

**“Project Management Using Earned Value”
Case Study Solution 1.1**



1.1

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**SAMPLE
PROGRESS REPORT**

----- SELECTIVE CRITIQUE -----

Utility Light & Power Company

Pioneer Unit I

Progress Report

The following comments apply to correspondingly numbered markings on the Pioneer Unit I progress report for the month ending July, Year 3.

- 1) There is a two-month lag from the end of the reporting period to issuance of the report. Considering the significance of the information given about the project in the report, this is too long.
- 2) The “recovery schedule” has been alluded to here as a new schedule, but nowhere else in the report is it mentioned. Has a new schedule been adopted? What is it?

This problem and its impact are described very subjectively. It says, “things have been slow but we hope they will get better later on.” This problem should be thoroughly explained. Cost and schedule impact (backed up by actual numbers) should be given, as well as an outline of the corrective action, if any, planned.

- 3) As in (2) above, the problem of dewatering is defined very subjectively. No cost or schedule impact is given. As this is merely a summary, this treatment may be satisfactory - but we should expect a detailed discussion, containing quantitative information, later in the report. Unfortunately it doesn’t exist. No information is given concerning the reason for the lack of additives, how long the problem has existed, how long it is expected to exist and what corrective action is being implemented or planned.
- 4) WAYLO’s job-shoppers have increased - how many were added? What is the status of drawing production? How many additional manhours (at what cost) should it take to bring drawing production back on schedule?
- 5) It would be interesting to know how these precise percentages were obtained.
- 6) This engineering progress section is worthwhile in that it does detail progress by engineering product (as opposed to level of effort or man-hours expended). However, it doesn’t relate the products completed to the number scheduled (or budgeted) for completion either for the reporting period or to-date. What it says is: “Here’s the number of items to be done over the eight year project, and here’s what we’ve done so far.” This gives no early warning or estimated-to-complete information, nor does it measure performance of the engineering effort. In addition, it says nothing of cost. Note that “Engineering and Consultants” (account #981 of Table 2) is a \$41,600,000 cost item and that one million dollars were expended for it during this quarter. It is a major candidate for control and performance reporting. As such, a baseline budget should be prepared, actual progress accumulated, and accomplishment measured both in terms of cost and schedule. Variances should be identified and corrective action described and estimates-to-complete should be listed.

- 7) This could be a very serious or a minor problem. Exception reporting is needed to isolate significant DCN issues. Additional information is required to describe:
 - The number of DCN’s issued-to-date.
 - The number of DCN’s resolved (and information concerning the significant ones).
 - The number of DCN’s issued during July.
 - The major sources of nonconformance.

- 8) This short paragraph brings quite a few major problems to our attention, yet does not explain their impact nor detail the corrective action that is “being planned.”

- 9) As in 2) above, more impact data is required, along with corrective action. Many questions remain unanswered, i.e.: how long did the strike last, what did it impact, why is the recovery slow (how slow?), how great are the manpower shortages cited (number, percent, etc.), what can be done to alleviate this problem, what effects will corrective measures have, how much will they cost?

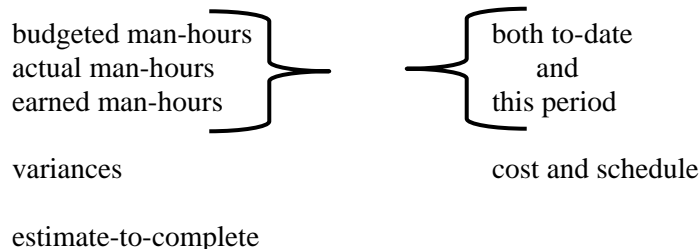
- 10) This section describes how late some major buildings are so far. Three primary deficiencies are apparent:
 - a. The progress, by building, does not match the format by which the work is performed (see discussion of construction packages, starting at coded item # 14) nor how costs are estimated (by FERC account, table #2). Meaningful comparisons among the three are impossible.

 - b. Other major construction activities are ignored. These include: piping (we already know of a shortage of pipe fitter welders, this section should tell us how this major activity is doing), electrical work, circulating water system, major equipment, turbine pedestal, etc.

While not pertaining to any particular structure, these items are significant and could easily lie on the critical path.

 - c. Again, no information concerning estimate-to-complete (will things get better or worse?), no reasons for delay and no outline of corrective action.

- 11) This summary gives the appearance that an “earned value” approach is being taken regarding construction man-hours. However, it is not explained whether these figures reflect project to-date or merely the current reporting period. Comparisons between planned and actual man-hours are missing. No actual or budgeted costs are listed. No variances are listed. The following items should be reported in order for an “earned man-hour evaluation program” to have merit:



Where major variances exist, a detailed report isolating their causes should be available, as well as corrective action plans.

- 12) This information has very little value. Like many of the other data given in the report, it only indicates the peak force. Manpower loading curves could be used to isolate resource constraints in the aggregate and by construction craft, as well as to show trends in staffing ability. All we know from this listing is the greatest number of bodies on the project for some particular day. Strikes and manpower shortages have been alluded to earlier in the report. What is their magnitude? Which crafts have been affected? How long have these conditions persisted and how severe have they been? How will the manpower loading appear in the future? How will this compare to required manpower, by craft? Manpower loading curves would give this information. Also, participants should know: How many shifts are being worked, what is the resulting productivity; how much overtime is being used and to what effect; what crafts will be heavily needed in the future, and will they be available: Why does WAYLO have one man for every 5 1/2 contractor men during the day and one man for every 145 at night. Are these numbers mixtures of direct and indirect, (manual and non-manual), etc.?
- 13) No variances are explained. No cost data are given. For construction equipment, the word “committed” could mean scheduled, required, promised, or paid for. What does this data tell us? By the same token, what does “on hand” mean? Could all equipment be on hand yet 50% of it out of service due to maintenance, repairs, etc?
- 14) Please note comment 10). Almost no quantitative results are given. Throughout this narrative we learn that a lot of work has “begun” and a lot of work “continues.” This tells virtually nothing of its schedule status. It tells absolutely nothing regarding cost.
- 15) See comment 3) above. In addition, although the status of piping work in the yard is discussed, the status of piping work not in the yard is not given. No objective information is given regarding the progress of this contractor to date, his schedule status, or corrective action plans to work around the dewatering problem.
- 16) Item 10) tells us that the cooling tower is 28 weeks behind schedule and that it lies on the critical path. Apparently, WAYLO is 28 weeks behind in preparing the bid specifications. Here we find out that their specification is in progress? When is it expected to be complete? How late will this put the cooling tower construction once it begins? What is being done to expedite WAYLO?
- 17) See items 3), 9) and 15) above. Earlier we are told that circulating water pipe installation has been halted due to the dewatering problem, and here we find out that all yard piping has ceased due to a shortage of pipe fitters! Again, how great is the shortage; how long has it persisted; how long should we expect it to persist; what will it do to our project; and what can we do about it? This points out the need for exception reporting. This item, along with its extent and impact, should be headlined up front.
- 18) A “cash requirements estimate” should be prepared more often than yearly.
- 19) The amount expended through July 31, Year 3, shown here, is dramatically different from that shown on Table #2 (see item 26)).
- 20) There is no way to reconcile the numbers contained in Tables 1 and 2, nor is any explanation

given. How can \$290 million already be expended through July 31 (Table 1) when the Quarterly Project Cost Summary shown in Table 2 only shows \$175.5 million expended through Year 3? One inconsistency obviously relates to the handling of AFUDC. In table 2, \$67 million remains to be spent in Year 3. Meanwhile, Table 1 indicates a TOTAL project cost remaining of only \$14.3 million for the year. Not only should there be an explanation of the differences between these two tables, but a consistent accounting approach should be applied as well.

- 21) Again, no performance data is given. No budgeted to-date or this period; no variance; no estimate-to-complete.
- 22) See comment 10). A cost summary by major property accounting code is virtually useless in understanding performance of the project.
- 23) Committed and expended amounts for accounts 321, 322, 324, and 992 already exceed those estimated. Some explanation of these accounts is in order. In particular, a variance analysis is required and it should describe the estimate-to-complete for structures & improvements, boiler plant equipment, accessory electrical equipment, and temporary construction facilities
- 24) See comment 6).
- 25) These items should be disturbing. What is “suspense?” What is the cost item “omissions?” There appears to be no reserve or “contingency” other than on the gross project level. Recommend contingencies, as well as escalation, should be identified with the cost item they pertain to and their use monitored. This report says that no contingencies or escalation amounts have been expended or committed during the third year of the project!
- 26) See comment 19).
- 27) A significant variance has occurred during Year 3 and its effect on “estimate-to-complete” (which is not shown) demands further explanation. This graph is difficult to read, and no numbers are listed for project forecast at the end of the reporting period.

ULP



Utility Light & Power Co.

September 28, Year 3

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To: President
 Vice President, Finance
 Vice President, Power Generation
 Vice President, Operations

Gentlemen:

Enclosed for your information is a copy of ULP Co.’s Pioneer Unit 1 progress report for the month ending **July 31, Year 3.**

Sincerely,

D.A. Wilson
Pioneer I Project Manager

DAW/bcr
Enclosures

I. **Summary of Project Status**

In general, construction progress on Pioneer I was satisfactory with the project now approximately 34.7% complete. However, critical path items have continued to fall behind schedule due to difficulty in receiving vendor prints on critical equipment and congested placements for reinforcing bars and structural steel on major buildings.

The recovery schedule following the carpenters’ strike in May is being implemented and with manpower levels improving, at least a partial recovery of schedule slippage can be expected by the end of the year. Detailed status of construction is shown on Figure 1 (attached).

2

The proposed ownership reallocations have been proceeding very slowly and may result in a revision to the completion date. The biggest hurdle has been the reluctance of the state PUC to grant approval. These hearings have dragged out for over a year and, unfortunately show no indication of a faster conclusion.

3

Dewatering activities have slowed the installation of circulating water pipe to a point where this work is virtually stopped. A lack of chemical additives for the disposal water has forced a cessation of the well point process and flooded open pipe trenches.

4

In order to expedite production of “issued for construction” drawings by the project engineering consultant, WAYLO associates, authority has been granted for WAYLO to increase the level of temporary designers and drafters to 85.

The Pioneer Trails nature park has been a very busy attraction this summer. Over 200 visitors frequented the temporary information center, bringing the total to date to over 4,000. Several civic and educational groups have indicated a desire to sponsor group tours of the proposed wildlife preserve north of the plant site.

Soil testing for the ash disposal area is proceeding according to schedule. Preliminary results show the possibility of a clay liner to prevent seepage from both ponds.

II. **Licensing**

Hearings are proceeding with the DNR regarding the impact of the railroad spur (corridor C) on the proposed Pioneer Trails Wildlife Preserve. Railine Consultants, Inc. have been retained to develop conceptual plans for proceeding with alternate access routes from the North-South line.

Preliminary findings from both the DNR and the Corps of Engineers are imminent concerning our applications for waivers for the make-up water intake pumping station.

III. **Engineering - Design**

5

Approximately 71.2% of the basic engineering design is completed, 82% of equipment is on order and contracts have been let for 93% of the construction work, the latter based upon dollar value.

Specific, detailed engineering progress is given below:

	<u>Total Number</u>	<u>Completed</u>
Equipment Specifications	306	272
System Descriptions	74	65
WAYLO Drawings	3,986	2,771
Procurements	217	178

6

There were no significant changes in the required quantities of material during this month.

7

A total of 92 unresolved Design Change Notices (DCN's) are pending.

8

Our field non-nuclear quality assurance program continued to be effective in its inspection and reporting efforts. Significant nonconformance reports issued during July involved: undetermined quantity of honeycomb cavities in the turbine pedestal, storage security, document control and weld inspection. These have been investigated and corrective action is being planned.

IV. **Construction**

Construction difficulties continue for items on the critical path, and during July three-and-one-half weeks of added slippage in schedule occurred. Difficulties are primarily in circulating water piping, condenser erection, control room, cooling tower vendor selection, rebar fabrication and placement and miscellaneous steel installation.

Structural steel erection for the turbine building has slowed due to modifications required in detailing of vendor shop drawings. Efforts are underway to resolve these delays; however, the complexity of the needed design and general congestion of the work area is making a solution very difficult. This is a critical problem as we have scheduled the turbine building to be enclosed before arrival of winter to permit installation of turbine - generator equipment.

9

The recovery from the carpenters' strike in May was slower than expected and shortages of carpenters and pipe fitters hindered the buildup in manpower. Although a shortage of pipe fitters now exists, the rest of the manpower problems have been resolved and only startup work on some building piping is now being affected.

Some of the construction highlights during July included the delivery of the turbine generator, completion of the chimney foundation, and expansion of the construction parking area.

The summary below shows the status of major buildings:

10

<u>Item</u>	<u>Current Status</u>	<u>Change Since Last Report</u>
Control Room	17 weeks behind	lost three weeks
*Turbine Bldg.	36 weeks behind	lost eight weeks
Boiler House	20 weeks behind	lost two weeks
*Cooling Tower	28 weeks behind	lost four weeks
Crusher House	3 weeks behind	gained one-half week
Precipitator	19 weeks behind	lost two weeks

*(Critical Path Items)

A summary of the total construction work completed as of July 31, Year 3 follows:

11

<u>Direct Manhours Estimated</u>	<u>Direct Manhours Earned</u>	<u>Percent Complete</u>	<u>Change Since Last Report</u>
7,195,506	1,417,703	19.7	+ 4.02%

Note: Under the manhour productivity evaluation plan instituted at the site, the percentage complete of each task is based on physical evaluation of progress. These figures are based upon the January Year 1 construction estimate, but have been adjusted to exclude all indirect craft manhours

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<u>Peak Force During this Period (July 18, Year 3)</u>			
	<u>Day</u>	<u>Night</u>	<u>Total</u>
WAYLO	190	6	196
Contractors	1,050	875	1,925

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<u>Construction Equipment Commitments</u>		
<u>Type</u>	<u>Committed</u>	<u>On Hand</u>
Construction Cranes	16	15
Earth Moving Equipment	24	20
Air Compressors	18	18
Concrete Trucks	11	11
Rented Cranes	4	3

A summary of major construction packages and their status is listed below.

14

Package #1 (Excavation)

The excavation contractor is substantially complete. Work is continuing on the office building extension.

15

Package #2 (Site Services)

Dewatering has been temporarily halted.

Package #5 (Structural Steel Vendor)

Shipments of structural steel are continuing.

Package #6 (Superstructure)

Work on the north and west walls of the turbine building continue. Began installation of boiler house stairs and grating. Miscellaneous steel in control room and flue gas ducts to elevation 48 feet is in progress.

Package #7 (Coal Handling)

Erection of conveyors is continuing. Receipt of crusher equipment continues. Work on primary crushers has begun. Redesign of bunkers continues.

16

Package #9 (Cooling Tower)

First draft of procurement specification is in progress at WAYLO.

Package #10 (Electrical #1)

Sub grade grounding work continues. Construction parking lot extension lighting has begun.

17

Package #17 (Piping)

Yard piping work has been stopped due to a shortage of pipefitters.

V. **Financial**

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The project is currently preparing a revised Cash Requirements Estimate. This estimate will not be available until the first quarter of next year at the earliest. Table 1 (attached) shows expected cash flow as determined from the earlier estimate. Also attached, as Table 2 is the Quarterly Cost Summary Report that details the estimate, expenditures and commitments by FERC accounts.

Table #1

Pioneer Unit 1

ESTIMATED CONSTRUCTION CASH REQUIREMENTS

Expended through July 31, Year 3			19	\$290,000,000
Estimated				
Year 3	August	2,600,000		
	September	2,700,000		
	October	2,900,000		
	November	3,000,000		
	December	3,100,000		
Year 3 (total)			20	\$ 14,300,000
Year 4				58,000,000
Year 5				56,700,000
	Estimated Total			419,000,000

Note: Includes Allowance for Funds Used During Construction (AFUDC). UL&P Co. indirect is not included.

QUARTERLY PROJECT COST

		<u>Current Estimate</u>	<u>Expended in This Qtr.</u>	<u>Total Expended Through Year</u>	<u>Total Committed and Expended Through Year</u>
22	Acct Plant				21
302	Franchise & License	1,500,000	-----	-----	-----
320	Land & Land Rights		-----	-----	-----
321	Structures & Improvements		2,000,000	42,000,000	66,700,000 23
322	Boiler Plant Equipmen		2,400,000	28,000,000	44,200,000
323	Turbine-Generator		400,000	14,000,000	39,800,000
324	Accessory Elect. Equip		200,000	10,000,000	17,000,000
325	Misc. Power Plant Equip.		1,700,000 24	2,500,000	3,000,000
981	Engineering & Consultant		1,000,000	22,000,000	23,000,000
982	General & Admin.		150,000	1,900,000	3,700,000
983	Other Indirect Costs	12,000,000	250,000	6,700,000	8,900,000
984	Earnings & Expenses During Construction		-----	4,000,000	4,000,000
985	AFUD		-----	39,000,000	106,000,000 20
991	Spare Parts		-----	-----	-----
992	Temp. Construction Facilities		300,000	5,600,000	5,600,000
993	Construction Tools & Equip.		200,000	1,900,000	4,700,000
995	Suspense Escalation Omissio Contingencies	-----	(400,000)	42,000,000	(2,100,000)
	PLANT		8,200,000	175,500,000 26	324,500,000

Pioneer Unit 1 Construction Progress

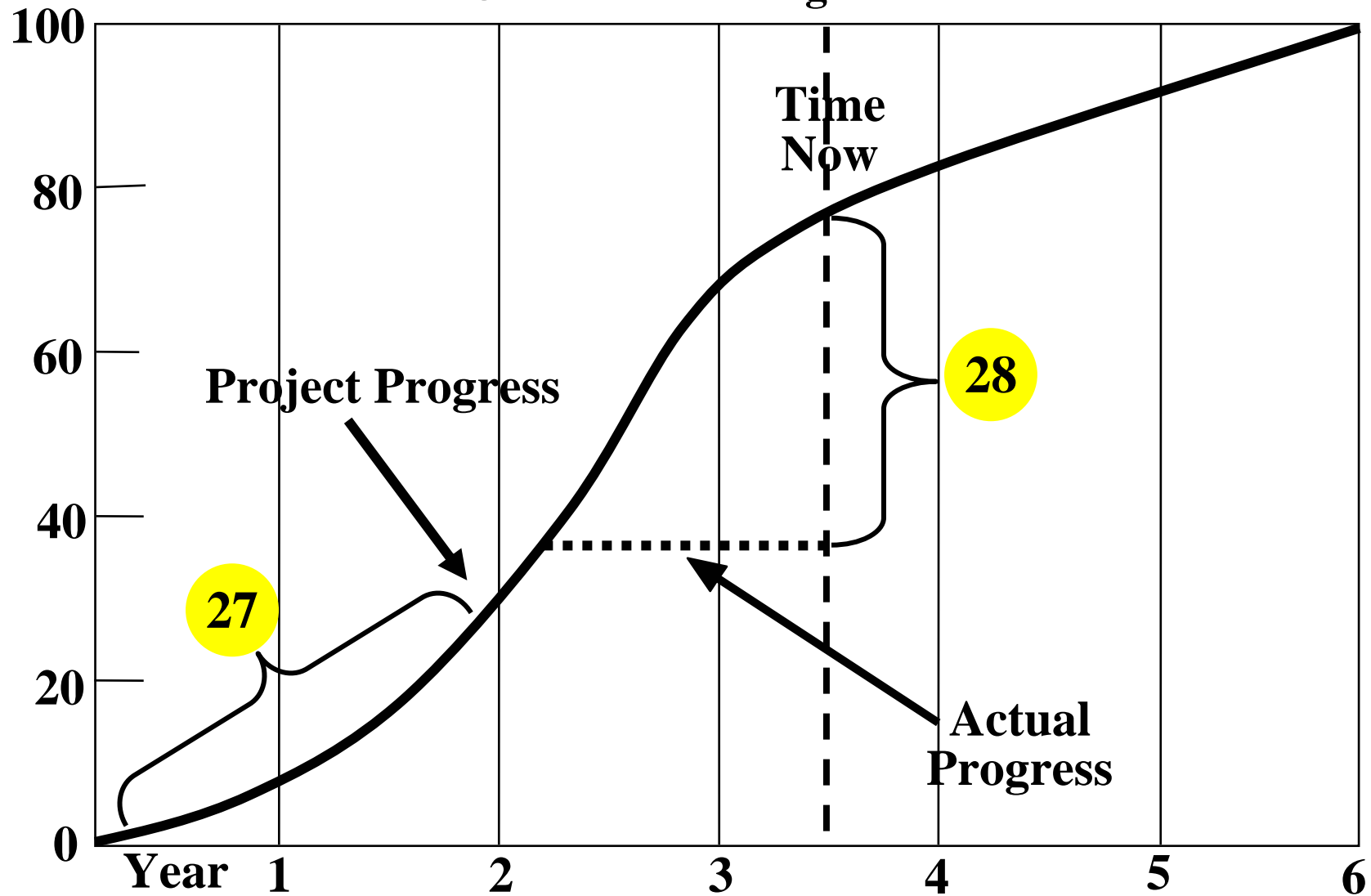


Figure 1