RHO-LD-78-4 SEP
Informal Report

MASTER

Spent Fuel Handling and Packaging Program Management Summary Report

September 1978

Prepared for the United States
Department of Energy
Under Contract EY-77-C-06-1030

Rockwell International

Rockwell Hanford Operations
Energy Systems Group
Richland, WA 99352

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PRELIMINARY REPORT

This Report contains information of a preliminary nature. It is subject to revision or correction and therefore does not represent a final Report. It was prepared primarily for internal use within The Rockwell Hanford Operations. Any expressed views and opinions are those of the Author and not necessarily of the Company.

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RHO-LD-78-4 SEPTEMBER
Informal Report

SPENT FUEL HANDLING AND PACKAGING PROGRAM

MANAGEMENT SUMMARY REPORT

SEPTEMBER 1978

PREPARED BY:

Spent Fuel Engineering
Design Engineering Department

DECEMBER 1978

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This document was prepared to report the progress of the Spent Fuel Handling and Packaging Program to the management and technical staffs of the U. S. Department of Energy, Rockwell Hanford Operations, and other Spent Fuel Handling and Packaging Program participants. As a Program Summary, it is subject to revision and/or correction as the work progresses. The information and opinions contained herein should not be considered as final. For the above reasons, this document should not be given public dissemination or referenced in publicly available documents without prior written approval of the Program Director, Waste Technology.

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SPENT FUEL HANDLING AND PACKAGING PROGRAM

PROGRAM SUMMARY

SEPTEMBER 1978

OBJECTIVE

Design, develop and demonstrate a spent fuel package for geologic storage and disposal, and design, license and construct the facilities to produce this package. Develop and demonstrate technology for the dry, passive surface storage of spent fuel.

PROGRESS DURING REPORT PERIOD

Meetings were held with the Office of Nuclear Waste Isolation (ONWI) to brief them on the Spent Fuel Handling and Packaging Program and to develop a plan for transferring Management of the Program to that office.

The Spent Fuel Receiving and Packaging Facility conceptual design report and a Nuclear Fuel Cycle Cost Model draft were completed.

Conceptual design plans for the Spent Fuel Dry Well Storage Facility and the Packaged Fuel Transfer Facility were prepared and sent to DOE for approval.

Turkey Point light water reactor fuel for the spent fuel demonstration at the Nevada Test Site (NTS) was characterized by Battelle Columbus Laboratories.

Construction and equipment fabrication continued for the Spent Fuel Demonstration at the NTS.

A spent fuel canister weld development program plan was completed.

MAJOR PROBLEM AREAS AND ACTION TAKEN

The present plan for transferring the program management to ONWI is affecting the program work scope. Meetings are being held with ONWI to determine the impact.

PLANNED WORK FOR SUBSEQUENT MONTHS

A final report on the Nuclear Fuel Cycle Cost Model which will include cost model runs will be issued.

Work will continue on the Spent Fuel Package Performance Criteria.

The interim Spent Fuel Package Performance Criteria will be issued.

A dry well and sealed storage cask at the NTS will be loaded with spent fuel from Turkey Point and put on test.

The conceptual design report for the Spent Fuel Dry Well Storage Facility and the Packaged Fuel Transfer Facility will be started.

VARIANCE EXPLANATION

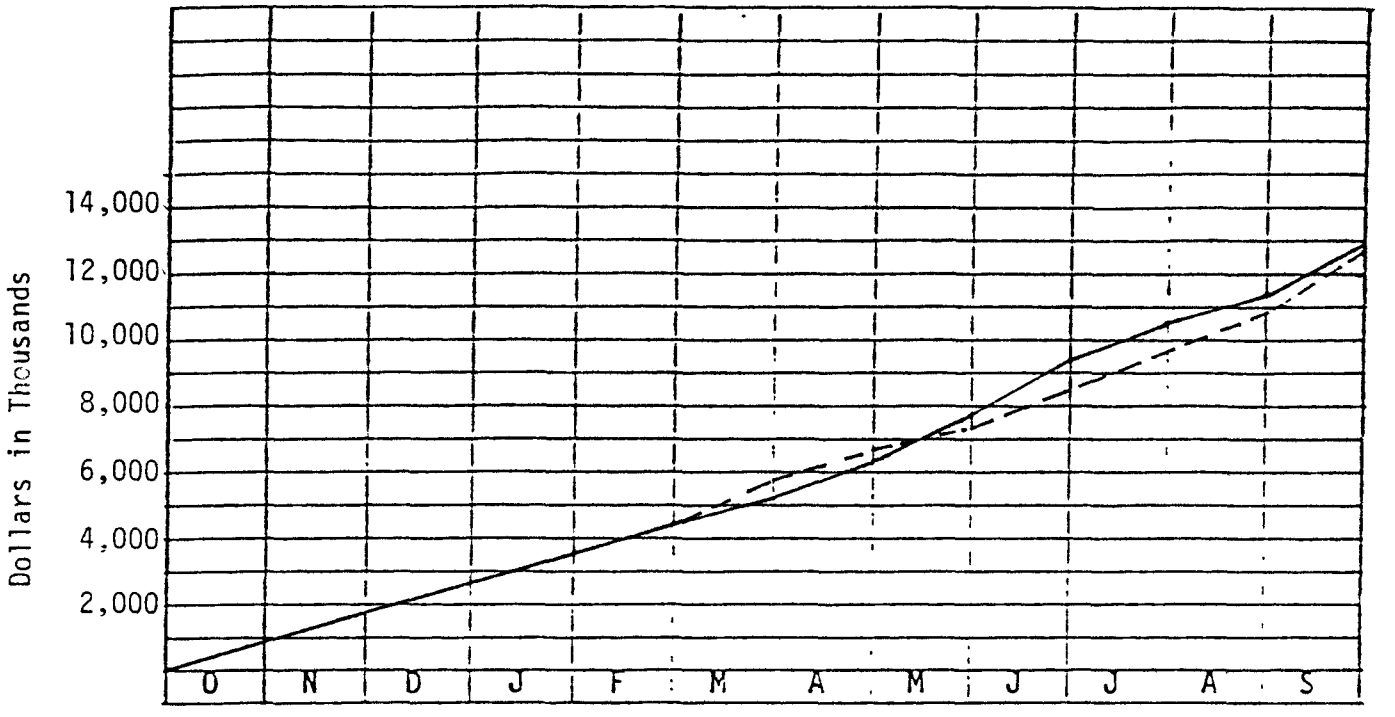
The year-to-date variance reflects the higher-than-planned construction costs at the Engine Maintenance Assembly and Disassembly Facility (EMAD) to support the 1978 demonstration program which were not fully offset by the additional funds provided.

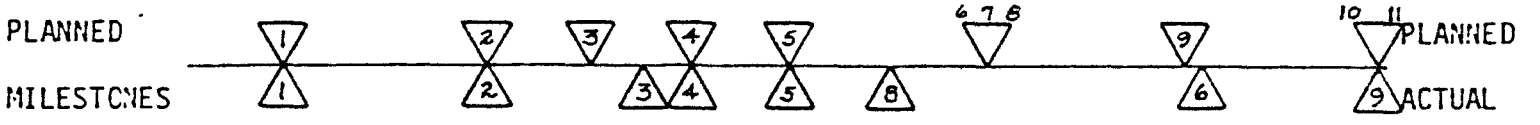
SPENT FUEL HANDLING AND PACKAGING PROGRAM

ACTIVITY: Summary Report REPORTING PERIOD: Sept. 1978

COST-VS-BUDGET STATUS:

FY 1978 BUDGET: 12702
CURRENT ESTIMATE: 12702





MILESTONES:

1. Issue draft program plan and program management plans.
2. Issue preliminary cost model report.
3. Spent fuel facility storage concept selection recommendation.
4. Start cold demonstration at Hanford.
5. Issue preliminary spent fuel facility licensing plan.
6. Revise program plan and program management plans. (Reschedule to August 4, 1978).
7. Select advanced package design. (This effort discontinued in revised program plan)
8. Startup EMAD cold demonstration (Soil temperature test).
9. Complete conceptual design of the spent fuel facility. (Rescheduled to September 29th)
10. Issue final cost model report. (Rescheduled to April 15, 1979).
11. Issue spent fuel facility conceptual design report.

VARIANCE EXPLANATION:

Conceptual design report, milestone 11, waiting DOE approval.

SEPTEMBER MONTHLY REPORT

TASK 1.0 - ENGINEERING AND SYSTEM STUDIES

TASK SUMMARY

OBJECTIVE

Siting studies, systems analyses, transportation logistics studies, centralized spent fuel data collection, fuel cycle cost modeling, and other studies related to evaluation of alternative spent fuel management scenarios are to be conducted in support of, and closely associated with, activities in other tasks.

PROGRESS DURING REPORT PERIOD

A draft of the spent fuel management cost model report was completed and submitted to the Department of Energy, Richland Operations Office, on September 29, 1978. This draft reflects completion of the cost model development work being conducted by Energy Incorporated of Idaho Falls, Idaho, under subcontract with Rockwell Hanford Operations.

PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

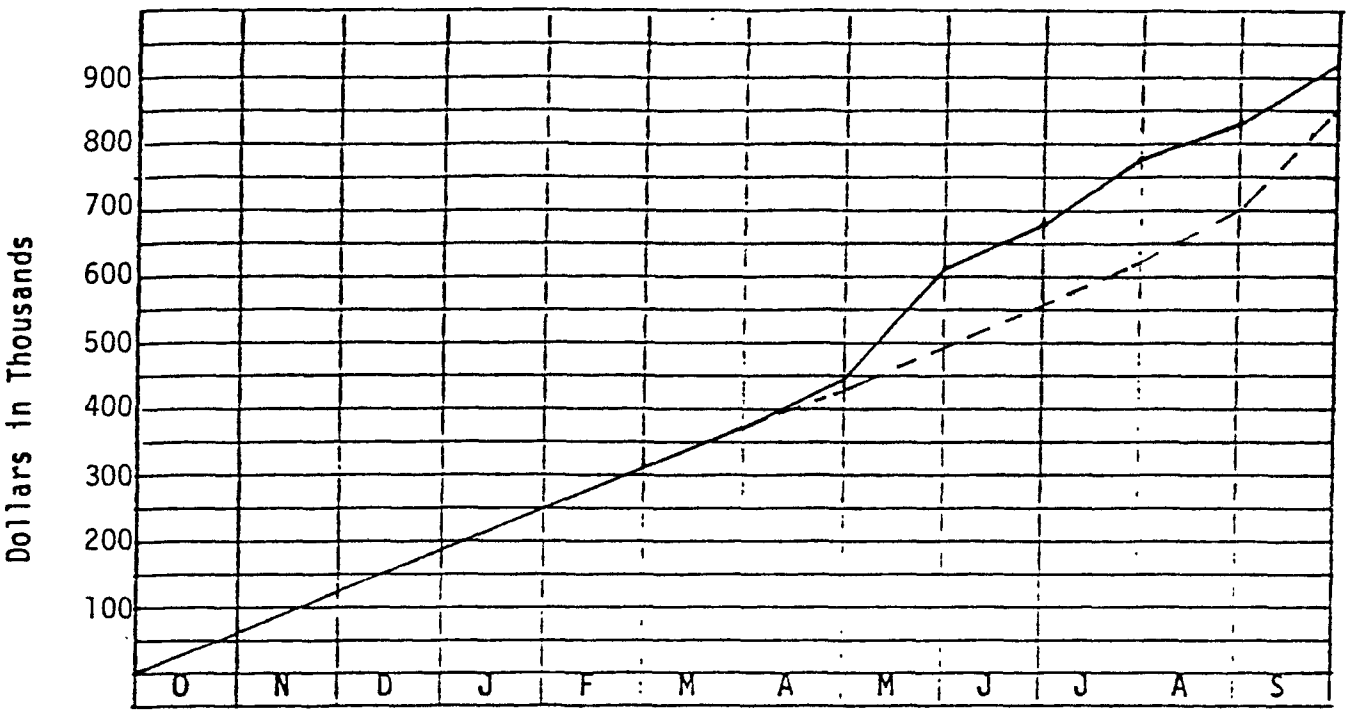
The final report on the spent fuel management cost model is scheduled for completion by the end of October, 1978.

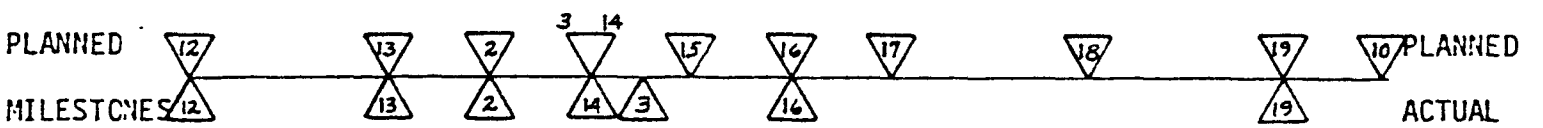
SPENT FUEL HANDLING AND PACKAGING PROGRAM

ACTIVITY: 1.0 Engineering Studies REPORTING PERIOD: Sept. 1978

COST-VS-BUDGET STATUS:

FY 1978 BUDGET: 850
CURRENT ESTIMATE: 920





MILESTONES:

12. Issue storage concept selection draft engineering study.
13. Develop site selection criteria.
14. Centralized fuel data preliminary report.
15. Concept selection (DOE). (Delayed because facility capital budget request delayed).
16. System study draft report.
17. Issue site evaluation committee report (This effort was cancelled).
18. Issue transportation logistics final report. (Rescheduled to November 1, 1978)
19. Issue interim cost model report.
2. Issue preliminary cost model.
3. Spent fuel facility storage concept selection recommendation.
10. Issue final cost model report. (Reschedule to April 15, 1979).

VARIANCE EXPLANATION:

SEPTEMBER MONTHLY REPORT

TASK 2.0 - TECHNICAL RESEARCH AND DEVELOPMENT STUDIES

TASK SUMMARY

OBJECTIVE

Studies pertaining to spent fuel characterization, compatibility of spent fuel packages with geologic storage and reprocessing, package design, advanced geologic package development, incentives for advanced waste forms, spent fuel leachability, and heat transfer, shielding, criticality, and safety analyses are to be performed to support design and licensing of a Spent Fuel Packaging Facility.

PROGRESS DURING REPORT PERIOD

The design and test plan were formalized for the Materials Interaction Test (MIT), which is designed to study the behavior of host rock and candidate canister/liner materials under prototypic spent fuel storage conditions. Mineral and geological samples were received, and the fabrication of specimens and capsule hardware was completed. In addition, all the test specimens were characterized and cleaned, and the neutron dosimetry scoping tests were completed.

The drawing package for the EMAD fuel characterization equipment was completed, including a detailed logic diagram to support estimates of the time required for the selected fuel characterization process. Also in this package were two alternative concepts generated by EG&G - Idaho Falls for the fuel rod handling machine. In a related effort, Kr-85 gamma scanning as a means of identifying failed fuel rods was evaluated. Results showed this method to be infeasible because of difficulties in distinguishing Kr-85 emissions from other sources in the fuel assembly.

A holding fixture for the in-cell speciment rig assembly to support the stress rupture testing effort was completed and delivered to the 324 Building hot-cell facility. The design of a profilometer for in-cell measurements of LWR cladding diameter was also completed.

Detailed preliminary design criteria for the spent fuel water boil-off calorimeter were reviewed and refined with Pacific Northwest Laboratory (responsible system design subcontractor) personnel.

Nondestructive characterization of the Turkey Point PWR spent fuel assemblies was completed. This included examming the bundle as well as five rods per assembly. The data are being reviewed and analyzed. Rod cutting diagrams for the destructive examinations were completed for Battelle Columbus Laboratories (BCL).

Whole rod test design and planning is continuing. Conceptual designs for the whole rod testing include individual rod encapsulations and a hexagonal array of six rods in one capsule. Initial isothermal whole rod testing will be conducted at BCL.

Heat transfer analysis of a hypothetical full-sized, helium-filled canister containing a 10-year-old 17 x 17 PWR fuel rod bundle has begun, using the newly developed computer code which accounts for convection as well as radiation and conduction. Preliminary results suggest that the inclusion of convection effects may reduce the maximum cladding temperature only about $4^{o}K$ at a canister wall temperature of $300^{o}K$.

Equipment specifications were developed for the power supplies, the thermocouple reference system, and the display terminal for use in the internal canister heat transfer model verification tests. The heater pin design was discussed with a potential vendor, which identified the need for further design and definition of operating conditions. The test section design included both spacer and tie plate design.

PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Work planned for subsequent months includes the following:

1. Complete the assembly of the MIT, prepare data package, and deliver experiment to BCL.

2. Begin destructive examinations on Turkey Point rod in early October, 1978.

3. Prepare a draft of the whole rod engineering test plan and place order for test furnaces.

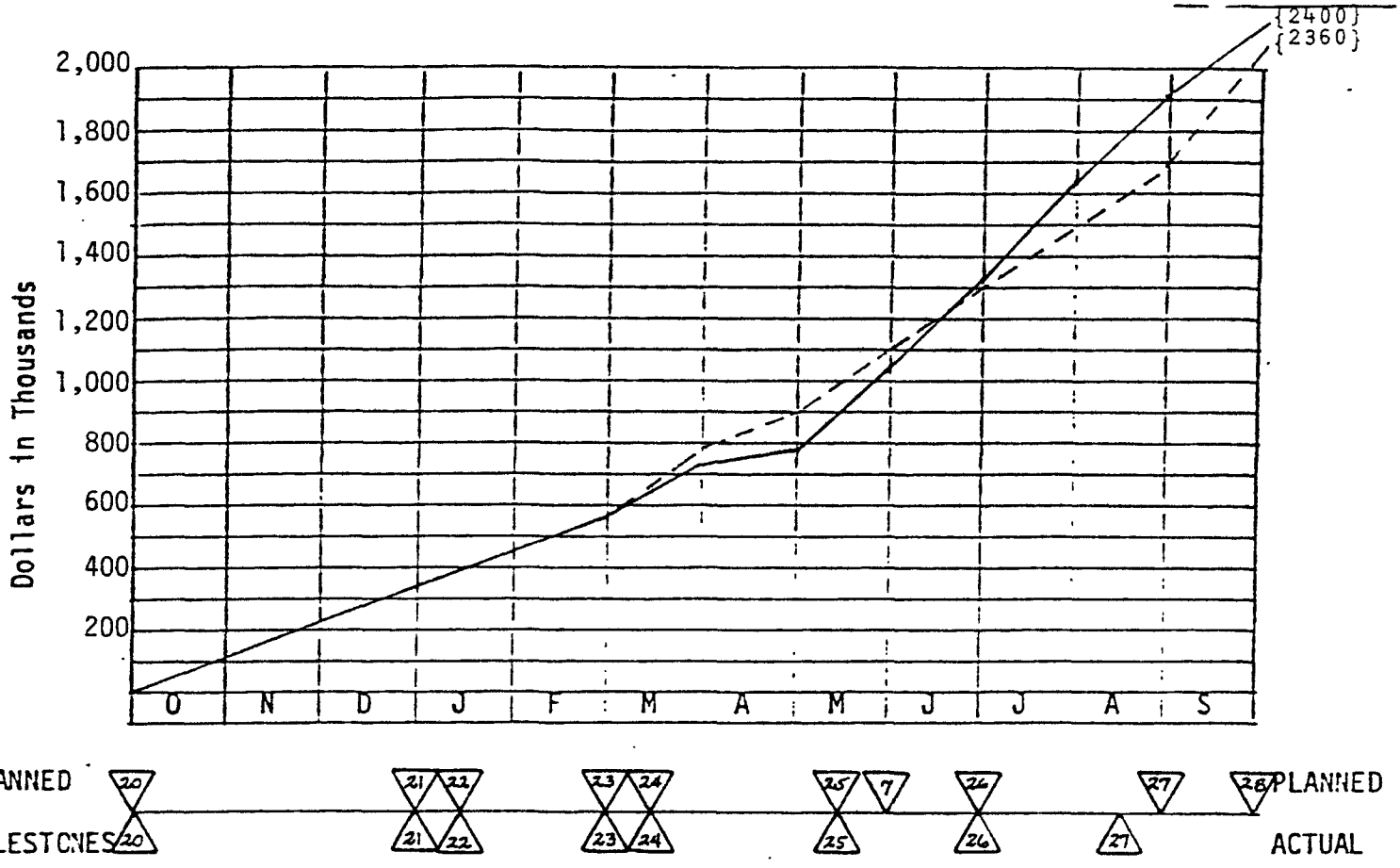
4. Issue draft interim package performance criteria by November 1, 1978.

SPENT FUEL HANDLING AND PACKAGING PROGRAM

ACTIVITY: 2.0 Technical R&D Studies REPORTING PERIOD: Sept. 1978

COST-VS-BUDGET STATUS:

FY 1978 BUDGET: 2360
CURRENT ESTIMATE: 2400



MILESTONES:

20. Issue reprocessing criteria initial report.
21. Issue engineering study reports for spent fuel characterization, advanced geologic package development, heat transfer analysis, shielding, criticality safety and storage concept risk assessment.
22. Issue preliminary package design.
23. Issue initial compatibility evaluation.
24. Issue reprocessing criteria final report.
25. Issue package design (as stabilized)
7. Select advanced package design (This effort discontinued in revised program plan)
26. Preliminary package design evaluation.
27. Final compatibility evaluation.
28. Initial evaluation of advanced package (This item will be readdressed in the updated program plan).

VARIANCE EXPLANATION:

SEPTEMBER MONTHLY REPORT

TASK 3.0 - DEMONSTRATIONS

TASK SUMMARY

OBJECTIVE

This task provides data, through cold and hot demonstrations, in support of conceptual, Title I, and Title II design of the Spent Fuel Facility, as well as a support of the Preliminary Safety Analysis Report (PSAR) and the Final Safety Analysis Report (FSAR).

PROGRESS DURING REPORT PERIOD

Kaiser Engineers' (KE) activities are still confined to reviewing and processing Field Change Orders and other A/E monitoring efforts during the construction of the sealed storage cask concrete shield by personnel at the Nevada Test Site (NTS). The first shield was poured on September 23, 1978, and it was witnessed by representatives of both KE and RHO. After some initial problems with obtaining the proper slump, the pour went well.

The Westinghouse Advanced Energy Systems Division (W-AESD) in Pittsburgh continued work in design and fabrication of hardware. A review of PNL's thermal model for fuel temperature analysis was completed. An analysis of helium leakage from the canister during the time required to emplace the seal cap fitting was completed, and it showed that less than 1 percent of the canister helium volume would be replaced by air.

The following hardware was shipped to the site:

- four drywell liners
- thermocouples
- the complete leak detection system
- vacuum chamber
- E. I. V. upper shield assembly
- SSC lifting sling and spreader bar

W-AESD at E-MAD continued with facility and equipment overhaul. The rail spur ties and rails were installed, and the concrete emplacement with five drywell positions was poured. The first SSC was poured. The concrete base slab and the pit walls for the lag storage pit were poured. Much progress was made on the CAM, TV, and video tape equipment.

PROBLEM AREAS AND ACTION TAKEN

The major problem which occurred during this period was that 36 of the strain gages in the first SSC concrete shield failed shortly after pouring concrete. Subsequent examination of identical gages installed in the reinforcing steel in the second unit, revealed that there was apparently a manufacturing defect in the plastic coating on this lot of gages.

The gages on the second unit were replaced by a competitive brand, and the manufacturer of the defective gages has agreed to refund the total purchase price. After the second unit is poured, and if the new gages perform all right, the second unit will be used in the first demonstration.

PLANNED WORK FOR SUBSEQUENT MONTHS

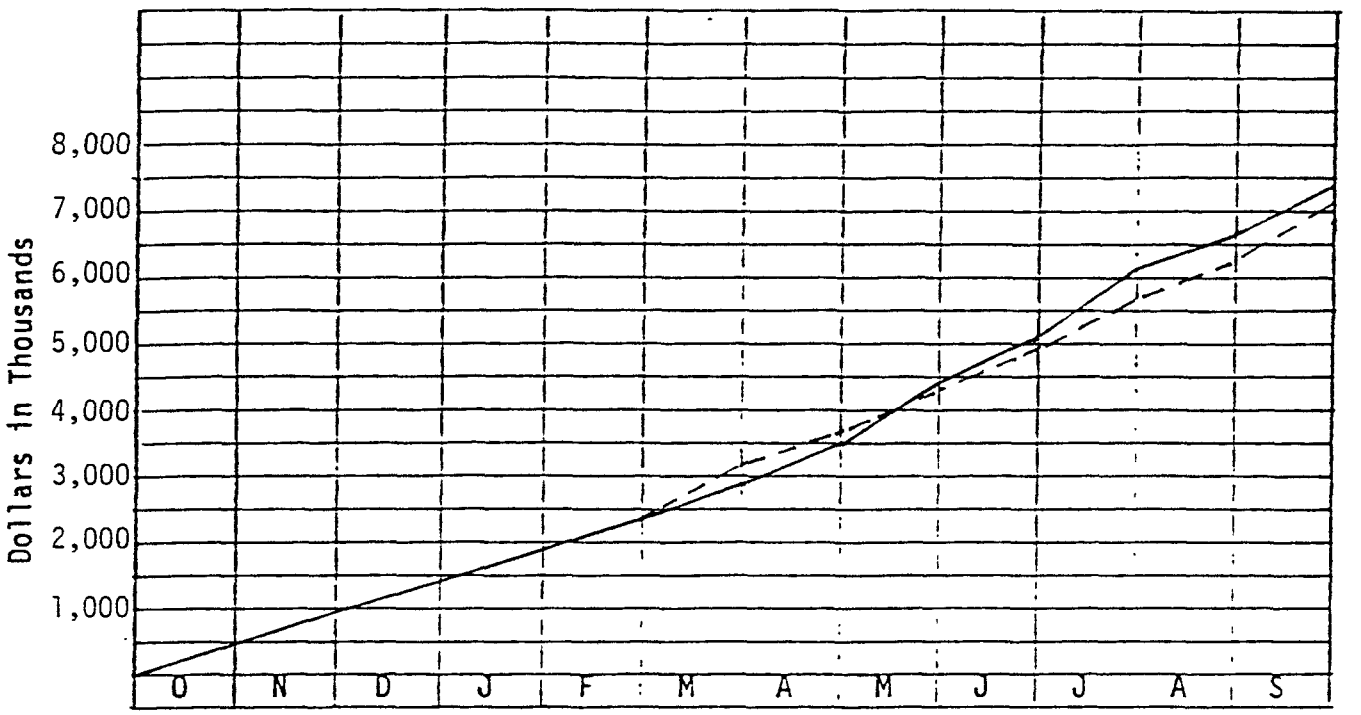
Kaiser Engineers will continue surveillance of the SSC construction, and will complete the as-built drawings. W-AESD will continue preparations to install one SSC by 12/31/78 and one drywell demonstration by 1/23/79. This effort involves completing fabrication of equipment, cleanup of the hotbay at E-MAD, installation of equipment, receiving and packaging two PWR fuel assemblies, and installing the demonstrations.

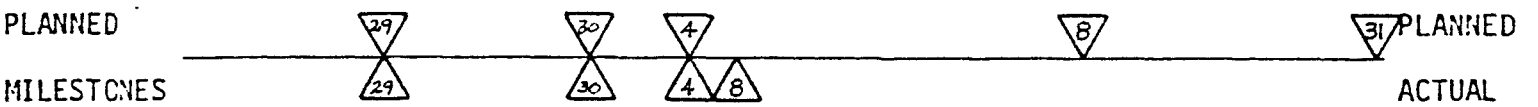
SPENT FUEL HANDLING AND PACKAGING PROGRAM

ACTIVITY: 3.0 Demonstrations REPORTING PERIOD: Sept. 1978

COST-VS-BUDGET STATUS:

FY 1978 BUDGET: 7087
CURRENT ESTIMATE: 7250





MILESTONES:

29. SSC shield final design
30. 1978 SURF demonstration final design
4. Start cold demonstration at Hanford
8. Start EMAD cold demonstration (soil temperature test)
31. Select welding process . (Rescheduled to November 24, 1978).

VARIANCE EXPLANATION:

SEPTEMBER MONTHLY REPORT

TASK 4.0 - PROJECT SUPPORT STUDIES

TASK SUMMARY

OBJECTIVE

This task addresses the licensing requirements of the Spent Fuel Facility project. It includes preparation of environmental statements and safety analysis reports to support the budgetary and licensing actions.

PROGRESS DURING REPORT PERIOD

There was no significant activity on this task during the report period.

PROBLEM AREAS AND ACTION TAKEN

None.

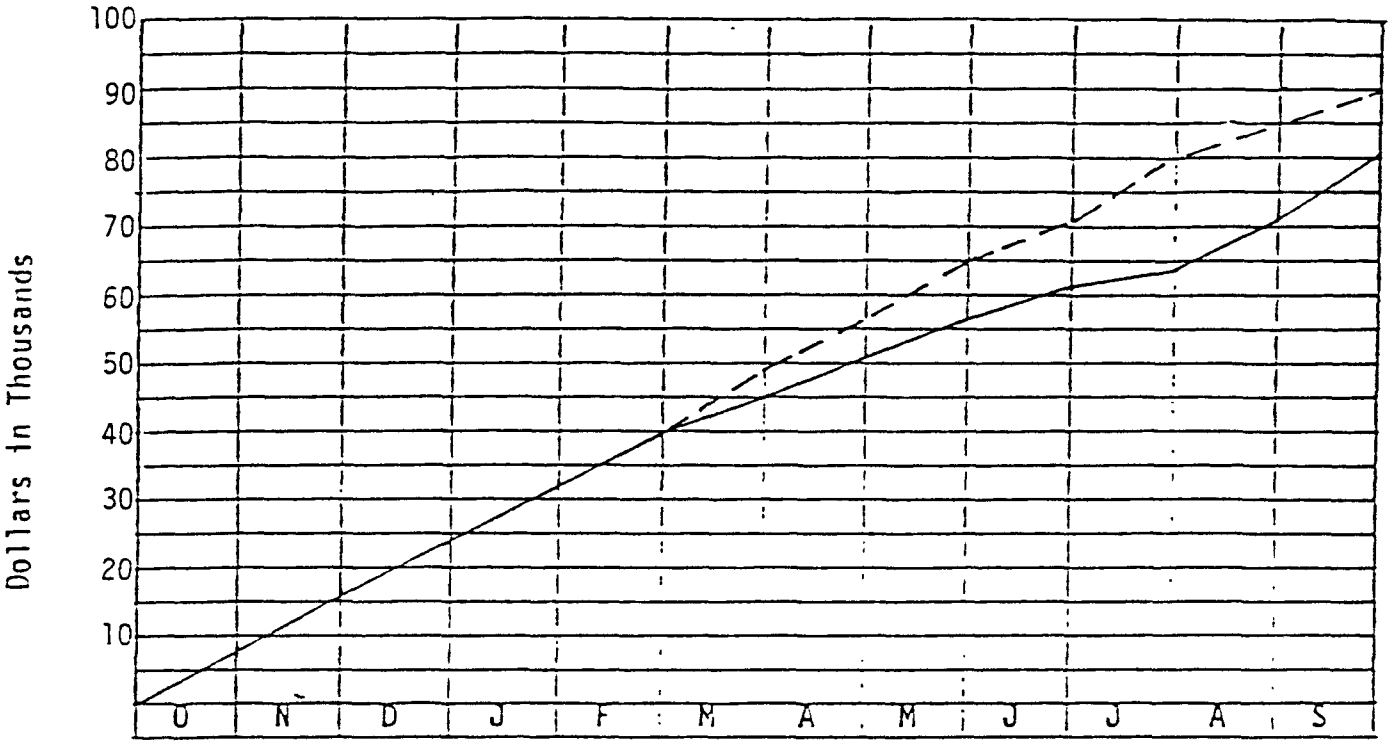
PLANNED WORK FOR SUBSEQUENT MONTHS

The review of licensing requirements will continue in order to assure compliance with all defined and proposed regulatory criteria.

ACTIVITY: 4.0 Project Support Studies REPORTING PERIOD: Sept. 1978

COST-VS-BUDGET STATUS:

FY 1978 BUDGET: 90
CURRENT ESTIMATE: 80



PLANNED
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PLANNED
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LESTONES

MILESTONES:

5. Issue preliminary SF facility licensing plan

VARIANCE EXPLANATION:

Task is slightly underrun, with the effort remaining on schedule.

SEPTEMBER MONTHLY REPORT

TASK 5.0 - SPENT FUEL FACILITY PROJECT

TASK SUMMARY

OBJECTIVE

The objective of this task is to design, construct, and initiate operation of a production spent fuel handling facility. It includes engineering concept development, design, procurement, construction, and plant startup.

PROGRESS DURING REPORT PERIOD

Revisions based on Kaiser and Rockwell comments were incorporated into the Receiving and Packaging Facility drawings for the 90% Conceptual Design Report. The revisions included reduction in the depth of the Lag Storage Pools, layouts of Weld and Test Cell and Special Functions Cell operating platforms, and changing the space heating distribution system from hot water to steam.

The 70% draft of the Conceptual Design Report (CDR) was reviewed, and the 90% draft of the CDR, incorporating recommended changes, was prepared. The 90% Report was transmitted in September to Rockwell/DOE-RL for final review and comment. Informal Rough-Order-of-Magnitude (ROM) construction cost estimates for the transfer and dry-well storage facilities were submitted to Rockwell. A review of the estimates and back-up for shop fabrication of the BWR and PWR canisters was completed.

PROBLEM AREAS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

Preparatory work is underway for starting conceptual design of the Dry Well Storage Facility and the Packaged Fuel Transfer Facility. Full scale work will begin after October 1, 1978 and is scheduled for completion by March 31, 1979.

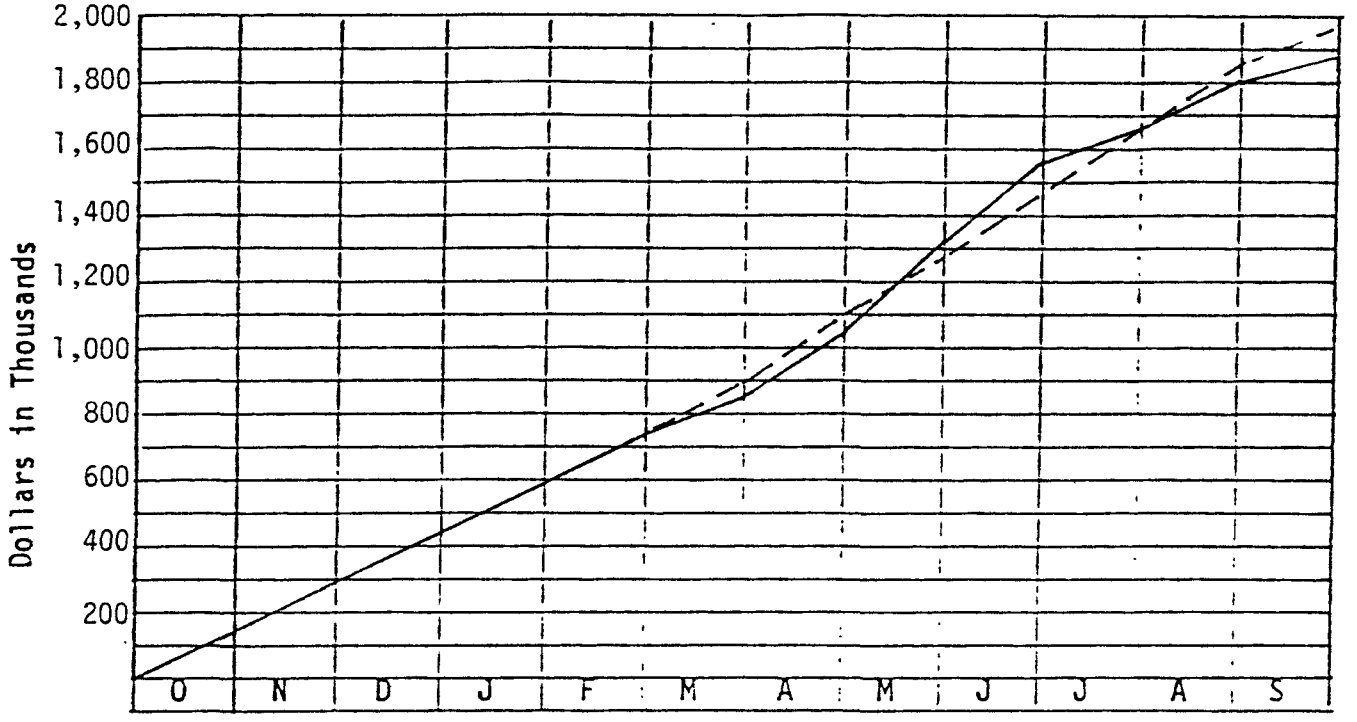
Complete the Conceptual Design Report for the Spent Fuel Receiving and Packaging Facility.

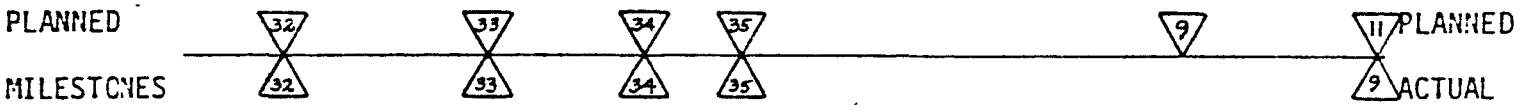
SPENT FUEL HANDLING AND PACKAGING PROGRAM

ACTIVITY: 5.0 Project Management REPORTING PERIOD: Sept. 1978

COST-VS-BUDGET STATUS:

FY 1978 BUDGET: 1985
CURRENT ESTIMATE: 1885





MILESTONES:

32. Wet receiving and lag storage initial TDS.
33. Start conceptual design of the spent fuel facility.
34. Safeguards criteria.
35. Wet receiving and lag storage final TDS
9. Complete conceptual design of the Spent Fuel Receiving and Packaging facility (Rescheduled to September 29).
11. Issue SF facility CDR.

VARIANCE EXPLANATION:

Conceptual design report, milestone 11, waiting DOE approval.

TASK 6.0 - PROGRAM MANAGEMENT

TASK SUMMARY

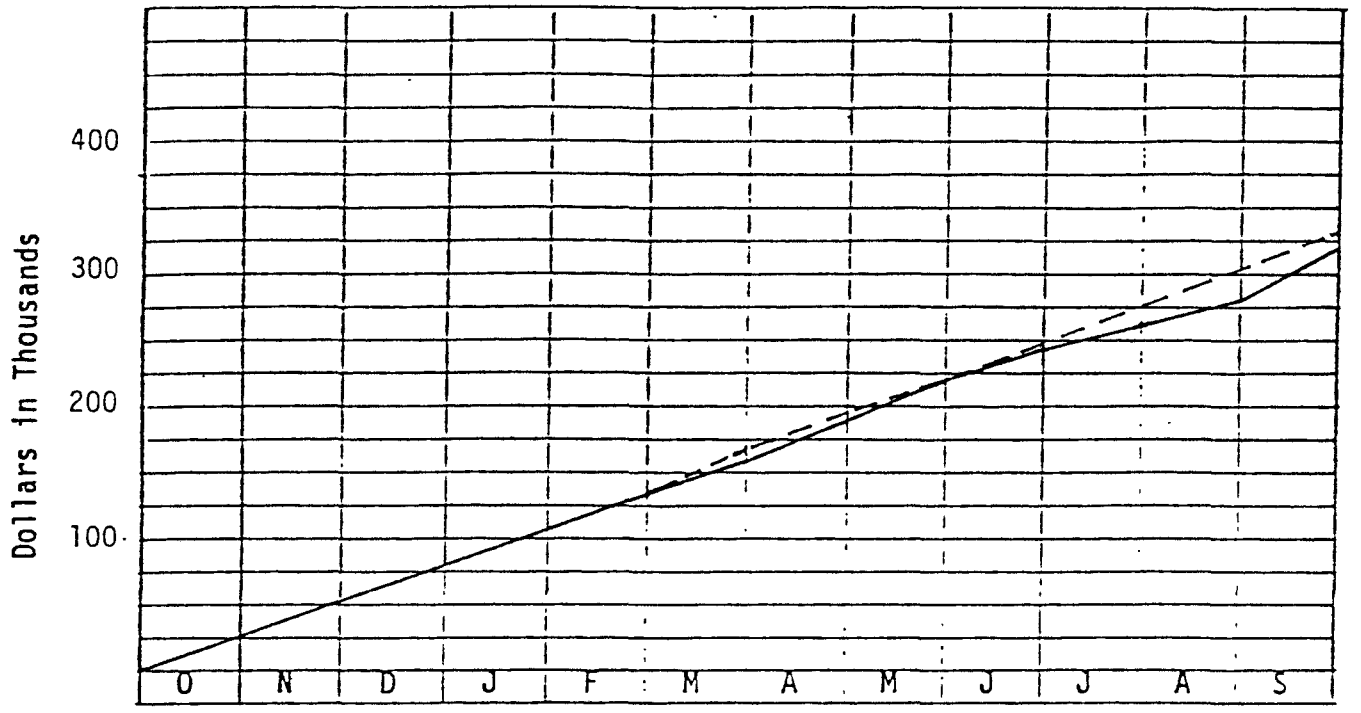
Meetings are being held with ONWI to determine the Rockwell work scope for FY 1979. As presently defined, the transfer of program management could impact the program scope substantially.

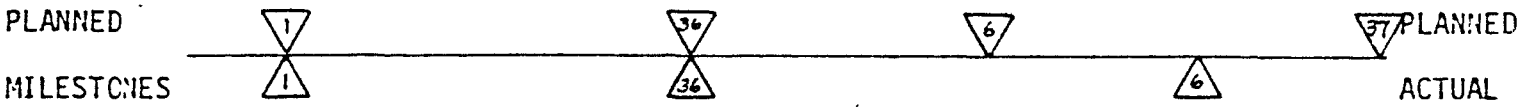
SPENT FUEL HANDLING AND PACKAGING PROGRAM

ACTIVITY: 6.0 Program Management REPORTING PERIOD: Sept. 1978

COST-VS-BUDGET STATUS:

FY 1978 BUDGET: 330
CURRENT ESTIMATE: 320





MILESTONES:

1. Issue draft program and management plans.
36. Commitment tracking system in place.
6. Revise program and management plans. (Rescheduled to August 4th)
37. FY 1979 program plan. (This item will be rescheduled in the updated program plan).

VARIANCE EXPLANATION:

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