16 78	17	18	19	50	21	55	53		25 197	26	27	28	

NOTE: 1- SCHEDULE BASED ON ESTIMATED MANMONTH EXPENDITURES.

NOTE: 2- PERCENT COMPLETE IS CALCULATED ON AN EQUIVALENT DRAWING BASIS.

NOTE . 3- PERCENT COMPLETE IS CALCULATED ON AN MANHOURS EXPENDED VERSUS TOTAL AT COMPLETION .

NOTE: 4-PERCENT COMPLETE FOR TOTAL DESIGN IS CALCULATED ON A WEIGHTED MANHOUR BASIS

EXHIBIT C

** KAISER ENGINEERS **

DESIGN & DRAWING REPORT JOB TITLE RESERVE MINING PROJECT SILVER BAY MINN STREET

DEPARTME	NT 2	~~~~~	SUMM	IARY			JOB NO.75	5083-0	0 l 		SUMMAR	Y 		MAF	1. 1. 19	78 	
AREA NO	TOTL	TURAL ISSU DWGS	ARCHI TOTL DWGS	155D		NICAL ISSD DWGS	CIN TOTL DWGS		TOTL	ING ISSD DWGS	H + TOTL DWGS	155D		RICAL ISSD DWGS	INSTRU TOTE DWGS	1550	
15	0	0	0	0	0	0	3	2	0	0	0	0	0	0	Ö	0	
22	8	7	3	3	0	0	55	13	23	7	5	3	18	11	4	2	
240	6	6	6	6	0	0	0	0	0	0	7	7	11	11	0	0	
161	120	7]	18	8	88	41	1	***	28	5	11	6	100	55	10	3	
170	67	12	5	5	42	10	0	0	138	8	4	0	420	40	28	9	
171	55	51	6	6	17	15	1	1	28	24	3	3	79	23	4	5	
290	45	0	4	2	1	1	1	1	20	7	5	0	95	11	9	3	
291	16	0	6	0	0	0	11	7	13	1	6	0	51	10	7	0	
292	0	0	1	0	0	0	٠.6	0	0	0	3	0	0	0	1	0	
293	5	0	5	0	0	0	2	1	0	0	12.	0	11	0	0	0	80 AM 450 WH 450 NB MB 450 WA AM 450 WA
TOTALS	322	147	54	30	148	67	47	26	250	52	56	19	785	128	62	19	

GRAND TOTALS
TOTAL DRAWINGS
TOTAL ISSUED

1724 488

Puliman Torkelson Co Judgar J. P. Judgar 1992 1992 ENG NEEDS CONSTRU	.c.ro=	s					F	REPO:	RT S	СНЕ	DUI	Æ									
CLIENT Minn. PCA					_PRC	JEC			Re	eserv	re M	ining	L(CAT	ION	Dulu	ith <u>,</u> I	Minn	<u> DA</u>	TE <u>3-</u>	27-7
Phase A Activities	Ma 24	ar. 31		April 4 2	1 28	5	M.	ay 19	26												Y
Prep. for Site Visit																					
Site Visit		V 2 9																			
Obtain Supl. Data			V ∃																		
Analyze Data																					
Prep. Report Draft					1																
Prelim. Report to PCA					\(\sigma_2\)	26															
PCA/RM Response						1	75														
Prep. Final Report																					
Submit Final Report								V	5				Societies and the same of the								

EN-11 5/74

▼ ACTUAL DELIVERY ♡ SCHEDULED DELIVERY.

POLLUTION CONTROL AGENCY

RESERVE MINING MONITORING PROJECT

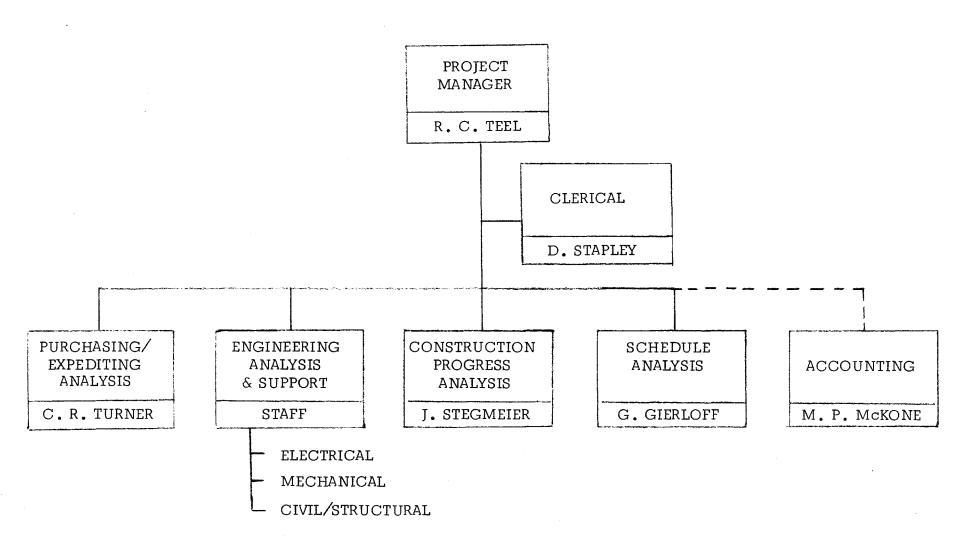


EXHIBIT F

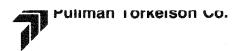
CRITICAL CONTROL DATES

EVENT COMPLETION BY FACILITY

MILEPOST #7 - TAILINGS DISPOSAL PLAN

RESERVE MINING COMPANY

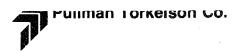
Facilities & Sheet Number	Completion Date	<u>Description</u>	Actual Completion
Dry Cobbing Bldg.			
1	7-1-77*	Issue RFQ, crane	8-3-77
1	9-1-77*	Award P.O. for crane	9-30-77
-1	10-1-77	Design of foundations completed	Complete
2	10-1-77*	Issue RFQ, dry cobbers	12-27-77
1	11-1-77*	Award P.O., conveyor components	12-16-77
1	12-1-77*	Release for fab, storage bins	
2	12-1-77*	Release for fab, switchgear	2-17-78
1	1-1-78*	Release for fab, struct & misc steel	
1	1-1-78*	Award P.O., belt feeders	1-23-78
2	1-1-78*	Award P.O., dry cobbers	3-2-78
2	3-1-78*	Release for fab, motor control centers	
2	4-1-78*	Award P.O., dust collectors and fans	12-27-77
2	5-1-78*	Award P.O., belt scales	
1	6-1-78	Storage bins delivered	
1	6-1-78*	Award P.O., conveyor chutes	



Facilities & Sheet Number (Dry Cobbing Bldg)	Completion	Description	Actual <u>Completion</u>
1	8-1-78	Foundation and slabs completed	
. 2	11-1-78	Dry cobbers delivered	
2	11-1-78	Dust collectors, fans delivered	
2	11-1-78	Motor control centers delivered	
2	11-1-78	Switchgear delivered	
1	1-1-79	Belt feeders delivered	
2	1-1-79	Belt scales delivered	
2	3-1-79	Dry cobbers installed	
2	5-1-79	Dust collectors, fans installed	
2	7-1-79	Facility checked and tested	
2	8-1-79	Dust collection ducts installed	
1	8-1-79*	Facility complete	
Coarse Tailings Handling			
3	8-1-77*	Award P.O., overhead cranes	9-30-77
3	11-1-77*	Award P.O., conv. 83 and 103 components	1-23-78
3	11-1-77*	Award P.O., conv. 84 and 184 components	1-23-78
4	11-1-77*	Release for fab, switchgear	
4	2-1-78*	Issue RFQ, dust collectors, fans	11-17-77
4	2-1-78*	Release for fab, motor control centers	



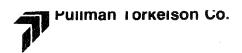
Facilities & Sheet Number (Coarse Tailings Handling)	Completion Date	Description	Actual Completion
4	5-1-78*	Award P.O., dust collectors, fans	12-27-77
3	8-1-78	Overhead cranes delivered	
4	8-1-78	Motor control centers delivered	
4	8-1-78	Switchgear delivered	
3	10-1-78	Conv. 83 & 138 components delivered	l
4	10-1-78	Dust collectors & fans delivered	
3	11-15-78	Conv. 84 & 184 components delivered	i
4	2-1-79	Dust collectors and fans installed	
4	4-1-79	Dust collection ducts installed	
4	7-1-79*	One conv. and L.O. system operational	
4	11-15-79*	Facility complete	
Truck Repair Shop			
5	3-15-78	Storage tank installed	
5	4-1-78*	Occupy as warehouse	
5	5-1-78	Underground tanks installed	
5	9-1-78*	Facility complete	
Concentrator Modifications			
6	8-1-77*	Issue RFQ, magnetic separators	8-8-77
6	9-1-77*	Issue RFQ, screens	10-13-77



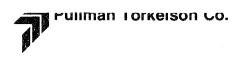
Facilities & Sheet Number (Concentrator Modifications)	Completion Date	Description	Actual Completion
6 6	9-1-77*	Issue RFQ, prim. hydro rake mechanisms	7-25-77
6	10-1-77*	Issue RFQ, flotation machines	9-8-77
6	11-1-77*	Award P.O., magnetic separators	12-20-77
6	12-1-77*	Award P.O., screens	1-6-78
6	12-1-77*	Award P.O., prim. hydro rake mechanisms	10-12-77
6	1-1-78*	Award P.O., flotation machines	10-24-77
6	2-1-78*	Release for fab, motor control centers	
6	7-1-78*	Start delivery, magnetic separators	
6	8-1-78	Start delivery, flotation machines	
6	8-1-78	Start delivery, screens	
6	10-1-78	Start delivery, motor control centers	
6	10-1-78	Start delivery, prim. hydro rake mechanisms	
6	12-1-78*	Shutdown Sect. 1 & 2	
6	1-51-79	Shutdown Sect. 3 & 4	
6	2-1-79	Complete delivery, flotation machines	
6	2-1-79	Complete delivery, screens	
6	2-1-79	Complete delivery, prim. hydro rake mechanisms	



Facilities & Sheet Number (Concentrator Modifications)	Completion Date	<u>Description</u>	Actual Completion
6	3-1-79	Shutdown Sect. 5 & 6	
6	4-15-79	Shutdown Sect. 7 & 8	
6	6-1-79	Shutdown Sect. 9 & 10	
6	7-1-79	Complete delivery, magnetic separators	
6	7-15-79	Shutdown Sect. 11 & 12	
6	9-1-79*	Sections 1 - 12 completed	
6	9-1-79	Shutdown Sect. 101 & 102	
6	10-15-79	Shutdown Sect. 103 & 104	
6	12-1-79	Shutdown Sect. 105 & 106	
6	1-15-80	Shtudown Sect. 107 & 108	
6	3-1-80	Shutdown Sect. 109 & 110	
6	4-15-80*	Concentrator modifications com pl ete	
Centralized Process Control			
9	12-1-77*	Issue RFQ, computers	
9	2-1-78*	Issue RFQ, control panels	
9	3-1-78*	Award P.O., computers	
9	5-1-78*	Award P.O., control panels	
9	7-1-78	End instrument spec. issue	
9	10-15-78	Computers delivered	

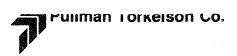


Facilities & Sheet Number (Centralized Process Control)	Completion Date	Description	Actual Completion
9	2-1-79	Computers installed	
9	5-1-79*	Hardware installation completed	
9	6-1-80*	Computer control facility com- plete	
Concentrate Filtering Building			
10	7-1-77*	Issue RFQ, concentrate thickeners	6-30-75
10	7-1-77*	Issue RFQ, slurry agitators	7-5-77
11	7-1-77*	Issue RFQ, disc filters	6-13-77
11	7-1-77*	Issue RFQ, filter vacuum pumps	6-14-77
10	9-1-77	Design main foundations	Complete
11	9-1-77*	Award P.O., disc filters	8-31-77
11	9-1-77*	Award P.O., filter vacuum pumps	10-18-77
10	10-1-77*	Release drwgs., struct & misc steel	Complete
10	10-1-77*	Award P.O., concentrate thickeners	9-30-77
10	10-1-77*	Award P.O., slurry agitators	10-20-77
10	5-1-78	Slurry agitators delivered	
10	7-1-78	Concentrate thickeners delivered	
11	7-1-78	Disc filters, deliver first filter	
11	7-1-78	Filter vacuum pumps, deliver first pumps	
. 11	10-1-78	Disc filters, last delivery	



Facilities & <u>Sheet Number</u> (Concentrate Filtering Building)	Completion Date	<u>Description</u>	Actual Completion
11	10-1-78	Filter vacuum pumps, last delivery	
11	6-15-79*	First 6 filter system operational	
11	11-1-79	Filter building complete	
Additive Building			
12	11-15-78	Underground piping, tanks installed	
12	9-1-79	Equipment and tanks painted	
12	12-1-79*	Facility Complete	
Delta Area and Yard Piping			
13	8-1-77*	Issue RFQ, clarifier drive mech. and rakes	8-31-77
13	11-1-77*	Award P.O., clarifier drive mech. and rakes	12-16-77
13	4-1-78	Clarifier concrete design completed	
13	7-1-78	First clarifier drive mech. delivered	
13	10-1-78	Construction of west clar. walls and pump houses completed	
13	10-1-79	Fourth clarifier drive mech. delivered	
13	10-1-79	Construction of east clar. walls and pump houses completed	
13	10-1-79	Clarifier bottom linings installed	
13	12-1-79	Clar. drive mech., rakes installed	
13	4-1-80*	Clarifiers completed for testing	
13	4-15-80*	Clarifiers completed for operation	

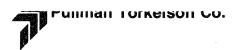
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Facilities & Sheet Number Tailings Pumping System		Completion Date	<u>Description</u>	Actual Completion	
	14	7-1-77*	Issue RFQ , transformers	6-14-77	
	14	8-1-77	Land requisitioned		
	14	9-1-77*	Issue P.O., transformers	11-17-77	
	14	10-1-77*	Issue RFQ, tailing pumps	10-28-77	
	14	12-1-77	24" tailings pipelines designed		
	14	12-1-77	24" reclaim waterline designed		
	14	1-1-78*	Award P.O., tailing pumps		
	14	2-1-78*	Release for fab, transformers		
	14	4-1-78	24" tailings pipelines material delivered		
	14	4-1-78	24" reclaim waterline material delivered		
	14	8-1-78*	Release for fab, substation switch- gear and starters		
	14	9-1-78	Tailings pumps delivered		
	14	1-1-79	Transformers delivered		
	14	6-1-79	Transformers, switchgear $\&$ starters of pumphouses $\#1$ $\&$ $\#2$ installed		
	14	10-1-79	Pumphouse #1 pumps installed		
	14	11-1-79	24" tailings pipelines installed		
	14	11-1-79	24" reclaim waterline installed		
	14	12-1-79	Substation switchgear and starters delivered		



	<u>Number</u> ngs Pumping	Completion Date	<u>Description</u>	Actual Completion
	14	4-1-80	Substation switchgear and starters' installed	
	14	4-1-80*	Tailing pumping system completed	
Dams Dams	and Diversion			
	15	12-15-77	Dam 1 diversion completed	
	· ₂ 15	4-1-78*	Railway construction to Dam 1 completed	
	15	9-1-78	Bear Lake diversion completed	
	15	9-1-78	Starter Dam 2-3 completed	
	15	9-21-78	Headwater diversion completed	
	15	9-21-78	Starter Dam 4 completed	
	15	10-1-78	Dam 1 diversion closed	
	15	10-8-78	Starter Dam 5 completed	
	15	10-15-78	Seepage recovery Dam 2-3 diversion completed	
	15	6-15-79	Dam 1 grouting completed	
	15	8-1-79*	Railway to Dam 2-3 and splitter dikes completed	
	15	8-1-79	Start coarse tailings to dams	
	15	8-1-79	Dam 2-3 grouting completed	
	15	8-1-79	Recovery Dam 1B construction completed	
	15	9-15-79	Dam 4 grouting completed	



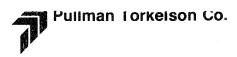
Facilities & Sheet Number (Dams and Diversion Dams)	Completion Date	<u>Description</u>	Actual Completion
15	10-1-79	Starter Dam 1 completed	
15	10-1-79	Seepage recovery Dam 2-3 completed	
15	11-1-79	Dam 5 grouting completed	
15	12-1-79	Seepage recovery Dam 1A completed	
15	4-15-80*	Tailings to pond	
Damsite Service Build	ling		
17	9-1-78	Underground tank installed	
17	10-1-78	Sanitary sewer & septic tank installed	Ė
17	5-1-79	Fuel station installed	
17	6-15-79*	Facility complete	
Power Plant <u>Modifications</u>			
19	1-1-78*	Release bid, circulation water pipe	
19	3-15-78*	Issue P.O., circ. water pipe	
19	12-1-78	Circ. water pipe delivered	
19	10-1-79	Circ. water pipe (outside) installed	
19	1-1-80*	Facility in service	

NOTES:

RFQ - Request for Quotation

P.O. - Purchase Order

* - Corresponds to identical item flagged by Kaiser Engineers



CHRONOLOGY OF EVENTS

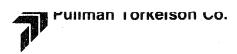
MILE POST #7 TAILINGS DISPOSAL PLAN

RESERVE MINING COMPANY

Com pl etion <u>Date</u>	<u>Facility</u>	Sheet No.	Description	Actual Completion
7-1-77*	Dry Cobber Bldg.	1	Issue RFQ, crane	8-3-77
7-1-77*	Concentrate Filter Bldg.	10	Issue RFQ, concentrate thickeners	6-30-75
7-1-77*	Concentrate Filter Bldg.	10	Issue RFQ, slurry agitators	7-5-77
7-1-77*	Concentrate Filter Bldg.	11	Issue RFQ, disc filters	6-13-77
7-1-77*	Concentrate Filter Bldg.	11	Issue RFQ, filter vacuum pumps	6-14-77
7-1-77*	Tailings Pumping Sys.	14	Issue RFQ, transformers	6-14-77
8-1-77*	Coarse Tailings Hdlg.	3	Award P.O., overhead cranes	9-30-77
8-1-77*	Concentrator Modifica- tions	6	Issue RFQ, magnetic separators	8-8-77
8-1-77*	Delta Area & Yard Piping	13	Issue RFQ, clarifier drive mech. and rakes	8-31-77
8-1-77	Tailings Pumping Sys.	14	Land requisitioned	
9-1-77*	Dry Cobber Bldg.	1	Award P.O., crane	9-30-77
9-1-77*	Concentrator Modifica-	6	Issue RFQ, screens	10-13-77
9-1-77*	Concentrator Modifica- tions	6	Issue RFQ, prim. hydro rake mechanism	7-25-77
9-1-77	Concentrate Filter Bldg.	10	Design of main foundations completed	Complete



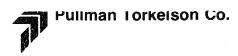
Completion Date	Facility	Sheet No.	Description	Actual Completion
9-1-77*	Concentrate Filter Bldg.	11	Award P.O., disc filters	8-31-77
9-1-77*	Concentrate Filter Bldg.	11	Award P.O., filter vacuum pumps	10-18-77
9-1-77	Tailings Pumping Sys.	14	Award P.O., transformers	11-17-77
10-1-77	Dry Cobber Bldg.	1	Design of foundations completed	Complete
10-1-77*	Dry Cobber Bldg.	2	Issue RFQ, dry cobbers	12-27-77
10-1-77*	Concentrator Modifica-	6	Issue RFQ, flotation machines	9-8-77
10-1-77*	Concentrate Filter Bldg.	10	Release dwgs., struct. & misc. steel	
10-1-77*	Concentrate Filter Bldg.	10	Award P.O., concentrate thickeners	9-30-77
10-1-77*	Concentrate Filter Bldg.	10	Award P.O., slurry agitators	10-20-77
10-1-77*	Tailings Pumping Sys.	14	Issue RFQ, tailing pumps	10-28-77
11-1-77*	Dry Cobber Bldg.	1	Award P.O., conveyor components	12-16-77
11-1-77*	Coarse Tailings Hdlg.	3	Award P.O., conv. 83 & 183 components	1-23-78
11-1-77*	Coarse Tailings Hdlg.	3	Award P.O., conv. 84 & 184 components	1-23-78
11-1-77*	Coarse Tailings Hdlg.	4	Release for fab, switchgear	
11-1-77*	Concentrator Modifica- tion	6	Award P.O., magnetic separators	12-20-77
11-1-77*	Delta Area & Yard Piping	13	Award P.O., clarifier drive mech. and rakes	12-16-77



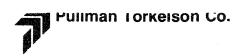
Completion Date	Facility	Sheet <u>No.</u>	Description	Actual Completion
12-1-77*	Dry Cobber Bldg.	1	Release for fab, storage bins	
12-1-77*	Dry Cobber Bldg.	2	Release for fab, switchgear	2-17-78
12-1-77*	Concentrator Modifi- cations	6	Award P.O., screens	1-6-78
12-1-77*	Concentrator Modifi- cations	6	Award P.O., prim. hydro rake mechanism	10-12-77
12-1-77*	Centralized Process Control	9	Issue RFQ, computers	
12-1-77	Tailings Pumping Sys.	14	24" tailings pipelines designed	
12-1-77	Tailings Pumping Sys.	14	24" reclaim waterline designed	
12-15-77	Dams & Divers. Dams	15	Dam 1 diversion completed	
1-1-78*	Dry Cobber Bldg.	1	Release for fab, struct. and misc. steel	
1-1-78*	Dry Cobber Bldg.	1	Award P.O., belt feeders	1-23-78
1-1-78*	Dry Cobber Bldg.	2	Award P.O., dry cobbers	3-2-78
1-1-78*	Concentrator Modifi- cations	6	Award P.O., flotation machines	10-24-77
1-1-78*	Tailings Pumping Sys.	14	Award P.O., tailing pumps	
1-1-78*	Power System Modifi- cations	19	Release bid, circulation water pipe	
2-1-78*	Coarse Tailings Hdlg.	4	Issue RFQ, dust collectors and fans	11-17-77
2-1-78	Coarse Tailings Hdlg.	4	Release for fab, motor control centers	



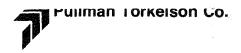
Completion <u>Date</u>	Facility	Sheet No.	Description	Actual Completion
2-1-78*	Concentrator Modifi- cations	6	Release for fab, motor control centers	
2-1-78*	Centralized Process Control	9	Issue RFQ, control panels	
2-1-78*	Tailings Pumping Sys.	14	Release for fab, transformer	S
3-1-78*	Dry Cobber Bldg.	2	Release for fab, motor control centers	
3-1-78*	Centralized Process Control	9	Award P.O., computers'	
3-15-78	Truck Repair Shop	5	Storage tank installed	
3-15-78	Power System Modifi- cations	19	Issue P.O., circ. water pipe	
4-1-78*	Dry Cobber Bldg.	2	Award P.O., dust collectors and fans	11-17-77
4-1-78*	Truck Repair Shop	5	Occupy as warehouse	
4-1-78	Delta Area & Yard Piping	13	Clarifier concrete design completed	
4-1-78	Tailings Pumping Sys.	14	24" tailings pipeline material delivered	
4-1-78	Tailings Pumping Sys.	14	24" reclaim waterline material delivered	
4-1-78*	Dams & Divers. Dams	15	Railway construction to Dam 1 completed	
5-1-78*	Dry Cobber Bldg.	2	Award P.O., belt scales	
5-1-78*	Coarse Tailings Hdlg.	4	Award P.O., dust collectors and fans	s 11 - 17-77
5-1-78*	Truck Repair Shop	5	Underground tanks installed	l
		- 4 -		



Completion Date	Facility	Sheet <u>No.</u>	<u>Description</u>	Actual Completion
5-1-78*	Centralized Process	9	Award P.O., control panels	
5-1-78	Concentrate Filter Bldg.	10	Slurry agitators delivered	
6-1-78	Dry Cobber Building	1	Storage bins delivered	
6-1-78*	Dry Cobber Building	1	Award P.O., conv. chutes	
7-1-78	Concentrator Modifi- cations	6	Start delivery, magnetic separators	
7-1-78	Centralized Process Control	9	End instrument spec issue	
7-1-78	Concentrate Filter Bldg.	10	Concentrate thickeners delivered	
7-1-78	Concentrate Filter Bldg.	11	Disc filters, deliver first filter	
7-1-78	Concentrate Filter Bldg.	11	Filter vacuum pumps, deliver first pumps	
7-1-78	Delta Area & Yard Piping	13	First clarifier drive mech. delivered	
8-1-78	Dry Cobber Building	1	Foundation, slabs completed	d
8-1-78	Coarse Tailings Hdlg.	3	Overhead cranes delivered	
8-1-78	Coarse Tailings Hdlg.	4	Motor control centers delivered	
8-1-78	Coarse Tailings Hdlg.	4	Switchgear delivered	
8-1-78	Concentrator Modifi- cations	6	Start delivery, flotation machines	
8-1-78	Concentrator Modifi- cations	6	Start delivery, screens	



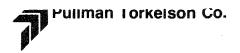
Completion Date	Facility	Sheet No.	Description	Actual Completion
8-1-78*	Tailings Pumping Sys.	14	Release for fab, sub- station switchgear and starters	
9-1-78*	Truck Repair Shop	5	Facility complete	
9-1-78	Tailings Pumping Sys.	14	Tailing pump delivered	
9-1-78	Dams & Divers. Dams	15	Bear Lake diversion completed	
9-1-78	Dams & Divers. Dams	15	Starter Dam 2-3 completed	
9-1-78	Damsite Service Bldg.	17	Underground tank installed	
9-21-78	Dams & Divers. Dams	15	Headwater diversion com- pleted	
9-21-78	Dams & Divers. Dams	15	Starter Dam 4 completed	
10-1-78	Coarse Tailings Hdlg.	3	Conv. 83 & 183 components delivered	
10-1-78	Coarse Tailings Hdlg.	4	Dust collectors and fans delivered	
10-1-78	Concentrator Modifi- cations	6	Start delivery, motor control centers	
10-1-78	Concentrator Modifi- cations	6	Start delivery, prim. hydro rake mechanisms	
10-1-78	Concentrate Filter Bldg.	11	Disc filters, last delivery	
10-1-78	Concentrate Filter Bldg.	11	Filter vacuum pumps, last delivery	
10-1-78	Delta Area & Yard Piping	13	Constr. of west clar. walls and pumphouses completed	
10-1-78	Dams & Divers. Dams	15	Dam 1 diversion closed	



Completion Date	Facility	Sheet No.	<u>Description</u>	Actual Completion
10-1-78	Damsite Service Bldg.	17	Sanitary sewer and septic tank installed	
10-8-78	Dams & Divers. Dams	15	Starter Dam 5 completed	
10-15-78	Centralized Process Control	9	Computers delivered	
10-15-78	Dams & Divers. Dams	15	Seepage recovery Dam 2-3 diversion completed	
11-1-78	Dry Cobber Building	2	Dry cobbers delivered	
11-1-78	Dry Cobber Building	2	Dust collectors and fans delivered	
11-1-78	Dry Cobber Building	2	Motor control centers delivered	
11-1-78	Dry Cobber Building	2	Switchgear delivered	
11-15-78	Coarse Tailings Hdlg.	3	Conv. 84 & 184 components delivered	
11-15-78	Additive Building	12	Underground piping and tank installed	S
12-1-78*	Concentrator Modifi cations	6	Shutdown sect. 1 & 2	
12-1-78	Power System Modifi- cations	19	Circ. water pipe delivered	
1-1-79	Dry Cobber Building	1	Belt feeders delivered	
1-1-79	Dry Cobber Building	2	Belt scales delivered	
1-1-79	Delta Area & Yard Piping	13	Fourth clarifier drive mech. delivered	
1-1-79	Tailings Pumping Sys.	14	Transformers delivered	



Completion		Sheet		Actual
Date	Facility	No.	Description	Completion
1-15-79	Concentrator Modifi- cations	6	Shutdown Sect. 3 & 4	
2-1-79	Coarse Tailings Hdlg.	4	Dust collectors and fans installed	
2-1-79	Concentrator Modifi- cations	6	Complete delivery, flota- tion machines	
2-1-79	Concentrator Modifi- cations	6	Complete delivery, screens	
2-1-79	Concentrator Modifi- cations	6	Complete delivery, prim. hydro rake mechanisms	
2-1-79	Centralized Process Control	9	Computers installed	
3-1-79	Dry Cobber Building	2	Dry cobbers installed	
3-1-79	Concentrator Modifi- cations	6	Shutdown sect. 5 & 6	
4-1-79	Coarse Tailings Hdlg.	4	Dust collection ducts installed	
4-15-79	Concentrator Modifica- tions	6	Shutdown sect. 7 & 8	
5-1-79	Dry Cobber Building	2	Dust collectors and fans installed	
5-1-79*	Centralized Process Control	9	Hardware installation completed	
5-1-79	Damsite Service Bldg.	17	Fuel station installed	
6-1-79	Concentrator Modifi- cations	6	Shutdown sect. 9 & 10	
6-1-79	Tailings Pumping Sys.	14	Transformers, switchgear an starters of pumphouse $\#1$ & $\#2$ installed	



Completion Date	Facility	Sheet No.	Description	Actual Completion
6-15-79	Concentrate Filter Bldg.	11	First six filter systems operational	
6-15-79	Dams & Divers. Dams	15	Dam 1 grouting completed	
6-15-79*	Damsite Service Bldg.	17	Facility complete	
7-1-79	Dry Cobber Building	2	Facility checked and tested	
7-1-79*	Coarse Tailings Hdlg.	4	One conv. and L.O. system operational	
7–1–79	Concentrator Modifi- cations	6	Complete delivery, mag- netic separators	
7-15-79	Concentrator Modifi- cations	6	Shutdown sect. 11 & 12	
8-1-79	Dry Cobber Building	2	Dust collection ducts installed	
8-1-79*	Dry Cobber Building	1	Facility complete	
8-1-79*	Dams & Divers. Dams	15	Railway to Dam 2-3 and splitter dikes	
8-1-79*	Dams & Divers. Dams	1 5	Start coarse tailings to dams	
8-1-79	Dams & Divers. Dams	15	Dam 2-3 grouting completed	
8-1-79	Dams & Divers. Dams	15	Recovery Dam 1B construction completed	
9-1-79*	Concentrator Modifi- cations	6	Sections 1-12 completed	
9-1-79	Concentrator Modifi- cations	6	Shutdown Sect. 101 & 102	
9-1-79	Additive Building	12	Equipment & tanks painted	



Completion Date	<u>Facility</u>	Sheet No.	<u>Description</u>	Actual Completion
9-15-79	Dams & Divers. Dams	15	Dam 4 grouting completed	
10-1-79	Delta Area & Yard Piping	13	Const. of east clar. walls and pumphouses completed	
10-1-79	Delta Area & Yard Piping	13	Clarifier bottom linings installed	
10-1-79	Tailings Pumping Sys.	14	Pumphouse #1 pumps installed	
10-1-79	Dams & Divers. Dams	15	Starter Dam 1 completed	
10-1-79	Dams & Divers. Dams	15	Seepage Recovery Dam 2-3 completed	
10-1-79	Power System Modifi- cations	19	Circ. water pipe (outside) installed	
10-15-79	Concentrator Modifi- cations	6	Shutdown sect. 103 & 104	
11-1-79*	Concentrate Filter Bldg.	11	Filter building complete	
11-1-79	Tailings Pumping Sys.	14	24" tailings pipelines installed	
11-1-79	Tailings Pumping Sys.	14	24" reclaim waterline installed	
11-1-79	Dams & Divers. Dams	15	Dam 5 grouting completed	
11-15-79*	Coarse Tailings Hdlg.	4	Facility complete	
12-1-79	Concentrator Modifi- cations	6	Shutdown sect. 105 & 106	
12-1-79*	Additive Building	12	Facility complete	
12-1-79	Delta Area & Yard Piping	13	Clarifier drive mech. and rakes installed	

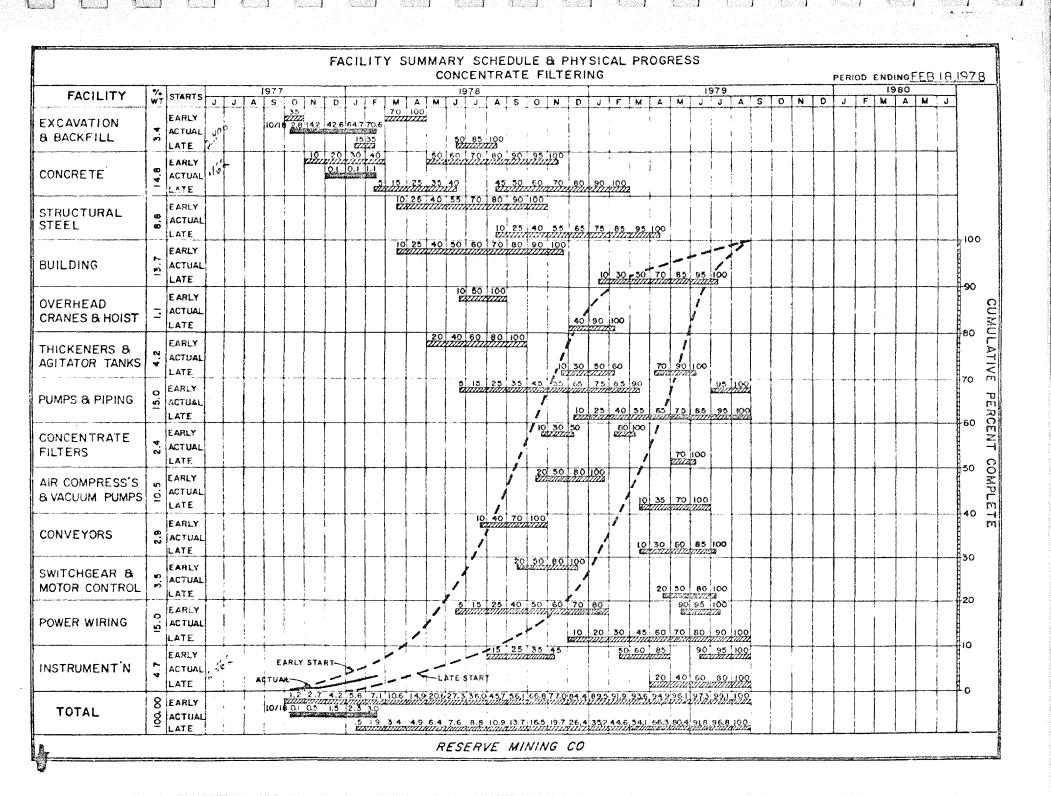


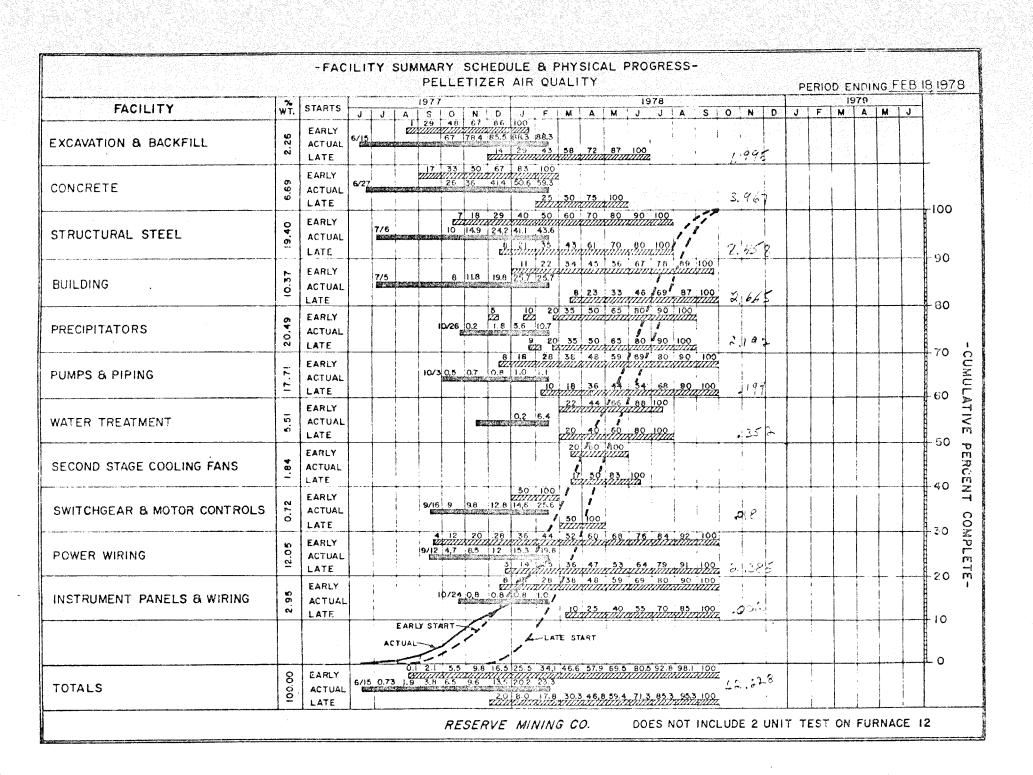
Completion Date	Facility	Sheet No.	Description	Actual Completion
12-1-79	Tailings Pumping Sys.	14	Substation switchgear and starters delivered	
12-1-79	Dams & Divers. Dams	15	Seepage Recovery Dam 1A completed	
1-1-80*	Power System Modifi- cations	19	Facility in service	
1-15-80	Concentrator Modifi- cations	6	Shutdown sect. 107 & 108	
3-1-80	Concentrator Modifi- cations	6	Shutdown sect. 109 & 110	
4-1-80*	Delta Area & Yard Piping	13	Clarifiers completed for testing	
4-1-80	Tailings Pumping Sys.	14	Substation switchgear and starters installed	
4-1-80*	Tailings Pumping Sys.	14	Tailing pumping system completed	
4-15-80*	Concentrator Modifi- cations	6	Concentrator modifications complete	
4-15-80*	Delta Area & Yard Piping	13	Clarifiers completed for operation	
4-15-80*	Dams & Divers. Dams	15	Tailings to pond	
6-1-80*	Centralized Process Control	9	Computer control facility completed	
NOTES:	RFQ - Request for Quo P.O Purchase Order * - Corresponds to		al item flagged by Kaiser Engi	ineers

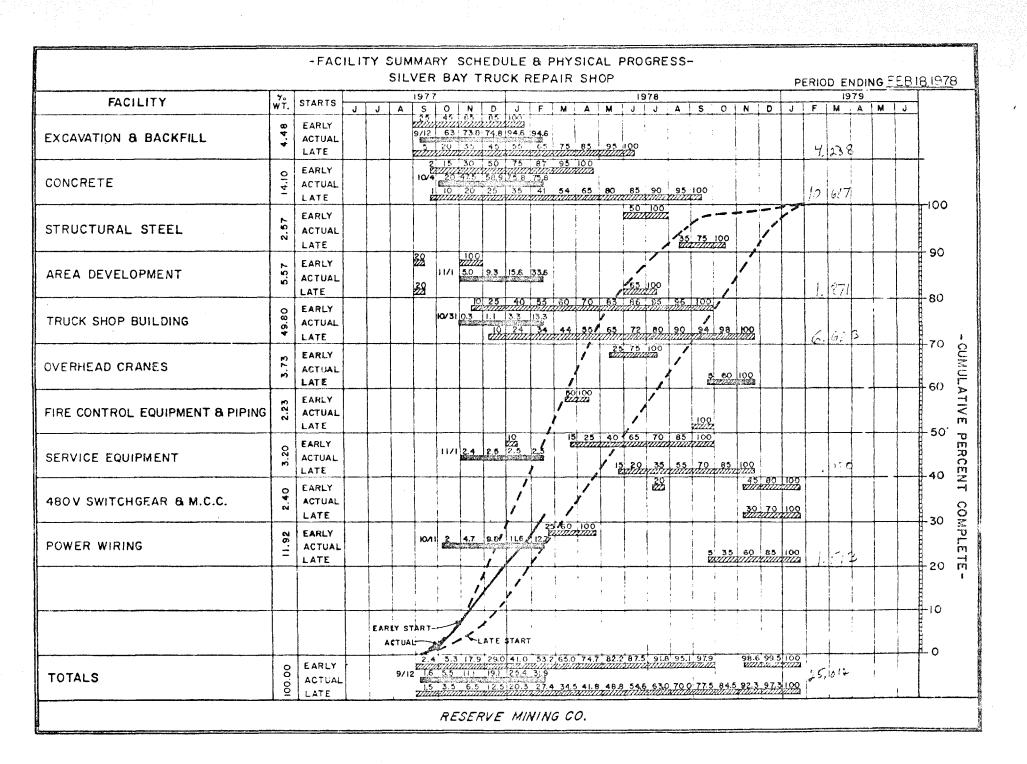
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FINE CRUSHER AIR	2.14	EARLY ACTUAL LATE	100																			i																
DRY COBBING	2.86	EARLY ACTUAL LATE				0.5 0.5	0.5	1.6 2.1	3.7 1.7	5.1 2.5	6.8 9.5 6.5	9.1 8.7	11.9	1211 161	0.0	22.5	34.1	43.0 6 51.6 4	10.5	6.4.5 €.1.4.6	9.0 7	7.2 8	3.2 7	0.6 a	7.0 27	.5 9.1 1.8 0.1	3 100	<u>1</u>										
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CONCENTRATE FILTERING	3.83	EARLY ACTUAL LATE					0.1	0.5	1.5	2.3	3.0	[9.0		_ [1				T		T		T -	7									
PELLETIZER AIR QUALITY	9.21	EARLY ACTUAL LATE		.73	1.9	3.8	5.5	3.6	13.5	20.2	26.6					9.6 92.5 65.3			a gitting beginn	- Marie - Marie	A 1800AU PES			Negative and the			and passed to	and states	1				New College of the	- 18° A. Yapar Ah		1		- 17
POWERHOUSE AIR	2.76	EARLY ACTUAL LATE								****			- CALD - TA				wan a	annula app									1	1										7
POWERHOUSE MODIFICATIONS	2.31	EARLY ACTUAL LATE											_				\top		+				\top			-									\top	+		-#6
GENERAL PLANT	1.60	EARLY ACTUAL LATE					عند	1.5	3.1	2.0	2.3																								1	1		-6
SILVER BAY TRUCK REPAIR SHOP	0.95	EARLY ACTUAL LATE				1.8	5.3 8.6 3.5	17.9 11.1 6.3	29.0 19.1 12.5	41.0 25.4 20.3	53,2 31.6 27,4	65.0 34.5	41.8	46.8	87.8 54.6	91.6 63.0	70,0 7	7.5 8	1	2.3 9								1								-	-	- 5
SILVER BAY TOWNSITE	1.16	SCHED ACTUAL					24.7 MR		16.8	28.2	37.4					49.6																						
DELTA STABILIZATION	3.02	EARLY ACTUAL LATE																																			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
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ADDITIVE BUILDING	67.0	EARLY ACTUAL LATE																																				3
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TAILINGS PUMPING SYSTEM	1.89	EARLY ACTUAL LATE																																				_ 2
RETURN LINE SYSTEM	2.16	EARLY ACTUAL LATE																								-												
DAMSITE SERVICE BUILDING	}	EARLY ACTUAL LATE	_				_															·						_										
TAILINGS DAMS & DIVERSIONS	23.23	SCHED ACTUAL	0.2	1.0	2.0	3.5 4.0	4.8	6.4	13 A 7.6	6.0 A 5	10.7	21.6	22.0	23.4	24.7	30.5	36.9 4	7.3	<u> </u>	<u>o.el</u> s	1.5	323 6	2.5 5	3.6 5	3.0 20	5.7 58	4 67.	6 74.	8 62.1	95.0	316	21.0	84.0	76.4 2	- <u> </u>	00		s
SEEPAGE RECLAIM EQUIPMENT	0.27	EARLY ACTUAL LATE																\perp		_						_		1					<u> </u>	_	\perp		_	1
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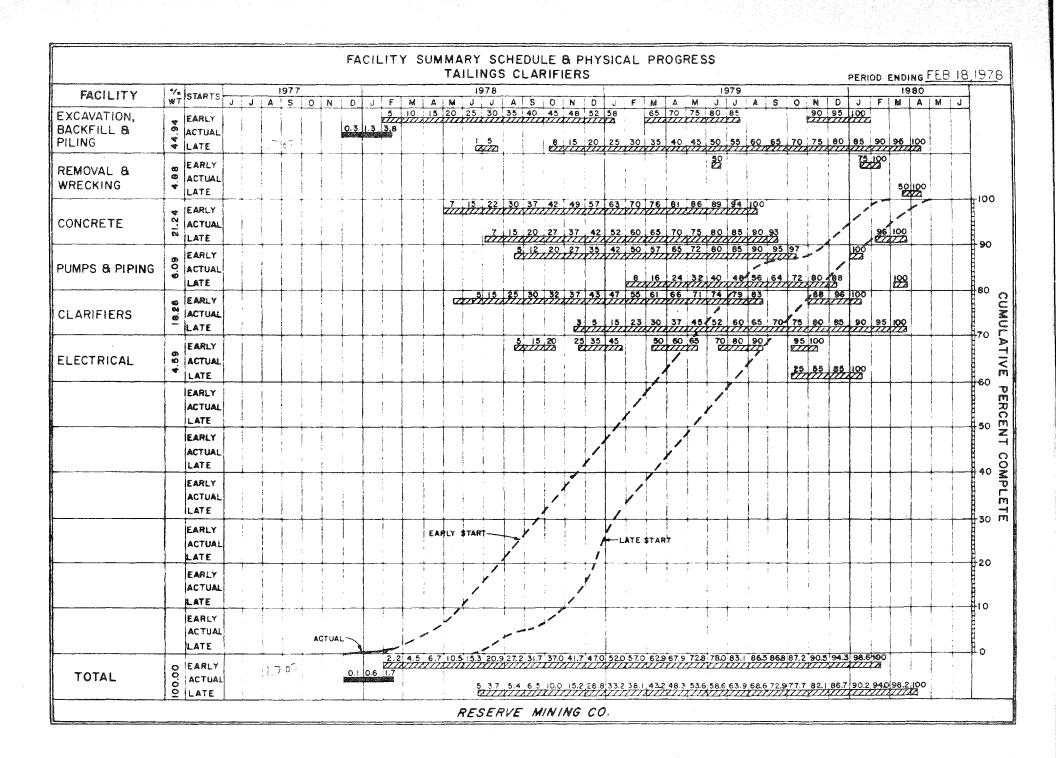
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PIPING	0.98	EARLY ACTUAL LATE														20 2272			0 80	34	9/25	50	76	63	95	100												0
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OVERHEAD CRANES & CONVEYORS	16.07	EARLY ACTUAL LATE													Êz	5	19,1	الم المحالة	3 35	4	2 55 2 57 2 60 2 7 7 2	i	1	1	f .	1												40
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POWER & CONTROL WIRING	12.61	EARLY ACTUAL LATE												ا	1/		1	- 1	l l	41	5 8.5 22.772 2.502 2.772	60	70	80 2222	90 222	100												30 20
COMPUTERS & WIRING	4.50	EARLY ACTUAL LATE											11		<i>39,</i> z	9977		15 3 2 <i>777</i>	5 40 2223		2.32	222		2222	100													0
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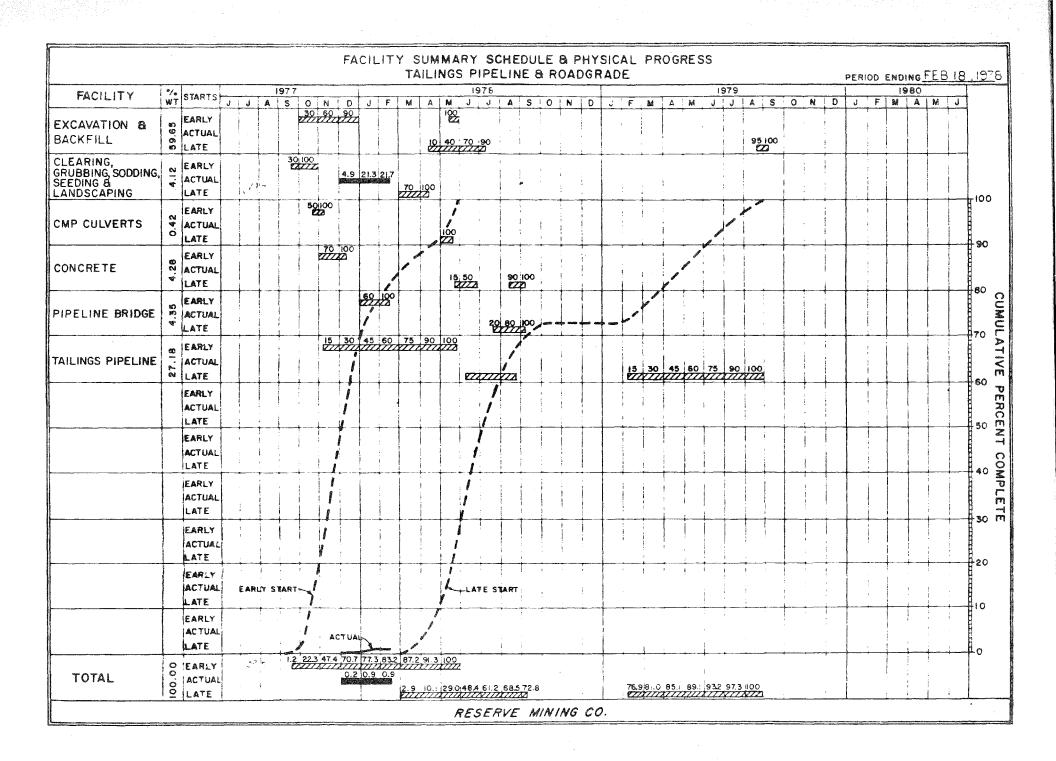
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PUMPS & PIPING	2.36	EARLY ACTUAL LATE											ZZ	27/2/2	uma i	1	200279			222 / 2222	2 22	cilla.	in	0 100							80
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OTHER EQUIPMENT	4.60	EARLY ACTUAL LATE											222		3923			1 ,	0 25 2 27				90 S	5 100							50
SWITCHGEAR & MOTOR CONTROL	86.0	EARLY ACTUAL LATE											/	1	22.72		/					70	100 223								40
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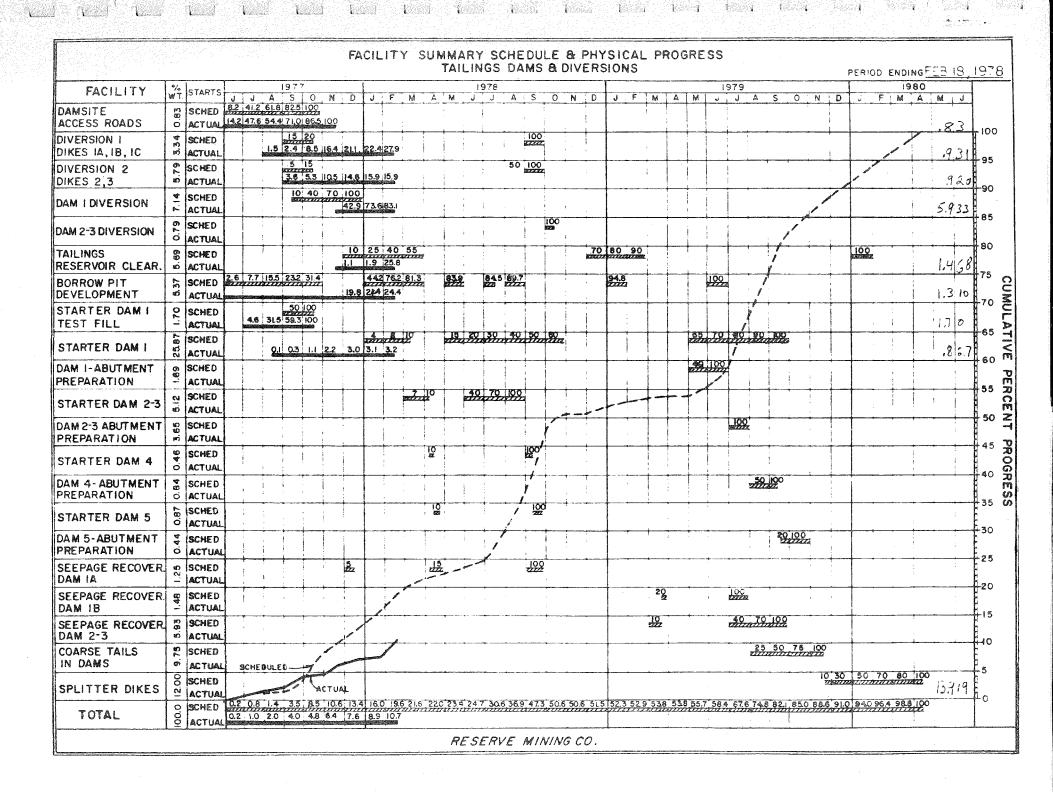








FACILITY SUMMARY SCHEDULE & PHYSICAL PROGRESS TOWNSITE 1979 FACILITY STARTS J J A S O N D J F M A M J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J A S O N SCHED. HOUSING-32 UNITS 80 ACTUAL 10 18 33 48 63 78 93 97 100 SCHED. LANDSCAPE & SERVICES ACTUAL CUMULATIVE PERCENT COMPLE 20 44 | 6.6 | 28.2 37.4 38 4 43.6 46.6 49.6 64.6 83.6 95 4 99 4 100 SCHED. TOTAL ACTUAL RESERVE MINING CO.



UC: 1 DISK: 104 UF: RD3228: D SF: SYM165: S FACILITIES FACILITY COMPLETE DRY COBBING BUILDING FPCILITY CO-FLETE COARSE TAILINGS HANDLING FECTLITY TRUCK REPAIR SHOP HODITE TIDES CONCENTRATOR MODIFICATIONS CENTRALIZED PROCESS CONTROL 15 6 FILTERS CONCENTRATE FILTERING BUILDING FREILITY FROILITY COMPLETE ABCITIVE BUILDING 15 COMPLETE DELTA AREA & YARO PIPING 13 TAILINGS PUMPING SYSTEM PARTON CAN TO DOMESTIE STARTOR DAYS COMPLETE FREE TEST DAMS AND DIVERSION DAMS DF. TA STABL IZATION CO-PLETE DELTA STABILIZATION 16 FRCILITY COMPLETE DAMSITE SERVICE BUILDING 17 N/A 18 LEGEND SPLETE POWER SYSTEM MODIFICATIONS 19 ENGINEERING PROCUREMENT TACILITY TOWNER / ELECTRICAL MODIFICATIONS CONSTRUCTION RISER E MINING COMPANY KAISER WATER THE THE SECOND JOS No. 75083 ROJET MASTER SCHEDULE SUMMARY SUMMERY

