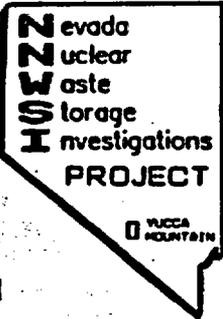


U.S. DEPARTMENT OF ENERGY

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NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT



MONTHLY REPORT

MAY 1985

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PDR WASTE
WM-11 PDR

UNITED STATES DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE

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SUMMARY

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT

MAY 1985

KEY ACTIVITIES

WBS X.2.1, SYSTEMS

As part of the fuel-consolidation study, repository costs are being compared for disposal of spent fuel with and without fuel-rod consolidation. Preliminary costs for no-consolidation options ranged from \$6.1 billion to \$7.1 billion.

The hydrodynamics of the Total System Performance Assessment Code (TOSPAC) are being tested on a set of Yucca Mountain - type problems. A new solution technique that may reduce computation time is being considered.

WBS X.2.2, WASTE PACKAGE

Four general trends have been noted in the electrochemical data obtained for copper and copper alloys. (1) Corrosion potentials for the alloys are more negative in 100x concentrated J-13 than in unconcentrated J-13 water. (2) The pitting potentials for all alloys are more positive with 100x concentrated J-13 than with unconcentrated J-13 water. (3) Passive current values are higher with 100x concentrated J-13 water. (4) The alloys have a higher corrosion rate in the 100x concentrated J-13 water.

Specifications and designs are being developed for the NNWSI Project Waste Package System Model. Efforts focused on a description of the logic and development of the equations for the system driver module. Modifications to WAFE continued for modeling the waste package environment. The PETROS thermal unsaturated flow model is being implemented.

WBS X.2.3, SITE

Measurements of water permeability are in progress on core samples from drillholes USW G-4 and USW GU-3/G-3. Thus far permeability values range from 0 to 10 micro-darcies for densely welded tuff. Permeability of partially to moderately welded tuff is in the 100 micro-darcy range.

Trenches were excavated near the centers of Yucca and Frenchman lakes to evaluate the potential of these playas for paleolimnological and paleoclimatic research. No sediments of obvious lacustrine or marsh origin were found. It is probable that these playa sections, to a depth of about 5 m, represent seasonally dry playa environments similar to those of today.

WBS X.2.4, REPOSITORY

Borehole analyses were extended in three areas. (1) A suggested performance criterion for borehole seals was evaluated in which the saturated conductivity of the seal material equaled the effective saturated conductivity of the host rock. (2) Design charts were developed for seals placed in boreholes and

shafts (or drifts) in the Topopah Spring and Calico Hills units. (3) Boreholes that penetrate through the Calico Hills unit are being studied as possible drains and preferential pathways to the water table.

Calculations applying the boundary-element code HEFF to a probabilistic-failure approach were completed. Stability was assessed for the tuff mains using horizontal emplacement after modeling the variability of six influential thermomechanical properties.

WBS X.2.5, REGULATORY/INSTITUTIONAL

Progress was made on SCP chapters 2 (Geoengineering), 5 (Climatology), 7 (Waste Package), 8.6 (Quality Assurance), and 8.7 (Decontamination and Decommissioning).

The first draft of the Environmental Assessment Comment/Response Appendix was written.

WBS X.2.6, EXPLORATORY SHAFT

Part I of the Exploratory Shaft Test Plan (Rev. 1) was completed, except for the Executive Summary and Chapter 5 (Rationale). Preliminary input for Part II was completed.

Trial measurements continued with high frequency electromagnetic geotomography methods in a sand pit. Tests of USBM borehole deformation gauges in a heated environment are being planned.

WBS X.2.7, TEST FACILITIES

The REVERT code was used to provide final conversion and temperature compensations for all acquired SFT-C data. The resulting nine million data points were sorted into separate data files for each of the 969 instruments to simplify subsequent analysis.

WBS X.2.8, LAND ACQUISITION

No activity to report this month.

WBS X.2.9, PROGRAM MANAGEMENT

The Earned Value or Performance Measurement System Study neared completion. Work began on the earned value computation programs for the NNWSI Project.

The draft WBS Dictionary was delivered for review to WMPO/NV and the Project participants.

The Site Characterization Plan Management Plan has been implemented. The Environmental Assessment Management Plan for the final Environmental Assessment including Comment/Response Appendix is being finalized.

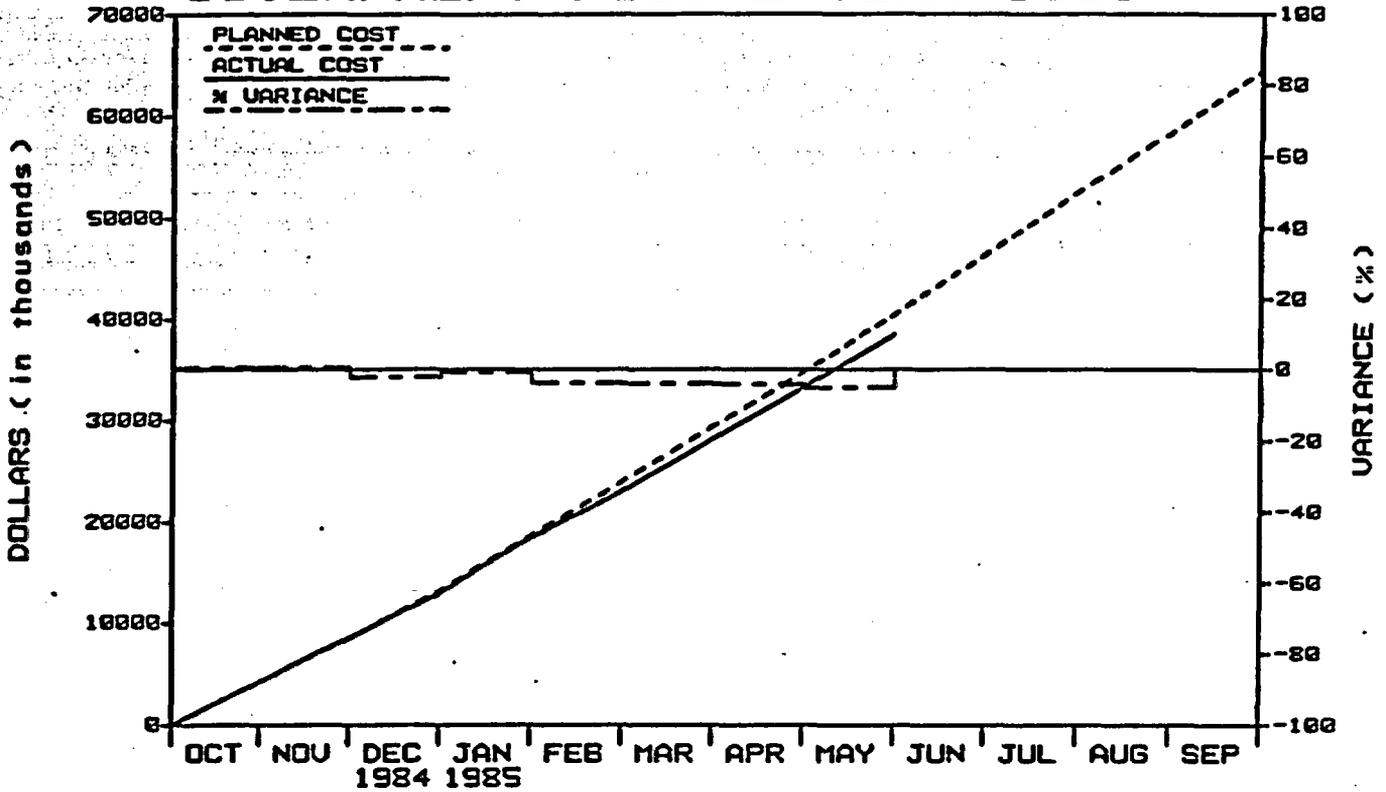
FUNDING OVERVIEW

The month-end programmatic estimated costs were \$38,440,000 against a plan of \$40,504,000 resulting in a cost underrun of \$2,064,000 through the month of May. The total FY 85 budget for the NNWSI Project was \$69,664,000 which breaks down to \$64,390,000 in operating funds and \$5,274,000 in capital equipment funds.

The following are the year-to-date plans, costs, and variances.

	<u>Plan</u>	<u>Cost</u>	<u>Variance</u>	<u>% Variance</u>
X.2.1 Systems	\$2,540,000	\$2,522,000	\$18,000	1
X.2.2 Waste Package	3,511,000	3,216,000	295,000	8
X.2.3 Site	11,968,000	11,526,000	442,000	4
X.2.4 Repository	7,362,000	6,575,000	787,000	11
X.2.5 Regulatory/Institutional	4,164,000	3,361,000	803,000	19
X.2.6 Exploratory Shaft	3,542,000	3,619,000	<77,000>	<2>
X.2.7 Test Facilities	1,157,000	1,328,000	<171,000>	<15>
X.2.9 Program Management	6,260,000	6,293,000	<33,000>	<1>
Total	<u>\$40,504,000</u>	<u>\$38,440,000</u>	<u>\$2,064,000</u>	<u>5</u>

WBS X.2 NNWSI PROJECT GOVERNMENT FISCAL YEAR 1985



PLAN (X1000)	4217	8482	13238	18656	23973	29355	34734	40504	46391	52509	58228	64390
COST (X1000)	4241	8543	12955	18478	23077	28203	33266	38440	0	0	0	0
VARIANCE (X1000)	-24	-61	283	178	896	1152	1468	2064	0	0	0	0
X VARIANCE	1	1	-2	-1	-4	-4	-4	-5	0	0	0	0

NNWSI PLANNING AND SCHEDULING
BUDGET BASELINE

MAY 1985

<u>CONTRACTORS</u>	<u>(\$000) BEGINNING FUNDING</u>	<u>CHANGE</u>	<u>(\$000) ENDING FUNDING</u>
SNL	\$18,334	-	\$18,334
LLNL	8,565	-	8,565
LANL	10,130	-	10,130
USGS	9,922	-	9,922
SAIC	7,775	-	7,775
REECO	4,608	-	4,608
H&N	753	-	753
F&S	1,212	-	1,212
WSI	200	-	200
PAN AM	50	-	50
STATE GRANT	1,899	-	1,899
MISCELLANEOUS	530	-	530
NTS ALLOCATION	412	-	412
RESERVE	-0-	-	-0-
	<hr/>	<hr/>	<hr/>
SUBTOTAL	\$64,390	-0-	\$64,390
CAPITAL EQUIPMENT	5,274	-	5,274
	<hr/>	<hr/>	<hr/>
TOTAL	\$69,664	-0-	\$69,664

U.S. DEPARTMENT OF ENERGY

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PROJECT STATUS

X.2.1 SYSTEMS

OBJECTIVE

The objective of this task is to apply the concept of systems to the development and design of the repository, both the surface and subsurface facilities, and to the evaluation of the effectiveness of the geologic and hydrologic environment in isolating radionuclides.

ACTIVITIES

Systems Management and Integration

In May 1985 NNWSI Project participants provided written comments on the draft OGR Systems Engineering Management Plan (SEMP) to SNL. SNL combined and summarized the comments and sent the summary to the DOE-NV/WMPO for inclusion in the formal NNWSI Project review response. NNWSI Project reviewers generally agreed with the systems-engineering objectives presented in the OGR SEMP; however there was concern that the effects of systems engineering implementation on ongoing program and Project activities were not clearly stated in the OGR SEMP.

An informal management plan was developed for the preparation of the NNWSI Performance Assessment Plan (PAP), an annotated outline for Volume I (post-closure performance assessment) was completed, and an instruction letter was prepared for distribution to PAP authors. The PAP package will be sent to authors early in June 1985 and writing of individual sections will begin.

System Studies

As part of the fuel-consolidation study, repository costs are being compared for disposal of spent-fuel with and without fuel-rod consolidation. In this study, the reference cost for disposal of consolidated fuel was derived from the Bechtel National Inc. (BNI) estimate for a two-stage repository with vertical canister emplacement, no defense high-level waste (DHLW), and all spent fuel except high-burnup pressurized-water-reactor (PWR) consolidated fuel. For the reference case, the total repository cost was \$6.3 billion.

Preliminary cost estimates for no-consolidation options were developed using presently available, but incomplete, information. Preliminary costs for no-consolidation options ranged from \$6.1 billion (for a hybrid canister containing three intact PWR and four intact boiling-water reactor (BWR) spent fuel elements) to \$7.1 billion (for the reference NNWSI Project canister loaded with three intact PWRs or six intact BWRs).

The presence of DHLW in the repository (which lessens the total amount of spent fuel), horizontal emplacement (which lowers the incremental mining and drilling costs), anticipated canister costs that are lower than those assumed, and the inclusion of other cost factors not yet considered will likely result in lower costs for no-consolidation scenarios.

Work completed on the Retrieval Program Plan (Milestone M196) during May 1985 included completion of an abstract, completion of the editorial review, and the incorporation of comments from the editorial review. SNL line review will begin on June 3, 1985.

Work on responses to comments on retrieval for the NNWSI Project Environmental Assessment also continued, and retrieval considerations for the NNWSI Project Site Characterization Plan were completed.

Cost Schedule

The search for updated repository cost-estimating software continued. The evaluation of dozens of cost-estimating systems reduced the field to three appropriate candidates: (1) the LANL Estimating System, which uses a LANL data base and a general data base, (2) the DOE/FAST calibrated parametric models, and (3) the DOE Cost-Estimating System (CES), which is a subsystem of the LLNL Technology Information System (TIS) with access to several other reputable construction cost-estimating systems.

Tuff Data Base

The Tuff Data Base, TUFFDB, was updated to include new and revised hole information, and the unpublished reference for USW G-4 geologic stratigraphy was superseded by the published version. TUFFDB PRIMER was updated to Version 10 to incorporate new and revised hole information as contained in TUFFDB.

The semiannual TUFFDB audit was completed and several problems were noted. In an effort to address some of these problems, work has begun to develop (1) new audit (inspection) procedures, (2) new data-entry procedures, and (3) an automated data-base update system. The display subroutines for the TUFFDB INTERFACE were completed.

The nucleus of the Reference Properties Data Base has been established. The data base contains reference intact-rock and rock-mass properties, design specifications, and waste-form descriptions.

Computer Graphics

Active model data, which have been supported on the APPLICON system, are being transferred to the CALMA system. Software and procedures are being developed to ensure that data integrity is maintained during the transfer process. After proper verification these models will be given product numbers that identify them as being resident on the CALMA graphics system. Current surface-generation software resident on the APPLICON is being developed for the GE CALMA system. This software uses precalculated coefficients to predict the elevation of any given point on a surface.

Flow and Radionuclide Transport

A report entitled "Reduction of the Well Test Data for Test Well USW H-1, Adjacent to Nevada Test Site, Nye County, Nevada" (SAND84-0637) was published. This report provides an independent approach to estimating hydraulic conductivity and storativity values from drawdown and recovery tests of Well USW H-1, to complement results obtained by the USGS.

A contractor report from Lawrence Berkeley Laboratory (LBL) entitled "Hydrologic Mechanisms Governing Fluid Flow in Partially Saturated, Fractured, Porous Tuff at Yucca Mountain" (SAND84-7202) was published. The report presents a conceptual approach to modeling the effects of discrete fractures on water movement through the unsaturated zone at Yucca Mountain.

Parametric-modeling studies of the unsaturated- and saturated-flow systems at Yucca Mountain progressed in the area of assigning the material properties for the finite-element analysis. The saturated studies continued by performing runs of the two-dimensional, groundwater-flow code to establish a reasonable steady-state potentiometric surface consistent with observed static water levels in the drillholes at and around Yucca Mountain.

Radionuclide Source Term

The three NNWSI Project analysts involved with the near-field hydrological problem (COVE3) revised the initial and boundary conditions in each of the codes until the calculated geothermal temperature gradients (based only on conduction) agreed. The steady-state saturation and thermal profiles without any external heat source were then calculated; these results were in reasonable agreement. The next step in this verification exercise will be to solve the full, thermally driven problem.

A series of meetings was held to define the division of responsibility between LLNL and SNL for several common postclosure-analysis activities. Basically, LLNL is responsible for all detailed analyses concerning the waste package and its environment. In order to accomplish this, LLNL must also study the hydrology and groundwater geochemistry of the very near field (<1 m from borehole). SNL is responsible for the detailed analyses of near-field processes (hydrology, thermomechanics, radionuclide transport). Specific performance-assessment responsibilities are:

1. Demonstrating compliance with the waste-package containment requirement (LLNL).
2. Demonstrating compliance with the engineered-barrier-system (EBS) release rate requirement. (LLNL will perform the waste-package analysis and SNL the underground-facility analysis.)
3. Formulating the source term(s) to be used in the performance assessment of the overall system (SNL with portion of this term to be based on the detailed LLNL waste-package model.)

Development and Certification of Computer Codes

Final documentation of the SNL version of TRACR3D will include TRACR3D results for the INTRACOIN benchmarking problems. A complete run of TRACR3D for one of the INTRACOIN transport problems was done. The results improved slightly from earlier calculations because of changes to input variables. Correction of several input values will be done before another run is attempted because of the large amount of CRAY time required for a full run of this problem.

A meeting was held to discuss the current status and priorities of work to support code development, verification, and validation. Highest priority will be given to (1) the solution of the COVE2 benchmarking problems, (2) the simulation of one-dimensional infiltration and transport through layers of tuff corresponding to the stratigraphy at USW G-4 at Yucca Mountain, and (3) COVE3 simulation of water, air, vapor, and heat transport in a 40- by 16-m vertical cross section surrounding waste emplaced in densely welded Topopah Spring tuff. Code development work on FEMTRAN will include the addition of subroutines to account for retardation in fractures and for saturation dependence of the linear equilibrium-retardation factor in the rock matrix. These changes are needed to account for the reduced wetted-surface area in the pores, which reduces the surfaces across which sorption, ion exchange, and diffusion can occur.

Some type of development is necessary to incorporate NORIA's time-integration and higher-order solution procedures into the standard SAGUARO code, if SAGUARO is to be used for analysis of Yucca Mountain under flux conditions that promote fracture flow. The more sophisticated modeling techniques have been shown to be necessary to converge to the steady-state solution on the one-dimensional infiltration problem.

A DOE/NRC symposium, "Symposium on Groundwater Flow and Transport Modeling for Performance Assessment of Deep Geologic Disposal of Radioactive Waste--A Critical Evaluation of the State of the Art," was held in Albuquerque, NM on May 20-21, 1985. The symposium was held to take advantage of the international group assembled for the HYDROCOIN workshop. NNWSI Project technical presentations included (1) "CHAMP--A Computer Code for Modeling Transient Fluid Flow and Chemical Transport with Hydrodynamic Dispersion in Variably Saturated Systems" (SAND85-7105A), (2) "Fluid Flow in Fractured Rock Masses" (SAND85-0855C), (3) "The Effect of Percolation Rate on Water Travel Time in Deep, Partially Saturated Zones" (SAND85-0854), (4) "Sensitivity of Calculated Hydrological Flows Through Multi-layered Hard Rock to Computational Solution Procedures" (SAND85-0773A), and (5) "Benchmarking NNWSI Flow and Transport Codes: Current Results and Activities" (SAND85-0883A). These presentations described results of current modeling activities for NNWSI Project performance assessment. The papers will be published in the symposium proceedings.

The users manual for the code PETROS, entitled "PETROS--A Program for Calculating Transport of Heat, Water, Water Vapor, and Air Through a Porous Material" (SAND84-0878), was published. This code is a simple, one-dimensional, finite-difference solution to the equations for transport of water, vapor, air, and heat, and is used for scoping calculations for performance assessment.

The paper entitled "NORIA: A Finite Element Computer Program for Analyzing Water, Vapor, Air, and Energy Transport in Porous Media" (SAND84-2057) was sent to for policy review (Milestone N114). NORIA is a two-dimensional, finite-element solution to the same equations solved by PETROS. NORIA uses state-of-the-art numerical techniques that have proven necessary to obtain convergent solutions to some of the infiltration analyses of Yucca Mountain.

Radionuclide Releases from Total System

The hydrodynamics of the Total System Performance Assessment Code (TOSPAC) are being tested on a set of Yucca Mountain-type problems. One problem involves an increase in steady percolation flux from 0.5 mm/yr, a flux producing predominantly matrix flow through the mountain to 1.0 mm/yr, and a flux producing predominantly fracture flow. The computing time for the problem is about 10 hours on the VAX system; this time is obviously inconsistent with the notions that TOSPAC should be an interactive code or that TOSPAC can be used directly for statistical-uncertainty studies. A new solution technique that may smooth instabilities and reduce computation time is being considered.

PLANNED WORK

In early June 1985 a schedule will be developed for preparation of the NNWSI Project SEMP and the present completion date (August 8, 1985) will be revised. The NNWSI Project will also participate in a June 18-19 OGR workshop for final discussion of the OGR SEMP before it is baselined in July 1985.

The informal PAP management plan, annotated Volume I outline, and writing instructions will be sent to authors on June 3, 1985. Preparation of the NNWSI Project PAP according to the annotated outline will continue with final input due at SNL on September 20, 1985. The final draft will be submitted to WMPO for review on November 21, 1985.

Appropriate hardware/software will be procured to use the LANL Estimating System, build an NNWSI Project-specific cost data base, and permit communication with the FAST models and DOE/CES network. Since the LANL Estimating System cannot be operational at SNL for several months, the short-term cost reports will be similar to the Two-stage Repository Report with SNL/LATA collaborating.

The Monitored Retrievable Storage report cost estimate will be produced by BNI and reviewed by SNL/LATA in July 1985.

Work during June and July 1985 will focus on continued modeling of the movement of fluids through the Yucca Mountain site, based on the studies of the unsaturated and saturated zones. The saturated-zone study will include the use of a statistical technique (kriging) on the potential in the general region in order to provide a comparison with the previously derived potentiometric surface.

The near-field hydrology problem (COVE3) meeting will be held at LBL on June 14, 1985. The coordination of the efforts to complete the problem will be continued.

The initial draft of the portions of Section 8.3.5 of the SCP that are related to the radionuclide-source-term task will be completed. These include all of Issue 1.12 and the underground-facility parts of Issue 1.14. The drafting of the inputs to the PAP that are related to this task will begin. If conflicting priorities permit, the analysis to determine the EBS and disturbed-zone boundaries (Milestone M107) will be started.

A camera-ready copy of the report entitled "Benchmarking NNWSI Flow and Transport Codes: COVE1 Results" (SAND84-0996) was prepared. The report will be printed in early June 1985.

Work on the first volume of the TOSPAC report (Milestone M102) will be emphasized in June 1985, along with work towards completion of a rough draft report on "Preliminary Selection of Scenarios Involving Disruptive Events and Processes" (SAND85-0010), which will satisfy Milestone M104.

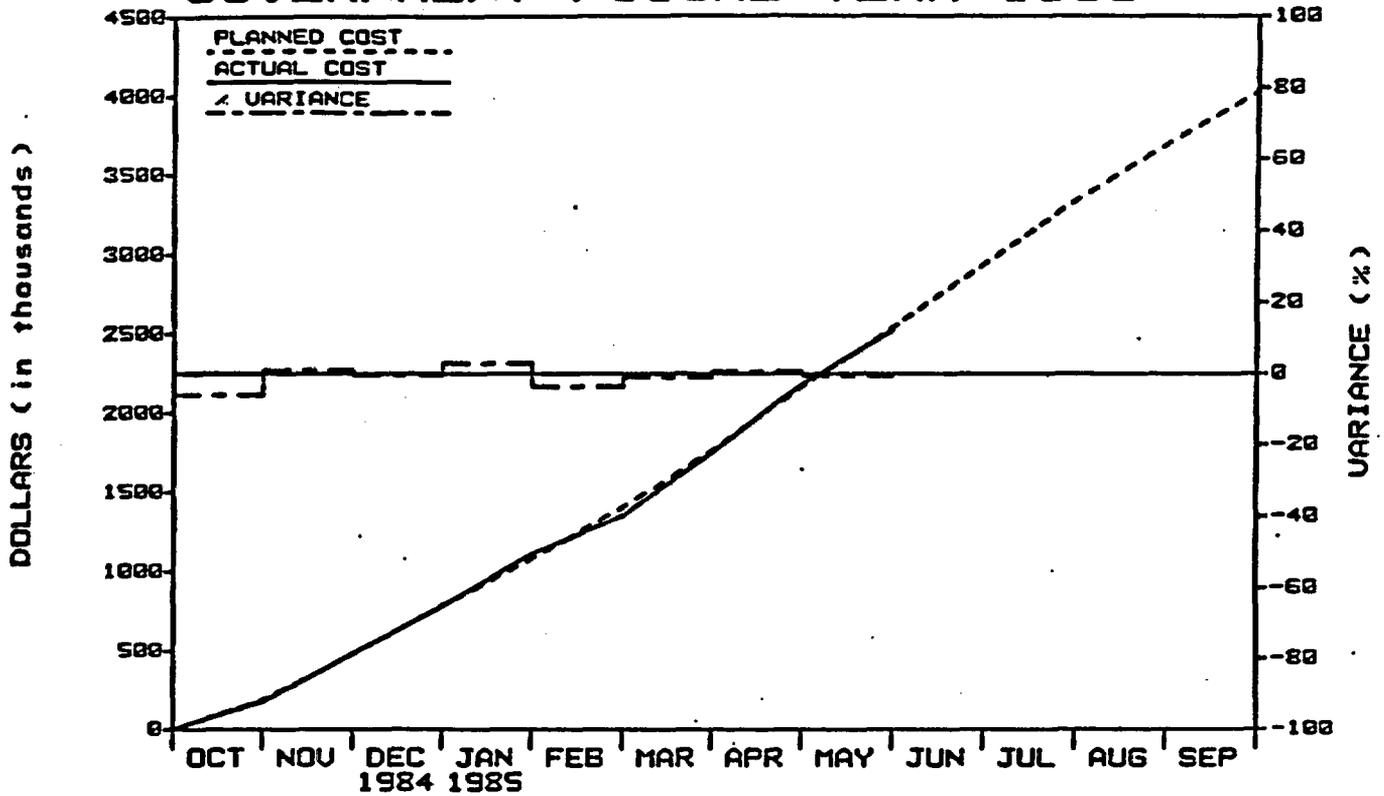
PROBLEM AREAS

OGR has announced an intention to require a common outline for PAPs prepared by the three projects. No further guidance has been received from OGR. If a common outline is required and it differs significantly from the NNWSI Project outline, the schedule for the NNWSI Project PAP could be affected. NNWSI Project writers are currently proceeding with their own outline.

System Description revision continued during May 1985, with emphasis on eliminating inapplicable requirements and redundancies, improving general readability, and improving consistency with the OGR source document entitled "Generic Requirements for a Mined Geologic Disposal System." Because of delays associated with Project Systems Engineering commitments, submission of the revised System Description to SNL management for review will likely be delayed. Planning in early June 1985 will establish a revised schedule for the System Description, and a date-change request for Milestone M120 will be submitted to the Change Control Board.

The priority commitment of the staff assigned to this task to the preparation of the SCP, PAP, and System Description documents will probably influence the depth of the analyses used to determine the EBS and disturbed-zone boundaries (M107).

WBS X.2.1 SYSTEMS GOVERNMENT FISCAL YEAR 1985



PLAN (x1000)	185	477	785	1078	1401	1761	2164	2540	2941	3335	3690	4024
COST (x1000)	174	482	781	1108	1349	1741	2179	2522	0	0	0	0
VARIANCE (x1000)	11	-5	5	-30	52	20	-15	18	0	0	0	0
% VARIANCE	-6	1	-1	3	-4	-1	1	-1	0	0	0	0

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
M120	SNL	12.1	YM Mined Geologic Disposal System Description (System Requirements)													△
M108	SNL	12.1	System Engineering Management Plan													△
M113	SNL	12.1	Performance Assessment Plan													△

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

X.2.2 WASTE PACKAGE

OBJECTIVE

The primary objective of this task is to develop a technical basis and engineering capability to design, test, and fabricate a waste package that is compatible with the hydrological conditions and geochemical environment in the unsaturated zone beneath Yucca Mountain.

ACTIVITIES

Waste Package Environment

Scanning electron microscope/electron microprobe analyses continued of primary phase post-test and secondary minerals resulting from hydrothermal interaction from the two long-term (303 day) core wafer tests (DB12 and DB13). Following analysis of phenocrysts present on the samples, an attempt will be made to remove the zeolite crystals produced in DB13 from the surface of the wafer for x-ray diffraction identification and determination of cell constants and to prepare a grain mount for quantitative analyses using the electron microprobe.

Sample characterization continued on three Topopah Spring vitric tuff samples. These samples are to be used in hydrothermal interaction tests run in the Dickson-type gold-bag rocking autoclaves to investigate the hydrothermal stability of vitric tuff from the Topopah Spring and underlying units. This cooperative research effort between LLNL and LANL will complement previous field studies to evaluate the susceptibility of vitrophyre to thermal alteration by emplacement of high-level waste in Yucca Mountain.

The first two short-term tests in the Dickson bombs were started and one of them was terminated normally. The other was terminated prematurely in April due to the effects of a laboratory-wide power failure and accompanying voltage surge. This test was restarted this month and now is running normally. The conditions for these tests are:

DB20 - G-4 1362' core wafer, J-13 water, 150 °C, plan 64 day, terminated normally at day 64.

DB21R - GU-3 1226' core wafer, J-13 water, 150 °C, plan 64 day, terminated normally at day 32.

The report entitled "Field Investigation of Keyblock Stability" was published. This report develops techniques to assess the behavior of underground openings where the stability of the opening is controlled by rock mass structure such as jointing. The stability of excavations such as emplacement holes is important for waste package integrity and retrieval, and can also be important during construction. A paper describing some general aspects of this work is being prepared for the Proceedings of the 34th Geomechanics Colloquy, which is organized by the Austrian Society for Geomechanics.

Permeability of the large Topopah Spring tuff sample has been measured periodically at 95 °C and 50 bars confining pressure. At about 5 bars pore pressure, permeability reached the 1.0 to 0.2 microdarcy range and appeared to be stable in that range for approximately one month. Variations in measured permeability values probably are due to experimental uncertainties and the inability to exactly duplicate the same pressure gradient on the sample for each measurement. At 25 bars pore pressure, permeability was measured between 2.0 to 10 microdarcies during the month. This sample has now been under study for 5-1/2 months.

The C-ring test apparatus is scheduled for installation in the hot cell in June. The hot water bath has been brought up to the 90 °C test temperature by introducing auxiliary heating. However, excessive water loss due to evaporation is being experienced. Alternatives for reducing the water loss to acceptable levels are being investigated. Thirty-four precision micrometer-measured C-ring specimens are ready for testing.

H. B. Robinson spent-fuel rods are being sectioned for the electrochemical corrosion experiment in deionized water at 170 °C. Each section will be closed on each end with Zircaloy-4 plugs. The plugs will be machined to fit the end of the section which will be reamed or swaged to a known diameter. The procedure used will depend on the amount of fuel-rod ovality observed after the rods are sectioned. Bench top dry runs with the Fluitron autoclaves are underway.

The 12-month electrochemical corrosion scoping test is presently running smoothly at 90 °C. The pH measured early in the month was 8.99 and later in May it was 8.70. This is typical of the pH variation observed previously.

A thermo-gravimetric analysis (TGA) test at 140 °C in air with a 14.5 °C dew point was stopped after 2170 hr as scheduled. The sample (initial weight of 197.94 mg) had gained 0.16 mg, which was approximately a factor of four less than expected based on the extrapolation of higher temperature data. The fragment was crushed and a ceramographic examination showed nothing unusual. The remainder of the crushed sample (184.18 mg) was run for an additional 306 hr with a weight gain of 0.12 mg observed. The rate of weight gain for the crushed fuel was approximately six times greater than for the single fragment. This is in contrast to the 225 °C run where there was no enhancement of the oxidation rate by crushing.

A detailed review of the Monticello rods at BCL was completed. The recommendation being transmitted to LLNL is not to acquire these rods due to rod variability and to have the MCC investigate companion rods at the reactor for possible acquisition.

It will be necessary to adapt the Unsaturated Test for use with spent fuel. Because of the unique and nonhomogeneous nature of spent fuel and the documented difficulty in simulating spent fuel, only tests on actual spent fuel can be used to provide a realistic reaction process. Since tests done with actual spent fuel need to be well documented in advance, it is necessary to demonstrate the utility of the Unsaturated Test method on non-irradiated fuel in order to anticipate any problems that may exist. This effort has two objectives: (1) to determine, using non-irradiated fuel and the prescribed Unsaturated Test flow conditions, whether a measurable amount of uranium is

released into solution and (2) to demonstrate whether a reaction between fuel and water can be monitored under conditions more applicable to spent fuel and anticipated repository conditions.

To address the first issue, two tests have been completed using pressed and sintered UO_2 pellets. One pellet (1.0 cm height x 1.0 cm dia) and one-half pellet (0.5 cm height) were stacked to simulate the waste form and were held in place using the same perforated end caps as used in the Unsaturated Test. These tests indicated that there was ample uranium released from the UO_2 pellets to be analyzed. To assess the second issue, a series of tests have been planned using three different configurations. In each test the UO_2 will be contained in Zircaloy tubing. The different configurations include (1) two full-size pellets, (2) 20 pellet slices of 1 mm thickness, and (3) crushed UO_2 (to give a solution area increase of approximately 80 times over test #2) enclosed by two 1 mm thick slices.

The parametric testing of ATM-12 (300-year aged) glass began. Four series of tests using deionized water, J-13 water, J-13 water plus tuff, and J-13 water plus tuff and stainless steel will run from 7 days to 182 days. Samples from the 7-, 14-, and 28-day reaction times are already being analyzed.

A brief seven-day test was conducted using crushed ATM-1c glass. This test was designed to investigate the leaching effect of J-13 water containing varying amounts of silicon. Three types of J-13 water were obtained by diluting a batch of 21-day equilibrated J-13 with deionized water in such a manner as for each type to contain 13, 26, and 52 ppm silicon, respectively. The solution area to volume ratio was 0.5 cm^{-1} .

A preliminary assessment of the spatial distribution of thorium and uranium within the Topopah Spring tuff has been made using the Cameca IMS-3F ion microscope. Measurements such as these will serve as a baseline to which tuff samples from actinide-doped-rock-water-interaction studies can be compared. To date measurements have been made for devitrified matrix material, vein quartz, and a plagioclase phenocryst from a sample previously characterized by scanning electron microscope techniques. The ion yields for Th-232 and U-238 have been determined relative to Si-28 and compared with Th-232/Si-28 and U-238/Si-28 ratios measured in NBS standard glass (SRM 614), which contains (nominally) 1 ppm Th and U. The results gave matrix concentrations of 1.9 to 2.4 ppm U and 10.2 to 10.8 ppm Th. These values are in good agreement with those measured by neutron activation analysis for bulk samples of Topopah Spring tuff.

The report entitled "Zircaloy Cladding Corrosion Degradation in a Tuff Repository - Initial Experimental Plan" was sent to WMPO on May 20, 1985.

Metals Barriers Testing

Literature review and chemical theory were applied to make a preliminary projection of the effects of gamma radiation on the chemistry of the fluid media expected to be present in a tuff repository. Two cases were considered: a single-phase air-steam system above the boiling point and a two-phase moist air-groundwater system below the boiling point. Particular attention was paid to the formation and behavior of hydrogen peroxide, nitrogenous species, nitric and nitrous acids, and carboxylic acids (formic and oxalic). Some insight was

obtained from analyses of solutions from past waste-form- dissolution and metal-corrosion experiments performed under irradiation within the Waste Package Task. Considerable work remains to be done to develop a clear understanding of the radiation chemistry of these systems and its effects on corrosion and waste- form dissolution, but this preliminary work provides guidance for analyzing experimental results.

Long-term gamma radiation-corrosion testing of copper alloys involves the testing of CDA 102, CDA 613, and CDA 715 in gamma-irradiated environments. In May the samples were loaded into the test chambers and the systems were checked. Initial testing began; however, the tests were terminated after one week when a pressure drop was noted. The suspected cause of failure was stress-corrosion cracking of a 304L pressure release valve. The samples are being repolished and testing is expected to be re-initiated during the first week in June.

The electrochemistry of copper and its alloys has been examined in J-13 water and 100x concentrated J-13 water at 23, 55, and 80 °C. Anodic polarization curves have been run in order to determine the corrosion potentials (E_{corr}), pitting potentials (E_{pit}), protection potentials (E_{prot}), passive current densities (i_{pass}), and the electrochemical corrosion rates. Duplicate experiments were run for each alloy in each environment. A third experiment is being performed in each case to generate more statistically significant results. A detailed analysis of the electrochemical data will be made after the final data set is collected. However, the following general trends are noted in the data obtained so far:

1. The values of E_{corr} for the alloys are generally more negative in 100x concentrated J-13 than in plain (unconcentrated) J-13 water.
2. For all the alloys, at all of the test temperatures, the value of E_{pit} is more positive with 100x concentrated J-13 than with unconcentrated J-13.
3. The general trend is for the passive current values to be higher with 100x concentrated J-13 than with unconcentrated J-13 water.
4. Generally, the alloys have a higher corrosion rate in 100x concentrated J-13 than in the unconcentrated J-13 water.

In comparison to the corrosion rates measured by weight loss in 80 °C J-13 after 3300 hr of test, the electrochemically-determined rates at the same temperature for CDA 102, CDA 613, and CDA 715 are higher. The enhanced values for the electrochemical experiments (ranging from a factor of 2 for CDA 102 to 38 for CDA 715) are in line with previous results for stainless steels.

Stress-corrosion test specimens have been prepared from the sound area of an upset resistance welded lid from Savannah River Laboratory. Initially only one sample was introduced into a J-13 water medium. This sample was stressed to 50 percent of yield strength and was checked daily. This sample was stressed again to 75 percent of yield and, as of April 1, 1985, had 3688 hr of stress time. Two more samples were added on January 2, 1985; these were stressed to 75 percent of psi yield strength and have 4024 hr as of June 1, 1985. To date, no specimens have exhibited crack initiation.

The stress-corrosion-cracking tests continued to add exposure time in the J-13 water and steam environments with no sign of failure. These tests involve four of the austenitic stainless steels, 304, 304L, 316L, and 321. The specimens have been thermomechanically processed to produce a variety of microstructures which could conceivably occur during repository life. No cracks were observed in the most recent examination (May 20, 1985). This examination was the most complete since the tests were started; each specimen was examined individually under a low-powered microscope after removing any oxide film which may have built up.

The report entitled "Metallurgical Analysis of a 304L Stainless Steel Canister from the Spent Fuel Test-Climax" was completed and forwarded to WMPO for review.

Design, Fabrication, and Prototype Testing

The FY 85 Development Plan for weld/NDE part fabrication at the E-MAD facility is in preparation. A set of shop drawings for PWR and BWR waste-package prototype designs has been prepared by SNL for the purpose of obtaining a detailed cost estimate for fabrication.

An investigation of the effects of uncertainties in spent-fuel thermal-conductivity data on peak spent-fuel temperature calculations has been completed.

The three-dimensional computer model of a fully-loaded horizontally-oriented container dropped 7 ft on a mild steel square tube (4 in x 1/4 in wall) previously done using NIKE3D will be analyzed using the code DYNA3D. The principal advantage of using DYNA3D is that plastic strains at the shell surface may be obtained directly.

The newest version of DYNA3D with a modified shell formulation was used to establish a reasonable correlation between brick and shell elements (as was done previously for NIKE3D). Verification work performed on the brick and shell test models calculated a very close correlation between the shell model and the brick model at three different points. Thus, the DYNA3D shell will be used for subsequent analyses.

QA requirements for the Package Design Subtask have been defined and work has begun on implementation of the design input QA procedure. This will begin with QA level determination of inputs for the thermal, structural, and design analyses.

The report entitled "Waste Package Advanced Conceptual Design Criteria" was sent to WMPO on May 31, 1985.

Performance Assessment

In support of the Waste Package Performance Assessment Subtask, work is in progress (1) to document the status and plans of this subtask for inclusion in the NNWSI Project SCP, (2) to develop and verify a one-dimensional waste package system model, and (3) to model the hydrothermal boundary conditions at the waste package/host rock interface.

Draft documentation describing the NNWSI Project Waste Package System Model and its status has been completed for inclusion in Section 7.4 of the NNWSI Project SCP. This material was included in the draft of Chapter 7 (Waste Package) that was delivered to SAIC on May 29. A description of plans for further model development is in preparation for Section 8.3.4 of the SCP and for the NNWSI Project Performance Assessment Plan.

Work continued to develop specifications and designs for the NNWSI Project Waste Package System Model. Efforts focused on a description of the logic and equations being developed for the system driver module. Data flow diagrams and a data dictionary are being developed to specify the required data flows into and out of the program and between the submodels. The NNWSI Project Waste Package System Model has process models linked together by a systems model called the Driver. The process models, in the order that they are applied, are (1) radiation model, (2) thermal model, (3) mechanical model, (4) fluid-flow model, (5) corrosion model, (6) waste-form release model, and (7) waste transport model (within the waste package subsystem).

With some modifications, the first three models can be adapted from the program WAPPA, which was written for a waste package emplaced below the water table. Similarly, the WAPPA program approach of conditions checking and table lookups will be adaptable, but specific mechanisms and data bases associated with barrier corrosion and waste-form release rates must be representative of Yucca Mountain emplacement conditions. Finally, the fluid flow and waste transport modules will be substantially different in the NNWSI Project Waste Package System Model than in WAPPA due to the anticipated low flux of groundwater which is available to contact the waste package. This condition necessitates extensive model development, but may allow some conservative simplification of the process models at the system model level.

Modifications to WAFE continued for modeling the waste package environment (currently concentrated on the comparison problem between WAFE, NORIA, and TOUGH). Much of the program modification is underway at LANL and should be complete in June. The WAFE code is also being set up to simulate the heated core experiment performed by LLNL.

Other hydrologic modeling efforts this month concentrated on the implementation of the PETROS thermal unsaturated flow model developed by SNL. The model was converted to the MFECC Cray system and a test problem was run. Results were comparable to those supplied by SNL. Very small differences in some results are attributed to different word lengths between 7600 and Cray computers. The program is currently being used to cross-check WAFE for the steady state comparison problem.

PLANNED WORK

The report on rocking autoclave studies using crushed Topopah Spring tuff and J-13 water has completed final technical review and is scheduled for delivery to WMPO in early June.

The second series of spent-fuel leaching/dissolution tests using H. B. Robinson and Turkey Point fuel is being extended into October 1985. These tests were initially scheduled to terminate in June to allow a new test series at 70 °C to start in July. Design of the test vessels for the higher temperature tests has progressed more slowly than expected and it now seems that these tests cannot start until early FY 86. Costs for the series 2 tests have exceeded the original estimates because more analytical work is being done on each solution sample. Continuation of the tests with periodic sampling will generate a more manageable number of samples and can be done within the existing budget. Continuation also will provide additional fuel-water contact time, which improves the ability to determine whether steady state solution concentrations have been achieved. The rescheduling of test termination will require some milestone rescheduling.

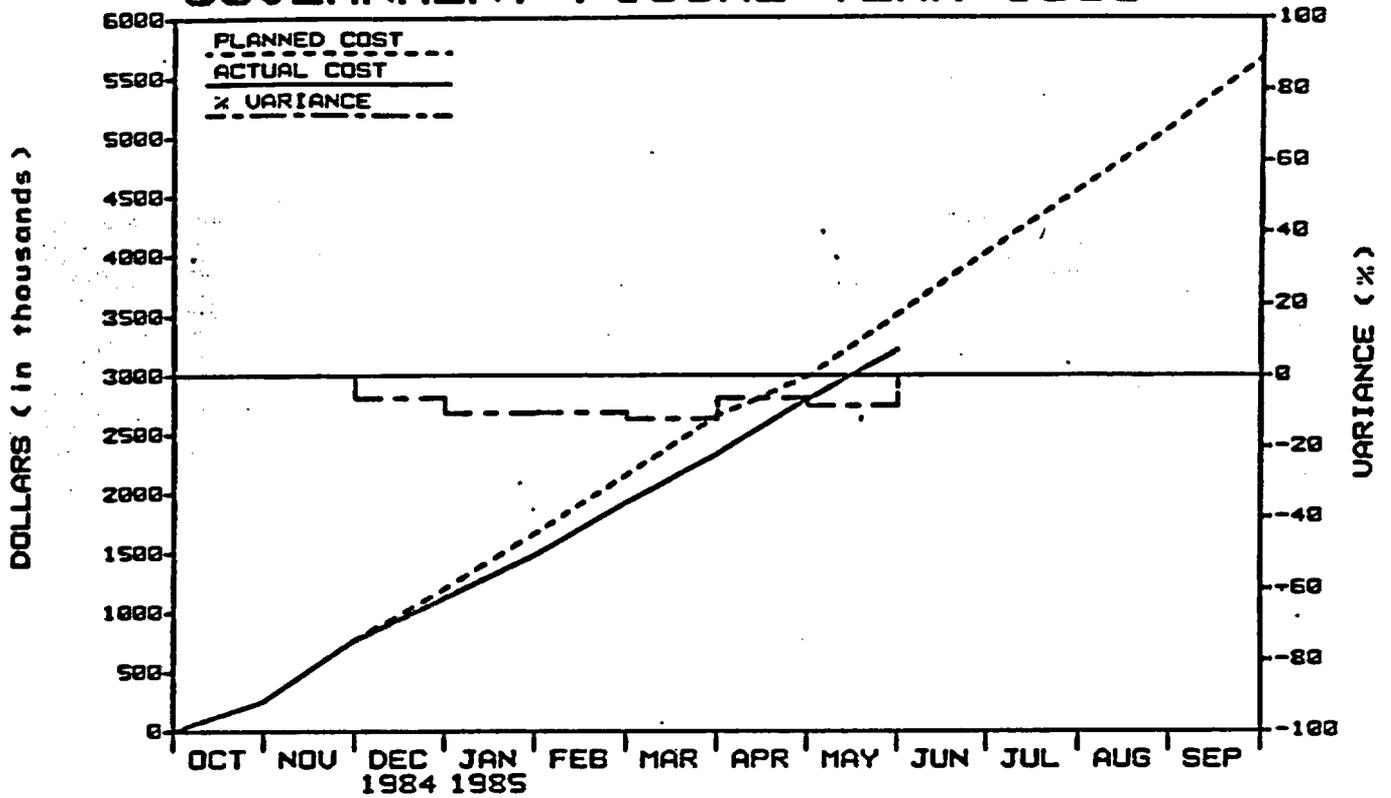
In the tests to determine the general corrosion rates and localized corrosion tendencies of copper based alloys CDA 102, CDA 613, and CDA 715, three coupons of each alloy are being exposed to 150 °C steam generated from deionized water. The 3000-hr evaluation of this activity is set for June 10, 1985.

PROBLEM AREAS

The MCC glass fabrication report was reviewed. A number of inconsistencies, both within the single document and between it and other information sent by letter on previous occasions, were identified. The information also seems to be incomplete in several respects. A formal review will be sent to the MCC in June together with a request for revision and publication in referenceable form.

The subcontract work at PNL on slow-strain-rate tests has been delayed for a few weeks due to a faulty speed controller in the motor which drives the load train. Slow-strain-rate tests in 95 °C J-13 water began in April. Specimens of types 304 and 316 stainless steel, given a variety of sensitization heat treatments, were tested at a strain rate of 1×10^{-6} /s. This strain rate did not produce a discernible difference in yield and ultimate strengths between heavily sensitized and lightly sensitized material. For this reason, the strain rate will be changed to allow the microstructural features (e.g., chromium carbides along grain boundaries) to manifest themselves as potential sources of material properties degradation.

WBS X.2.2 WASTE PACKAGE GOVERNMENT FISCAL YEAR 1985



PLAN (x1000)	252	771	1200	1657	2152	2657	2988	3511	4033	4554	5077	5662
COST (x1000)	252	769	1124	1480	1926	2333	2799	3216	0	0	0	0
VARIANCE (x1000)	0	2	76	177	226	324	189	295	0	0	0	0
% VARIANCE	0	0	-6	-11	-11	-12	-6	-8	0	0	0	0

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
M250	LLNL	12.2	Establish Interim Product Specifications	[Gantt bar from Oct to Aug]											
M222	LLNL	12.2	Input to DOE/HQ Rpt. to Congress on Copper for WP	[Gantt bar from Oct to Sep]											
M251	LLNL	12.2	Pre-closure Analysis of selected Conceptual Designs	[Gantt bar from Oct to Nov]											
M231	LLNL	12.2	Complete WP Conceptual Design Criteria	[Gantt bar from Oct to Sep]											
M233	LLNL	12.2	Initiate WP Advanced Conceptual Design	[Gantt bar from Oct to Sep]											

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

X.2.3 SITE

OBJECTIVE

The objective of this task is to determine whether Yucca Mountain is a suitable location for a high-level waste repository. The effort is divided into two areas of study. The first is understanding the characteristics of the rock mass that lies below the surface of Yucca Mountain. This encompasses the geology (structure and stratigraphy), hydrology (both saturated and unsaturated zone), geochemistry (chemical reactions that can be expected when waste is emplaced), and mineralogy and petrology (the study of the materials that will control the isolation and engineering characteristics of the rock). The second is understanding the processes and events that could occur in the area surrounding Yucca Mountain that could serve as potential disruptive forces. These efforts include the study of tectonics, seismicity, and volcanism, and the regional hydrologic, paleohydrologic, and paleoclimatologic systems.

ACTIVITIES

Geologic Investigations

Existing fracture maps of washed pavement surfaces were revised and photobases were prepared for mapping fractures exposed on natural pavements. Fracture data from the Topopah Spring Member core from borehole USW G-4 was plotted for analysis, as well as fracture data from washed pavements. Four sites were prepared for future washed pavements in the Yucca Mountain area.

Work continued on the compilation of the 2-meter contour topographic maps at the NTS. Six maps, three at 2-meter contour intervals and three with 1-meter supplemental contours were completed.

Geophysical Investigations

The Beatty and NTS 1:100,000-scale isostatic gravity maps were completed. Three other 1:100,000-scale maps (Indian Springs, Pahrangat Range, and Pahute Mesa) are being compiled.

High-precision gravity measurements at the NTS are being reduced and preparation began for additional high-precision gravity field work at Yucca Mountain and vicinity.

Seismic Investigations

About two-thirds of the preliminary digitization and plotting of the long-line seismic refraction data in the site area has been completed. This includes a N-S line along Fortymile Wash, a parallel line in Crater Flat, an E-W line across Bare Mountain and Yucca Mountain, and a parallel line across the Amargosa Desert just south of Highway 95. Data quality is very good; interpretation is scheduled to begin in mid-summer.

Rock Properties

Measurements of water permeability on core samples obtained from the Yucca Mountain USW G-4 and USW GU-3/G-3 boreholes are in progress. One-inch cores have been extracted from the original samples to determine flow rates in the vertical and horizontal directions. To date sufficient data have been collected to adequately present permeability values for the entire section penetrated by each borehole. For those intervals where dual measurements have been made small differences in permeability exist but no pattern has been defined on which to base a conclusion as to a preferential flow path within the individual stratigraphic units. Permeability values range from 0 to 10 micro-darcies for the densely welded tuff. The permeability of partially to moderately welded tuff is typically in the 100 micro-darcy range.

Distilled water has been used in the permeability determinations so as not to contaminate the samples with water that is chemically incompatible with water from the Yucca Mountain site. Permeabilities have been observed to decrease as a function of time; in some cases the rock becomes totally impermeable. The possibility exists that the reactive nature of distilled or "conductivity water" has produced particle development within the pore water of sufficient diameter to partially or totally block fluid migration through the interstitial pore spaces of the rock. To test this hypothesis, a liquid chromatograph will be used to analyze the ion content of the water before and after passage through the sample. Water from the J-13 well on the NTS will also be used to further evaluate the effect water quality has on the permeability of the rock.

Seismicity and Strain

A new study of seismic attenuation rates at the NTS and throughout the proposed repository area, intended for Journal of Geophysical Research publication, has been submitted to WMPO for review and approval. An open-file Historical Data Catalog of the seismicity is being prepared which will be the most complete ever assembled for the region. The catalog will be annotated and will specifically reference all data for each event.

A draft manuscript for USGS open-file release entitled "Report on Televiewer Log and Stress Measurement in Holes USW G-3 and UE-25p#1, Yucca Mountain, Nevada Test Site" was submitted to WMPO on May 21, 1985 for review and approval.

Ground-Water Flow Analysis

A paper was presented at the American Geophysical Union during the last week in May on a "Parameter Estimation Routine for the Analysis of Single-Well Tracer Tests."

An abstract on injection tests at the c-hole complex was submitted for the Geological Society of America conference in Orlando, FL the last week of October; the paper is entitled "Interpretation of Falling-Head Injection Test Data for Fractured Volcanic Tuffs, Yucca Mountain, Nevada Test Site."

The Franklin Lake neutron logs were subjected to preliminary analysis, for moisture flux rates and the Franklin Lake temperature logs were analyzed for groundwater flux rates. Water-table altitudes at the lake have been tabulated and gradients at piezometer nests calculated.

Talks were given in Minneapolis (2), St. Paul, Baltimore, and Reston on results from models of groundwater flow at Yucca Mountain and vicinity. The talks were very well received.

A manuscript entitled "A Program to Calculate Aquifer Transmissivity from Specific-Capacity Data for Programmable Calculators" has been accepted for publication in the Computer Notes section of the September-October issue of the Journal of Ground Water.

Unsaturated-Zone Hydrology

Approximately 2 ml of water was obtained from a 2-in-diameter core of nonwelded tuff from the unsaturated zone at Yucca Mountain. This represents the first water sample collected from the unsaturated zone at the NTS.

Future Hydrologic Conditions

During the week of May 13-17, trenches were excavated near the centers of Yucca and Frenchman lakes to evaluate the potential of these playas for paleolimnological and paleoclimatic research relevant to needs of the NNWSI Project. Because the Kawich Playa record, which appears to represent a late Pleistocene-Holocene environmental transition, occurred in the upper 4 m of playa deposits, it was decided that a similar investigation of Frenchman and Yucca playas would be most efficiently accomplished by a trenching operation that exposed the central playa section to a depth of 4 to 5 m. Accordingly, two 30-m long by 15-m wide trenches with paired, stepped walls along the long dimension were excavated near the centers of Yucca and Frenchman playas. The stepped walls descended in 4-ft benches to a depth of 16 ft (4.9 m). At Yucca Playa additional samples were taken below the trench floor with a bucket soil auger to a depth of 5.9 m. Augering below this depth was not feasible because the dry sediment could not be retained in the auger.

The sedimentary record of both trenches was inspected for characteristic marsh and (or) lacustrine sediments. No sediments of obvious lacustrine or marsh origin were encountered. It is probable that the Yucca and Frenchman playa sections, to a depth of about 5 m, represent seasonally dry playa environments that are basically similar to those of today. The sedimentary records of both Yucca and Frenchman playas and probably of other playas in southern Nevada contain paleoenvironmental information that will be useful and perhaps critical to the paleohydrology and paleoclimatology at the NTS. Representative samples have been taken from Yucca and Frenchman playas. These will be analyzed for microfossils, but the material does not appear promising. Samples for paleomagnetic study have been taken from the trench floor and may provide some chronological information. Both the Yucca and Frenchman trenches should be studied and described by a sedimentologist and a soil scientist. The study would determine the types and numbers of analyses appropriate for the material and the potential the sections have for paleoenvironment interpretation. The trenches can presumably be left open for several months, although NTSO requires

that they be backfilled prior to upcoming activities planned on the playa floors -- perhaps next year. It will be requested that the trenches be left open through October 1985.

Groundwater Chemistry

The second experiment began on the filtration of particulates from Well J-13. This experiment duplicates the first experiment, except for a smaller size and range of extracted particulates. First experiment preliminary results indicated that the particulates are largely compressed silicon, calcium, and iron, and that the ratio of particulates 10 to 0.4 micrometers versus 0.4 micrometers to 5 nanometers is approximately 100 to 1.

Natural Isotope Chemistry

Two samples from the Exploratory Shaft (ES) site trench were analyzed for chlorine-36 isotopic content at the University of Rochester tandem accelerator. The purpose was to ascertain the recharge at the site during the past 30 years by the determination of chlorine-36 infiltration from global fallout after certain high-yield above-ground nuclear weapon tests. The final values from these two new measurements are being calculated.

The calculated integrated bomb pulse of the YW-6 trench was 9.72×10^{12} atoms of chlorine-36 per square meter. The calculated bomb pulse at the ES site was 0.37 percent of that at the Yucca Wash site, but this figure may change, pending results of the sample analyses. The final figure still should indicate significant washout at the ES site compared with Yucca Wash.

Hydrothermal Geochemistry

The analcime thermodynamic models completed in April indicate that silica activity is an important variable in controlling mineral stability (particularly that of zeolites) in Yucca Mountain. One of the major means of maintaining elevated silica activity is the interaction of water with metastable silica phases such as glass and cristobalite. Examination continued of the kinetics of transformation of these phases to the stable polymorph and quartz.

Sorption and Precipitation

LANL researchers presented a paper entitled "Effect of Groundwater Composition on the Sorptive Behavior of Radionuclides" at the American Chemical Society National Meeting in Miami Beach, April 28 - May 3.

Sorption measurements were performed on unheated clinoptilolite samples and samples that had been heated to 105 and 200 °C for 385 days. When complete the data will indicate whether clinoptilolite sorptive properties are greatly altered by such heat treatment.

Retardation Sensitivity Analysis

LANL personnel attended the spring American Geophysical Union meeting in Baltimore, Maryland, and presented an invited talk on the development and use of coupled hydrologic and geochemical codes.

Applied Diffusion

TRACR3D was used to calculate the effect of a vertical fracture near a diffusion experiment in Topopah Spring Member tuff. The fracture was assumed to be 5.15 cm from the center of the borehole containing the tracer solution. The calculations indicated water flow into the fracture at 12.6 hr. The simulation encountered problems with boundary conditions beginning at 1.3 days.

Geochemical Modeling Code EQ3/6

Significant revisions were made to the MCRT data-base management system. The random-access version of the MCRT data file now has variable block length, which has permitted a reduction in the size of the file and made it possible for the manager code to deal more effectively with changes to the references portion of the file.

The thermodynamic data-base files DATA0, DATA1, DATA2, and DATA3 were revised to include newer aluminum hydroxide species.

After testing the EQ3/6 package on both PRIME and Ridge systems, it was decided to order a Ridge 32C for the group. The Ridge has the UNIX operating system and is about three times faster for some of the calculations. It also does not need special air conditioning or power connections, which greatly simplifies installation. If, after several months of testing, the Ridge proves it will handle the code development maintenance and application efforts, the system will be expanded and connected to all of the group.

An analytical solution has been developed for the ideal case of the solid solution submodel. Two numerical approaches are being tested with non-ideal solution models.

Meteorological Monitoring Program

Dr. Vieth's comments on the Meteorological Monitoring Plan were received and revisions are being made. Monitoring activities were assigned quality levels and were transmitted to WMPO for approval. Purchase orders have been approved by WMPO. H&N has completed the monitoring station site construction and electrical drawings. SAIC and REECO have ordered all the equipment and some items have been received.

Socioeconomics Studies Program

Progress was made in developing alternative methods to investigate the social impacts of locating a repository at the Yucca Mountain site. Experts from throughout the United States were contacted to identify alternative methods so that the completed plan can include recent progress in the growing social impact analysis field. This report will be available for SAIC internal technical review in June.

PLANNED WORK

Drilling of RF-9 is expected to begin in mid-June 1985, somewhat later than had been predicted. Depending on the results of RF-9, deepening of hole RF-3 will be considered, in addition to the drilling of an intermediate hole (RF-10). This will provide a cross section across the presumed alluvial wedge east of Exile Hill. Seismic-velocity determinations and reflection feasibility studies will begin after completion of the borehole program.

The tracer tests for the UE-25c complex of holes are scheduled for the last week of June.

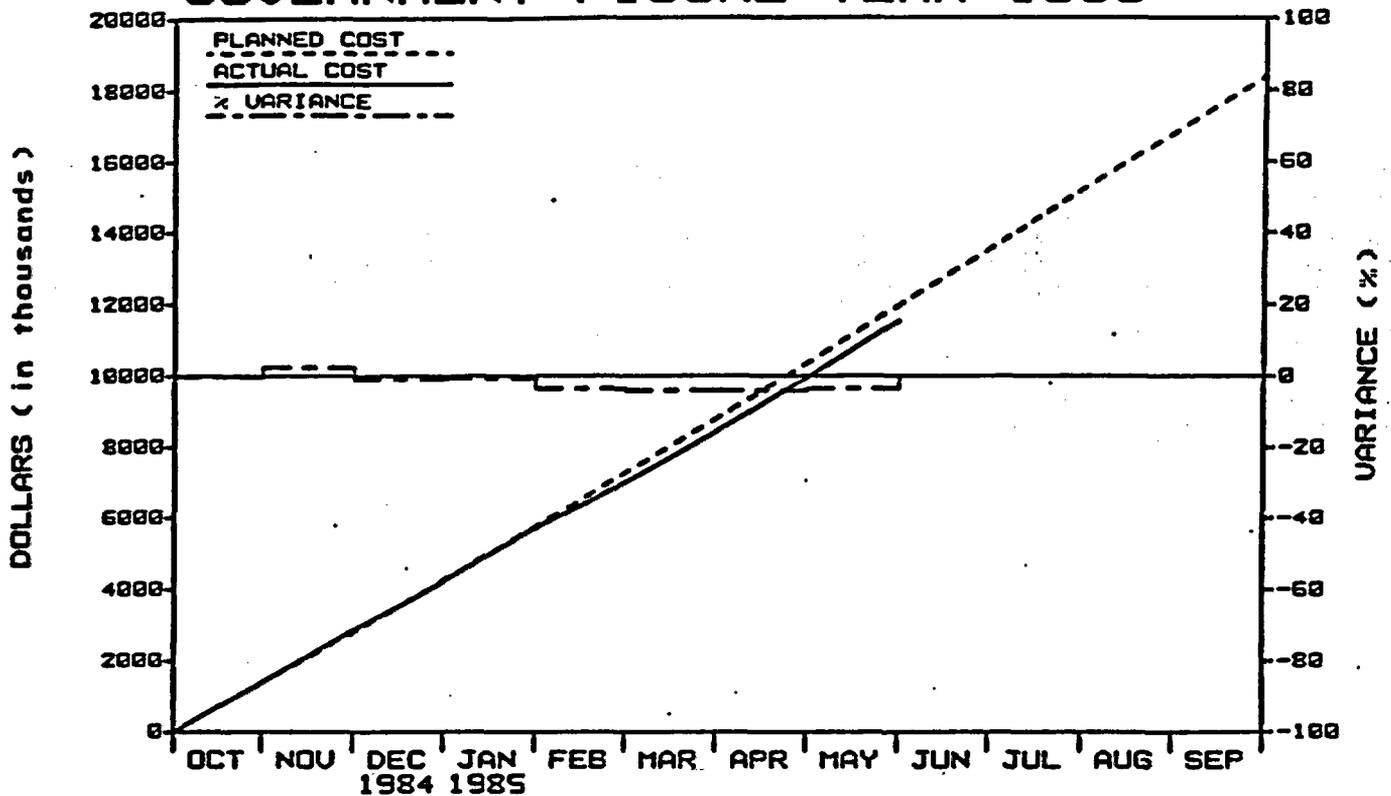
The report on the thermodynamics of albite will be prepared and modeling will continue of kinetic controls on the distribution of silica polymorphs in Yucca Mountain. A detailed feasibility study for using solubility measurements to determine thermodynamic properties for zeolites will be conducted.

The meteorological monitoring towers will be erected in June 1985. Equipment will be QA audited, calibrated, and installed in June and July and the monitoring system will be operational by August 1, 1985.

PROBLEM AREAS

Because of the late starting date of the RF-9 drilling, field geophysical observations have been delayed, crowding the schedule for timely completion of Milestone N448.

WBS X.2.3 SITE INVESTIGATIONS GOVERNMENT FISCAL YEAR 1985



PLAN (x1000)	1392	2797	4244	5733	7262	8795	10361	11968	13532	15185	16777	18378
COST (x1000)	1386	2861	4200	5685	6996	8423	9939	11526	0	0	0	0
VARIANCE (x1000)	6	-64	44	48	266	372	422	442	0	0	0	0
% VARIANCE	0	2	-1	-1	-4	-4	-4	-4	0	0	0	0

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
M354	LANL	12.3	Letter Rpt. on Groundwater Chemistry along Flow Path	◆	[Bar from Oct to Feb]											
M357	SNL	12.3	Weapons Test Seismic Rpt.	[Bar from Dec to May]							△					
M356	LANL	12.3	Complete Rpt. on Volcanic Hazards Analysis	[Bar from Oct to Nov]		◆										
M355	LANL	12.3	Progress Rpt. on 3-D Mineralogic Model of YM	◆	[Bar from Oct to Sep]											
M364	SAIC	12.3	Implementation of Meteorological Monitoring Plan	[Bar from Oct to Sep]											△	

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▲ COMPLETED AS SCHEDULED

◆ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

X.2.4 REPOSITORY

OBJECTIVE

The objective of this task is to develop the engineering capability to design, construct, operate, and decommission a repository in tuff. Four specific technical areas are involved that include (1) determination of the physical and mechanical properties of the rock matrix and rock mass that are important to the design and construction of an underground structure; (2) engineering analysis and evaluation of technical details that are important to the design and operation of a repository; (3) development of the techniques of sealing a repository as part of decommissioning; and (4) preparation of a site-specific design that will be accommodated within the development of the equipment to construct the repository, handle the waste and waste package, and transfer the waste and waste package within the repository system.

ACTIVITIES

Rock Mass Analysis

A letter contract with RE/SPEC for thermomechanical calculational support was placed in early May 1985. This analysis support is necessary in order for SNL staff to accomplish timely completion of milestones. A proposal for analysis support from RE/SPEC was reviewed and a reply was sent to purchasing. As a result of this reply, a meeting with RE/SPEC and purchasing was held in which a final statement of work (including time and level of effort) was tentatively agreed upon. It will be approximately four to six weeks before the contract will be placed.

Analysis of the slot-strength test (proposed for the Exploratory Shaft) was begun. The initial meshing was completed along with linear elastic analysis to determine the potential effects of slot cutting and pressurizing. Future efforts are to include the application of the Thomas jointed-rock model in JAC to the problem.

Field Testing

Borehole drilling in the U12g.12 drift in G-Tunnel has indicated that the lower contact of the Grouse Canyon welded tuff is higher than expected. Subsequent mapping in the drift has indicated that there is a shear fault with a 12-ft displacement. A drillhole is being extended to determine the upper contact of the Grouse Canyon at this location.

The protective conduit from the welded-tuff mining area to the instrumentation alcove has been installed and an instrumentation lead wire has been strung through the conduit. Seven of the 12 holes that are being drilled from the U12g.12 drift into the welded-tuff mining area have been completed. The remaining holes should be completed in June 1985.

Laboratory Properties

Statistical analysis of laboratory properties of tuff is continuing after delays resulting from computer downtime. Analysis of mechanical-property data is approximately 80 percent complete.

Sample preparation for a study of the heat capacity of welded Topopah Spring Member, vitric Topopah Spring Member, and zeolitic tuffaceous beds of Calico Hills has begun. Thin sections of test samples have been prepared, and powdering of samples for heat-capacity measurements is approximately 20 percent complete.

Seal Performance Requirements

The report entitled "Hydrologic Calculations to Evaluate Backfilling Shafts and Drifts for a Prospective Nuclear Waste Repository in Unsaturated Tuff" (SAND83-2465) was modified in response to final peer-review comments. It will be submitted for publication in June 1985.

Seal Materials Evaluation

Work has been carried out during this period on completion of three reports: (1) the revision of the report "Preliminary Survey of the Stability of a Silica-Rich Cementitious Mortar [82-22] with Tuff" is expected to be completed by Pennsylvania State University (PSU) in the near future, (2) revision of a companion report "Mechanical Compatibility of Seal Materials with Tuff" has been completed by PSU except for some final documentation, which will be submitted separately as an appendix, and (3) work continued on the "Position Paper on Seal Degradation."

The first mechanical compatibility report summarized and analyzed preliminary studies that involved short-term determination of physical/mechanical properties of eight formulations. Two expansive mixes, one grout (#82-30) and one mortar (#82-22), were selected for more extensive study, which included measurement of mechanical properties over an extended period of time (1 yr) as well as interface-permeability and bond-strength measurements. The companion report describes the stability of sealing materials at elevated temperatures in contact with J-13 groundwater and in contact with tuff.

Seal Concepts Development

Analyses conducted in May 1985 included: (1) the borehole and shaft analyses, preparing design charts showing the influence of the seal, interface, and damage zone on flow rate; (2) an airflow analysis; and (3) miscellaneous calculations to complete the hydrological calculations in the design requirements report.

The hydrological calculations supporting the design-requirements report are now complete except for finalizing the borehole analyses. In the past month the borehole analyses have been extended in the following three areas.

1. A suggested performance criterion for borehole seals is that the saturated conductivity of the seal material should equal the effective saturated conductivity of the host rock. This requires an

evaluation of the effective saturated conductivity of the host rock considering the conductivity in a series of the stratified units. Such an evaluation has been made using the matrix conductivities given in Sinnock (1984).

2. Design charts have been developed for seals placed in boreholes and shafts (or drifts) in the Topopah Spring and Calico Hills. These charts show the influence of seal, interface, and damage-zone conductivity on total flow rate.
3. Water that passes through the repository and drains through the floor may become perched at the contact between the Topopah Spring and the underlying Calico Hills unit. Any boreholes that penetrate through the Calico Hills could then act as drains and preferential pathways to the water table.

Surface Facilities

A review of the surface-facility A/E's Quality Assurance Plan for the repository surface-facilities conceptual design was completed. Comments were sent to the A/E for incorporation into the plan.

A meeting was convened at the A/E's office to discuss potential postearthquake scenarios and to identify the failure modes of structures that may be important to safety. The group considered the scenario in which the repository facilities were designed for an acceleration of 0.4 g but experienced an earthquake with a maximum acceleration of about 1.0 g.

Shaft/Ramps

The shaft and ramp designs to be used in the SCP Conceptual Design were completed. In addition, the records from the Buckskin Mountain Tunnel in Arizona are being examined to obtain information on the use of tunnel-boring machines in tuff.

Underground Excavations

The designs to be presented in the SCP Conceptual Design were completed.

Underground Service System

Work on the ventilation analysis continued and the analysis of the underground system for the conceptual design supporting the SCP was completed.

Operations and Maintenance

Preliminary schedules for preparation of the Advanced Conceptual Design Repository Operations Plan have been developed. A description of the work required to support this plan was prepared and is being incorporated into the statement of work for the repository-design A/Es.

Design Analysis

Temperature calculations considering heat conduction only for a single, infinite borehole were made with ARRAYF to compare to PETROS. They were done to determine the relative importance of heat conduction and vapor-phase effects in design-analysis calculations. Results of these calculations will be used in planning the process of validating conduction as the heat-transfer mechanism for design-analysis calculations.

Calculations applying the boundary-element code HEFF to a probabilistic-failure approach, known as the point-estimate method, are complete. Stability was assessed for the tuff mains using horizontal emplacement after modeling the variability of six influential thermomechanical properties. Output results included probabilities of intact-rock failure and joint slip, expected values, and confidence limits for conventional safety factors.

PLANNED WORK

BNI has been directed to interrupt its work on the Site Characterization Plan (SCP) and Repository Conceptual Design Report (CDR) in order to support the MRS/Repository Interface Study. The MRS/Repository Interface Study is to be done quickly and should result in a completed report with appropriate cost estimates by August 30, 1985. The interruption of the effort by BNI for the SCP-CDR will continue on a day-by-day basis until the MRS/Repository Interface Study is complete. The completion date for the CDR (Milestone N432) will have to be changed; the estimated revised date is January 17, 1986.

"Measurement and Calculation of the Mechanical Response of a Highly Fractured Rock" (SAND84-2020C), "Calculation of Laboratory Stress-Strain Behavior Using a Compliant-Joint Model" (SAND84-7210C), "Implications About In Situ Stress at Yucca Mountain" (SAND84-2021C), and "Analysis of the Elastic and Strength Properties of Yucca Mountain Tuff" (SAND84-2145C) will be presented at the 26th U.S. Symposium on Rock Mechanics, Rapid City, SD, June 25-28, 1985.

Work planned for June through August 1985 includes (1) completion of parameter-effects testing at RE/SPEC and SNL, (2) completion of a draft report on the mechanical properties of the Topopah Spring Member, (3) preparation of a draft report on the thermal conductivity and thermal expansion of lithophysae-rich Topopah Spring Member, and (4) continuation of the heat-capacity study of tuff samples from Yucca Mountain.

The feasibility study of the use of electric power for the underground waste-transport system is scheduled for completion by July 31, 1985.

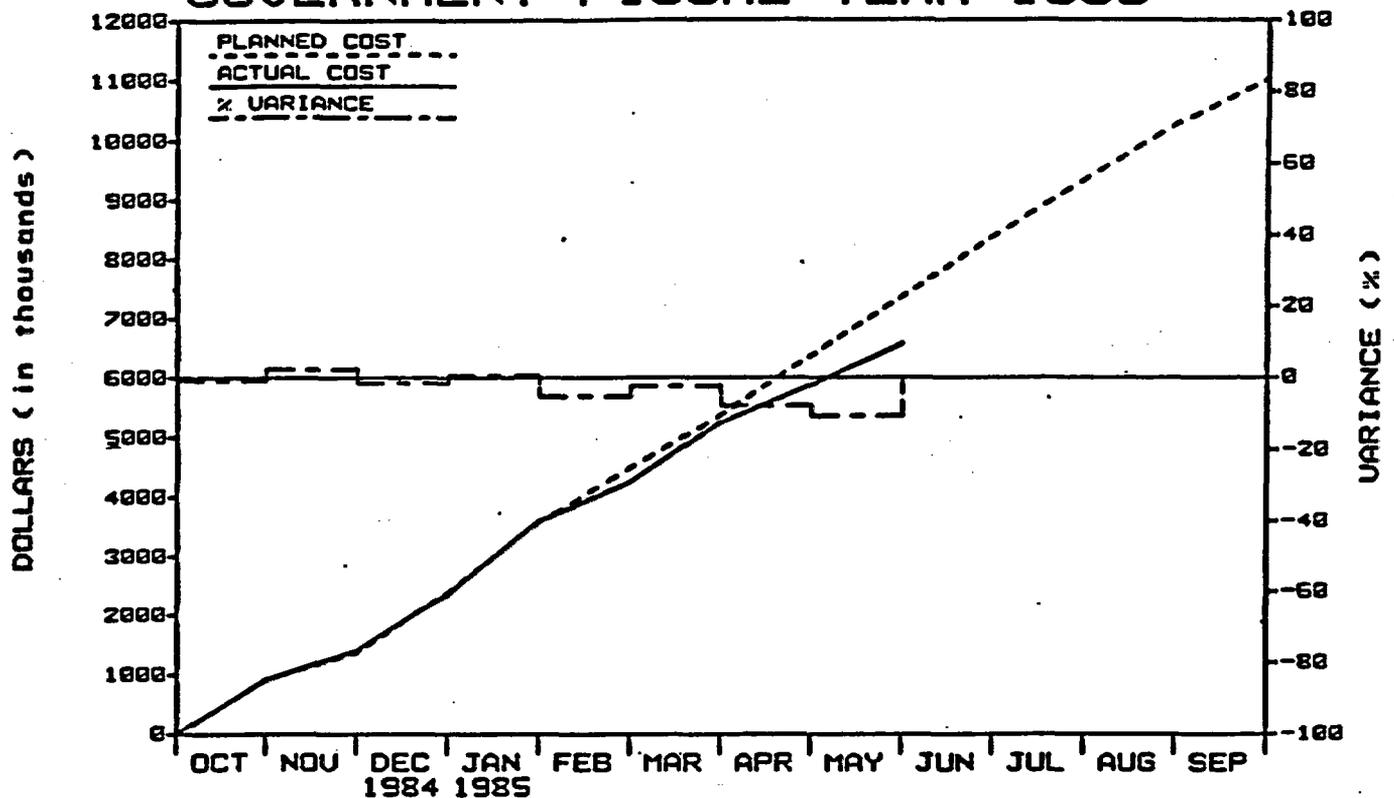
PROBLEM AREAS

A breakdown in experimental apparatus at Pacific Northwest Laboratories has delayed the measurement of the saturated conductivities of approximately 40 tuff samples. The breakdown occurred in late April 1985. The scheduled completion date for the conductivity testing is September 1985.

The question of whether to consolidate fuel is yet to be decided. This may be decided only after a decision on the question of having an MRS facility is made. Because of this, the scope of work for the revised contract for the surface facility is being prepared both with and without consolidation requirements. This in turn may affect the conceptual-design cost of the surface facilities.

Work on the Performance Assessment Plan Volume II (preclosure portion) has been stopped pending completion of inputs to the SCP and responses to EA comments.

WBS X.2.4 REPOSITORY INVESTIGATIONS GOVERNMENT FISCAL YEAR 1985



PLAN (x1000)	917	1359	2388	3565	4492	5388	6374	7362	8384	9329	10253	11011
COST (x1000)	909	1392	2344	3592	4256	5256	5876	6575	0	0	0	0
UARIANCE (x1000)	8	-33	36	-27	236	124	498	787	0	0	0	0
% UARIANCE	-1	2	-2	1	-5	-2	-8	-11	0	0	0	0

VARIANCE EXPLANATION: Underrun is due to subcontractor costs not being received in time for May costing and the redirection of work efforts to the EA and SCP. Replanning needs to be undertaken.

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
N406	SNL	12.4	Horizontal Waste Emplacement Equipment Development Plan												△
M447	SNL	12.4	Seal Development Plan for Repository		◆										
M430	SNL	12.4	Start Repository Conceptual Design												△
M432	SNL	12.4	MNWSI Project Site Specific Repository Design Concept Rpt.												△

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◆ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

X.2.5 REGULATORY/INSTITUTIONAL

OBJECTIVE

The objective of the Regulatory/Institutional task is to provide the capability for interfacing with all the institutions and to meet the requirements identified in various laws and regulations pertaining to the siting, design, and construction of a nuclear waste repository and a test and evaluation facility. The principal laws and regulations which govern the licensing of these include the Atomic Energy Act of 1954, the National Environmental Policy Act (NEPA) of 1969, and the Nuclear Waste Policy Act (NWPA) of 1982, 10 CFR Part 60, and 40 CFR Part 191.

ACTIVITIES

Site Characterization Plan (SCP)

The first draft of Chapter 2 (Geoengineering) was submitted in acceptable form on May 29 and was sent to members of the Internal Review Committee for review. The first review of Chapter 2 (Cycle 1 review in the SCP Management Plan) has been scheduled for the week of June 17, 1985. Sections 5.0, 5.1, and 5.3 (Climatology) were submitted, but were returned to the authors for completion. Section 8.6 (Quality Assurance) was submitted with incomplete QA and technical procedures tables, and requires additional input from the laboratories. Chapter 7 (Waste Package) was submitted May 29 and is undergoing review by the technical data working group coordinator. Section 8.7 (Decontamination and Decommissioning) was submitted without figures, which are dependent on the issuance of the Title II design report scheduled to be released on June 25, 1985.

A number of SCP-related meetings were held in Las Vegas during the month of May. Two regularly scheduled SCP Management Group meetings were held, one on May 6, the other on May 21; a meeting with Fenix & Scisson (F&S) regarding its input to Section 1.6 was held on May 22; and a SCP Management Plan seminar was scheduled for May 28.

Regulatory Analysis and Control Program

The NNWSI Project Issues Hierarchy continues to be adjusted as a result of the Information Need descriptions that are in preparation for SCP Section 8.3. A presentation of the NNWSI Project Issues Hierarchy was made to OCRWM in Washington on May 17.

Comments on the DOE/HQ Management Plan were prepared and transmitted from WMPO to C. Hanlon.

Regulatory Compliance Plans

Section 1 of the draft Meteorological Monitoring Plan prepared by SAIC was reviewed for consistency with NRC guidance and expectations. The program and assumptions (extrapolations) contained in the plan should be adequate for NRC licensing purposes.

Significant time was devoted to planning for NNWSI Project/NRC meetings on the Exploratory Shaft and unsaturated zone geology and hydrology. However, as a result of a NRC/DOE management meeting in Washington on May 30, the meetings were postponed pending completion of generic meetings on the same subjects. A revised meeting schedule was developed on May 30 and will be distributed to Project participants.

The first draft of the Environmental Assessment Comment/Response Appendix was written and transmitted to the Technical Overview Committee for review. This draft did not include responses to comments from the State of Nevada or from the State EA public hearings. State comments were received in early May from Weston. Comments from the State are being entered into the computerized tracking system.

Work began on the Environmental Permitting Plan that is being prepared to identify permits, detail permit requirements, and explain the procedures necessary for WMPO to follow to obtain each permit. Emphasis will be placed on permits for site characterization activities and long-term scheduling difficulties expected for repository permits. The draft will be sent to WMPO for review in June.

PLANNED ACTIVITIES

Draft implementation procedures for the NNWSI Project/NRC site-specific agreement were reviewed and approved by QA and T&MSS management and are being finalized for transmittal to WMPO by the first week in June 1985.

The NNWSI Project Management Plan for preparation of the final Environmental Assessment is being reviewed and will be completed in June 1985.

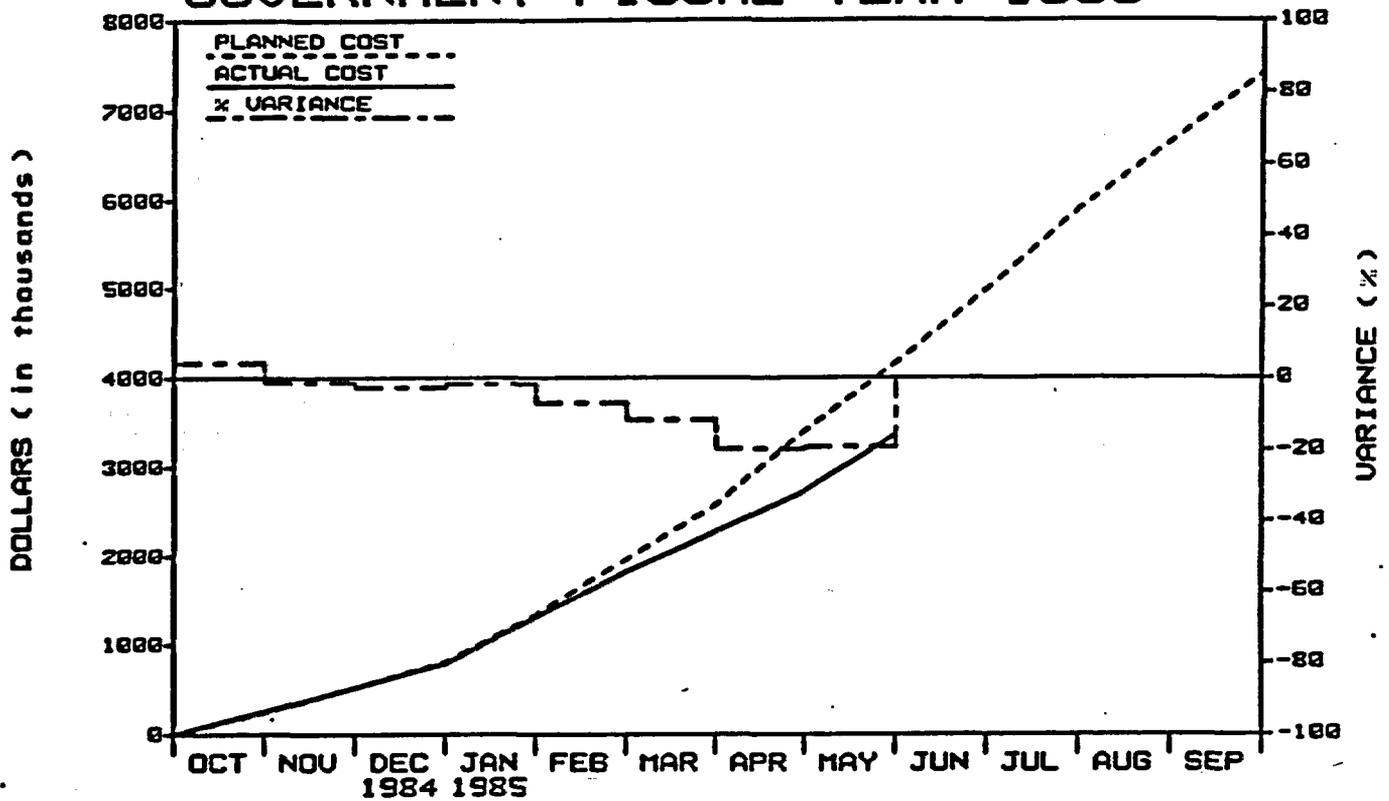
An updated Issues Hierarchy will be published in June 1985. Comments on and recommended changes to the SCP Style Guide are being prepared and will be sent to DOE/HQ the first week of June 1985.

PROBLEM AREAS

Draft input of SCP chapters and sections has been delayed by requirements imposed on the NNWSI Project participants by the EA and the EA Comment/Response Appendix.

Three topics have been identified that should be added to Chapter 2 of the SCP: (1) existing temperature regime, (2) soil properties, and (3) properties of sealing materials. SNL has recommended that these be added at the second or third level, which would require DOE/HQ CCB action.

WBS X.2.5 REGULATORY & INSTITUTIONAL GOVERNMENT FISCAL YEAR 1985



PLAN (X1000)	245	522	805	1328	1953	2576	3406	4164	4990	5887	6638	7410
COST (X1000)	255	515	783	1306	1816	2275	2734	3361	0	0	0	0
VARIANCE (X1000)	-10	7	22	22	137	301	672	803	0	0	0	0
% VARIANCE	4	-1	-3	-2	-7	-12	-20	-19	0	0	0	0

VARIANCE EXPLANATION: Costs for the SCP (2.5.2.2) and the State Grant (2.5.5) are well below the planned amount. However, costs for the EA (2.5.3.1) are slightly above the amount planned.

MLE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
M523	SAIC	12.5	MNWSI Project References for EA Complete		◆										
M502	SAIC	12.5	Draft Environmental Assessment		▲										
M504	SAIC	12.5	Final Environmental Assessment										△		
M503	SAIC	12.5	EA Comment/Response Document										△		

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

X.2.6 EXPLORATORY SHAFT

OBJECTIVE

The objective of this task is to identify and plan the tests that need to be conducted at the repository horizon as a part of detailed site characterization and to design and construct the Exploratory Shaft (ES) and the underground test area in Yucca Mountain. The primary focus of this effort will be to establish the basis for evaluating the unsaturated zone in a welded tuff formation. In addition, an effort will be made to define the nature of the unsaturated zone with regard to water content and water movement, and the nature of the natural barriers between the repository horizon and the static water level.

ACTIVITIES

Exploratory Shaft Facility

LANL has recently been asked by personnel working on the EA about the effect the liquid waste (mine waste water and sewage) from the Exploratory Shaft Facility (ESF) will have on the hydrologic testing of the repository block. The sites for shallow neutron holes for hydrologic testing near the ESF site will have to be avoided also. Currently, LANL feels that the solution is to pipe the liquid waste to a lagoon or pit that is located off the repository block to the east. Another possibility is to construct an evaporation pond; this option is being studied.

Exploratory Shaft Test Plan

First drafts of all hydrology test plans were received at LANL and are being added to the Wang ESTP files. This completes all preliminary input for Part II of Rev. 1. Except for the Executive Summary and Chapter 5 (Rationale), Part I of the ESTP has been completed. DOE/HQ was briefed on the format, status, and plans for the NNWSI Project ESTP Rev. 1.

A briefing on air coring technological problems and Project options was given to the PM/TPOs at the May meeting. As a result, the Project will begin a trade-off study of drilling versus mining to guide selection of the best option available.

Two memoranda were drafted at the request of the ESTP committee for documentation of performance-assessment concerns about the total depth of the ES. These memoranda, which contain the performance-assessment staff position, have been reviewed internally at SNL and at USGS and will be revised after review comments are incorporated. This work has also involved coordination between mineralogists at LANL and SNL staff using the IGIS at SNL. The first memorandum contains a recommendation for maximum penetration of the shaft based on performance-assessment analyses; the second describes data from the Calico Hills tests that will be used by the SNL performance-assessment division and describes how the data will be used.

As mentioned in previous monthly reports, HFEM geotomography may be applied in the Exploratory Shaft (ES) Waste Package Environment Tests. As a result, trial measurements with high frequency electromagnetic (HFEM) geotomography methods in a sand pit continued. Both continuous wave and time delay spectroscopy methods are being examined for their ability to detect anomalies of known size and shape in a pit of moist sand. Signal reflections and other problems encountered in the sand pit measurements are allowing sources of difficulty in the HFEM procedures to be pinpointed and treated. Other geophysical techniques for determining rock mass moisture content with high geometric resolution are also being investigated with the intent of obtaining redundancy in this category of measurements. These approaches include neutron logging techniques with carbon/oxygen probes and conventional slim-hole neutron tools.

Tests of USBM borehole deformation gauges in a heated environment are being planned for use in the Waste Package Environment Test. A fixture is being designed to retain the gauge contact buttons while the gauge is subjected to a controlled cycle of heating and cooling over a period of several weeks. Gauge behavior observed during the thermal cycle will provide a basis for possible subsequent modifications of the gauge design.

The latest draft of the conceptual test plan for the Waste Package Environment Tests is being reviewed at LLNL prior to use in ESTP (Rev. 1). Thermomechanical scoping calculations continued this month in support of technical concept development. Initial calculations of rock mass response with a finite element code were completed to guide instrument investigations; these results are being documented in a letter report. Supplemental calculations will be made with a finite element mesh of somewhat different zoning to examine thermomechanical effects very close to the heater emplacement hole. This work supersedes the analytic solutions that were used in preparation of the initial drafts of the conceptual test plan.

PLANNED WORK

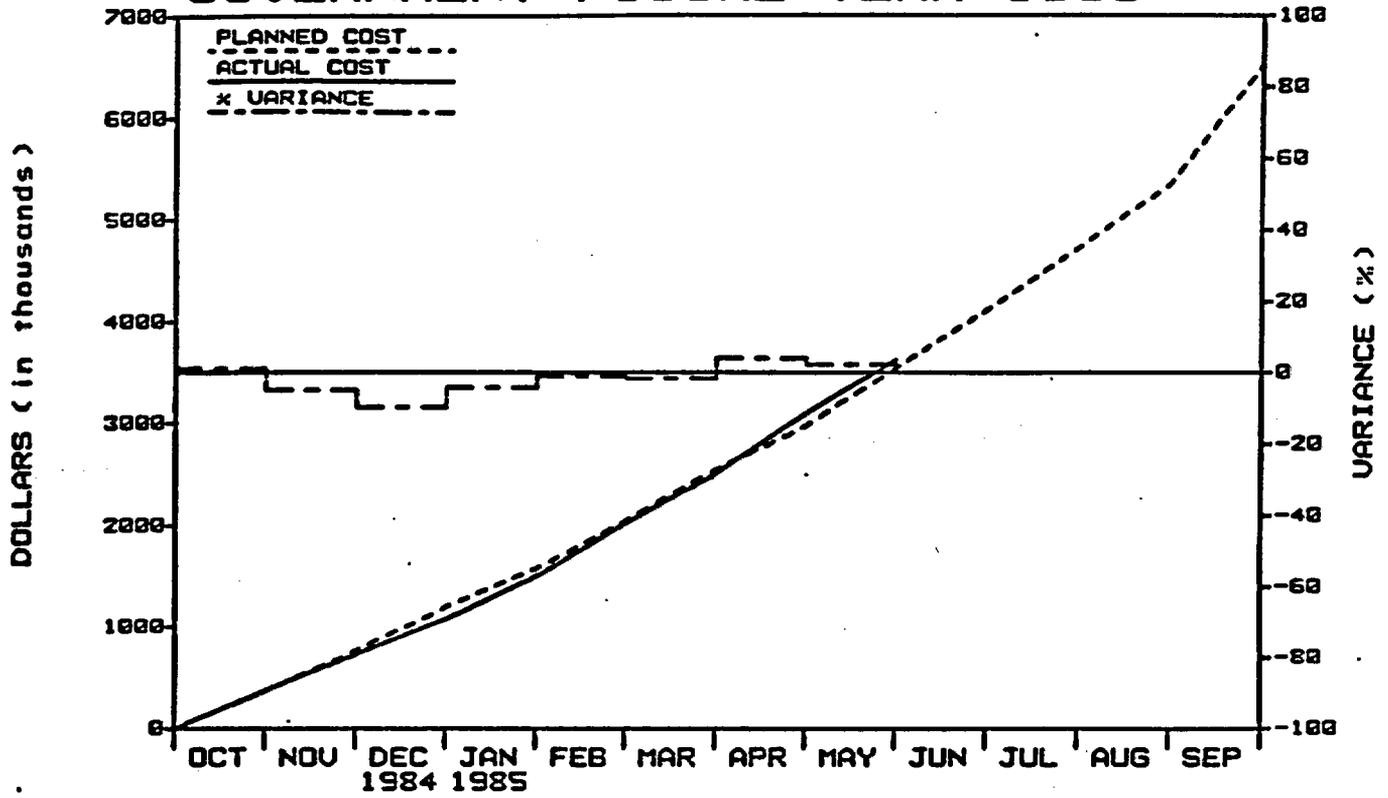
The first drafts of Chapter 5 (Rationale) and the Executive Summary of the ESTP will be completed. By June 18 the ESTP Committee is to receive a complete first-draft Rev. 1 document. Review and resolution of outstanding issues will be completed by July 11. LANL will make last changes and prepare the document for delivery to WMPO/NV on July 22.

Plans for tests of USBM gauges will be completed and implemented to examine gauge performance characteristics. Additional thermomechanical calculations using finite element models will be made to obtain estimates of stress changes and rock mass deformations in the very near field in order to guide instrument selection and development. Scoping calculations of geochemical phenomena may also be initiated. Tests of HFEM techniques in the sand pit will continue and more conventional geophysical techniques will be screened.

PROBLEM AREAS

Review of the F&S ES-1 revised design continued, but at a reduced pace. Included in the review are designs for the shaft excavation, liner, internals, safety barriers, and the shaft bottom. The June 28 date for completion of Title II design will not be met because of delays in design review by almost all participants, preparation for the DOE/NRC workshop on the Exploratory Shaft Facility, which was recently postponed, and budgeting exercises. A new date for the completion of ESF Title II design has not yet been established.

WBS X.2.6 EXPLORATORY SHAFT GOVERNMENT FISCAL YEAR 1985



PLAN (X1000)	366	762	1194	1573	2042	2546	2978	3542	4119	4725	5348	6505
COST (X1000)	370	724	1076	1504	2020	2502	3095	3619	0	0	0	0
VARIANCE (X1000)	-4	38	118	69	22	44	-117	-77	0	0	0	0
% VARIANCE	1	-5	-10	-4	-1	-2	4	2	0	0	0	0

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
				M666	LANL	12.6	Issue Exploratory Shaft Test Plan								

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

X.2.7 TEST FACILITIES

OBJECTIVE

The major objective of this task is the design, construction, and operation of the test facilities that support technology development for other waste management programs and other geologic repository projects. The two major facilities operated under this WBS element are the Climax Spent Fuel Test Facility and the E-MAD Facility.

ACTIVITIES

Spent Fuel Test-Climax

Geological Investigations

A report on the results of in situ deformability measurements at the SFT-C was submitted for internal and external peer reviews. This report documents nearly 250 deformability measurements which show the effects of loading direction, heat, proximity to major geologic features, and the general spatial variability of the deformability throughout the region of the test. These complexities have been addressed by developing models for subsets of the data and using an appropriate variety of statistical analyses to test the validity of the models and the significance of the observed effects.

The pretest and post-test deformability measurements obtained at the SFT-C are also being used to evaluate the efficacy of a data-screening technique which was recently proposed as an ASTM Standard method.

Post-Test Instrumentation Evaluations

A laboratory study of the combined effects of non-ideal borehole diameter and longitudinal bending of the NX borehole jack on the apparent deformation modulus of a large aluminum block was recently completed. Data reduction and preliminary analyses of the data were completed this month.

An error analysis was completed for the NX borehole jack. This statistical evaluation indicates that the resolution of the jack displacement readings limits the fundamental accuracy of deformation modulus values to about 15 percent.

A plan was developed for obtaining and preparing samples from the large aluminum block which was used in the laboratory study of the NX jack. Three samples will be loaded in compression and three will be loaded in tension to obtain the true deformation moduli of the material surrounding the borehole in which the NX jack tests were performed. In this manner the relationship between true and apparent moduli can be obtained at the various borehole diameters which were used in the laboratory tests. Because problems arose in obtaining samples from the block, the services of an outside vendor have been procured.

Post-Test Calculations

The results of recently completed ADINA/ADINAT calculations of the thermo-mechanical response of the SFT-C are being analyzed. Since these calculations used ranges of deformability and in situ stress values, they will be compared to assess how much the results differ for input data obtained from post-test, rather than pretest, measurements.

In addition to these comparisons among the calculational results, selected field data have been plotted with the calculational results to examine the level of agreement between them. Preliminary analyses indicate that the elastic parameters and in situ stress values measured post-test provide somewhat better results than were obtained using pretest values.

The results of post-test heat transfer calculations are being analyzed. Among the factors examined parametrically in these calculations were conductivity and heat capacity of the rock mass, conductivity of materials lining the floors of the drifts, convection coefficients of the drift surfaces, and the ventilation flowrate. In addition the effect of cooling the rock mass during the construction phase of the test was examined. After accounting for precooling, the level of agreement between measured and calculated temperatures (which was already very good) was substantially improved. Analysis of data and report preparation continued.

Data Management

The REVERT code was used to provide final conversion and temperature compensations for all acquired data. These conversions used calibration coefficients and conversion parameters which were selected as the best available for each individual instrument. Following successful conversion of the data, the resulting nine million data points were sorted and merged into a directory structure which consists of separate files for each of the 969 instruments. This approach of preparing data files for each individual instrument greatly simplifies subsequent plotting and data analysis functions. Successful completion of the REVERT and data sort/merge activities removed a major obstacle which had prevented thorough analysis of the geomechanical data that has been acquired on the SFT-C.

An existing plotting code was modified to improve its capabilities to plot the large number of SFT-C data files in an automated fashion. This code was used to prepare preliminary plots of all thermomechanical response data which were made available to the data analysts. In preparation for a release of these data for further analyses, the plot production files are being modified to produce a complete set of high-quality graphs in microfiche form.

Public Information Activities

At the request of DOE-OPA, the SFT-C Fact Sheet was revised to incorporate some key results which have been obtained on the test during the past year. This material is routinely used by OPA personnel who conduct briefings at the SFT-C.

The report entitled "Instrumentation Report No. 3: Performance and Reliability of Instrumentation Deployed for the SFT-C" has been submitted for publication. The report entitled "Physical and Chemical Changes to Rock Near Electrically

Heated Boreholes at SFT-C" was printed and distributed as UCID-20412. The report entitled "The Effect of Gamma Irradiation on the Strength and Elasticity of Climax Stock and Westerly Granites" was printed and distributed as UCRL-92526. Final reviews and approvals were received and the document entitled "Heater Test No. 1, Climax Stock Granite, Nevada" was submitted for publication. The report entitled "Structural Geology Report, SFT-C, NTS" was printed and distributed as UCRL-53381.

E-MAD

All E-MAD fuel assemblies are now stored in the Hot Bay Lag Storage Pit (LSP). Results of thermal monitoring of all fuel assemblies from May 1 through May 28 are as follows:

1. Fuel Assembly B02: highest center pin temperature, T/C #305, 126.9 °C
2. LSP #22, Fuel Assembly D06: highest canister temperature, T/C #108, 55.7 °C
3. LSP #8, Fuel Assembly B41: highest canister temperature, T/C #109, 44.5 °C
4. No canister temperatures were recorded on fuel assemblies B03, B43, D01, D04, D09, D15, D16, D18, D22, D34, D35, D40, D46, and D47, and fuel rods G9 and J8 from fuel assembly B02.
5. With exhaust fans off, the highest LSP exhaust temperature was 35.9 °C.

All canisterized fuel assemblies located in the Lag Storage Pit are in a safe configuration. The maximum recorded canister temperatures are well below the canister design limits. All monitored fuel assemblies reflect a normal profile over the past month.

The Operational Plan and operating procedure for disassembly of the Fuel Temperature Test (FTT) were issued. Fuel assembly B02 was removed from the FTT test stand and placed into a temporary (unwelded) storage canister. The canister was then placed into the E-MAD Lag Storage Pit. The condition of the fuel assembly appeared essentially unchanged as compared to when it had been placed into the FTT in February 1983, based on a very brief inspection. In particular there was no obvious defect in any of the fuel rods. Swipe surveys taken on the floor under the travel path in the Hot Bay showed no unusually high levels of contamination. Swipe samples were taken from the four sides of the lower nozzle and are being counted.

PLANNED WORK

Spent Fuel Test-Climax

In the coming month staff efforts will focus on analysis of geomechanical data obtained at the SFT-C. Draft reports on the post-test thermal and thermo-mechanical analyses will be prepared. A report evaluating proposed data screening criteria for the NX borehole jack will be drafted.

E-MAD

Fuel assemblies B41 and D06 will continue to be monitored.

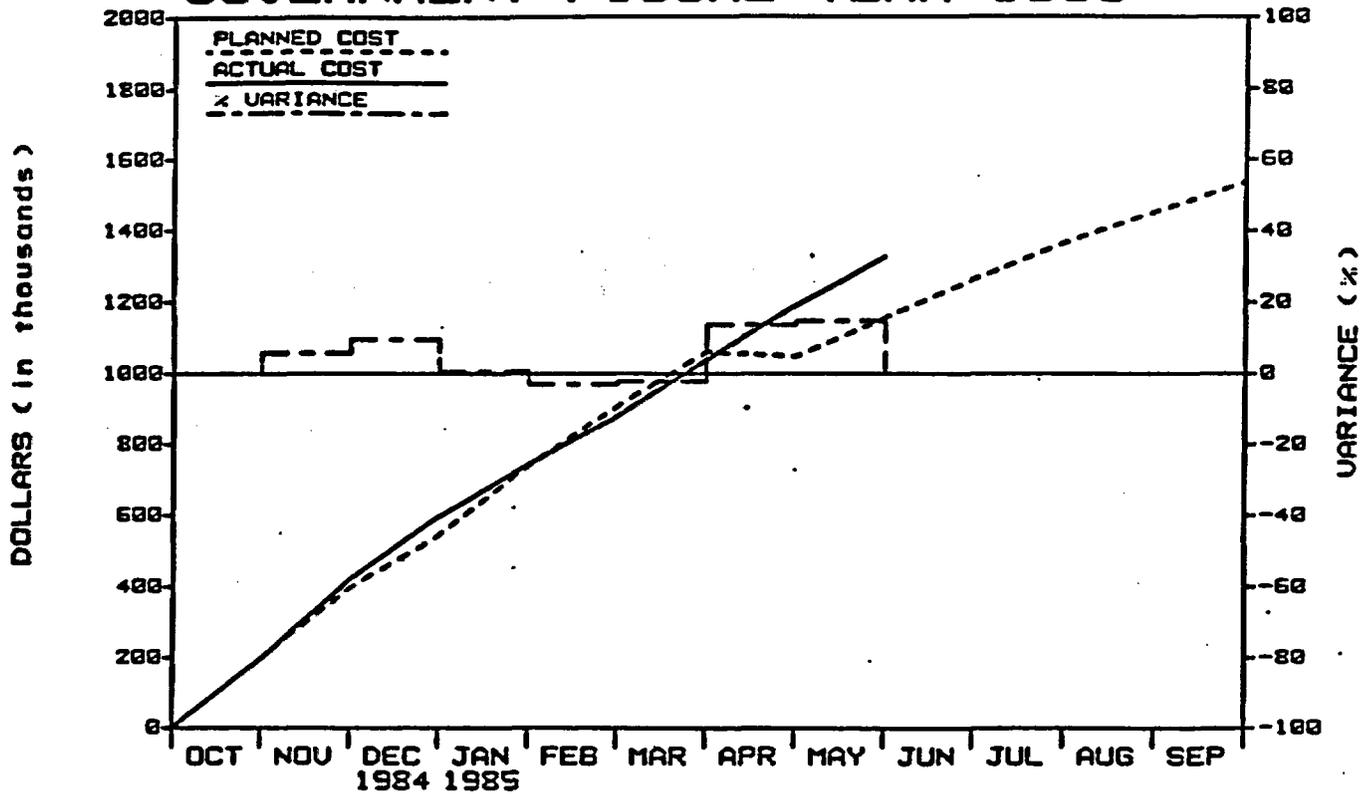
A test plan for performing post-test characterization of fuel assembly B02 was prepared and is being reviewed. Pacific Northwest Laboratories has requested that the fuel assembly be available for inspection on June 19 and 20.

Fuel assemblies D16 and D18 will be decanisterized, characterized, and installed in temporary canisters.

PROBLEM AREAS

None

WBS X.2.7 TEST FACILITIES GOVERNMENT FISCAL YEAR 1985



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
PLAN (x1000)	197	397	543	737	907	1061	1048	1157	1265	1365	1452	1535
COST (x1000)	197	420	595	742	879	1038	1191	1328	0	0	0	0
VARIANCE (x1000)	0	-23	-52	-5	28	23	-143	-171	0	0	0	0
% VARIANCE	0	6	10	1	-3	-2	14	15	0	0	0	0

VARIANCE EXPLANATION: The costs is for G-Tunnel, where work will soon be coming to an end.

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
M708	LLNL	12.7	Final Report on the SFT-C													△

△ PLANNED MILESTONE COMPLETION DATE
 ▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
 ◆ COMPLETED AS REVISED

X.2.8 LAND ACQUISITION

OBJECTIVE

The objective of this task is to maintain access to land adjacent to the Nevada Test Site that is controlled by the U.S. Air Force and the Bureau of Land Management and to protect land that could be used for a high-level waste repository and the surrounding buffer zones.

ACTIVITIES

None.

PLANNED WORK

To be included in future NNWSI Project Monthly Reports.

PROBLEM AREAS

None.

X.2.9 PROGRAM MANAGEMENT

OBJECTIVE

The objective of this task is to manage all activities of the NNWSI Project by all contractors. The five major areas identified are Project Management, Project Control, Interface Activities, Quality Assurance, and Generic Requirements Document (GRD) Support.

ACTIVITIES

Project Monitoring System

Work on the final report of the Earned Value or Performance Measurement System Study continued. SAIC staff members visited LANL, LLNL, and SNL to explain the proposed phased implementation of a performance measurement system, to explore various options for structuring Cost Account Plans, and to compute earned value for different types of tasks. A similar meeting was held in Las Vegas with the USGS. A format to be used in preparation of each participating organizations' estimate of incremental effort for support to the performance measurement system was distributed to all participants and responses were received from LANL, LLNL, and SNL. A formal estimate from USGS is expected by mid-June; this will complete the information needed for the SAIC final report on the Performance Measurement System Proposal for the NNWSI Project. Work began on the earned value computation programs for the NNWSI Project.

A draft WBS Dictionary was delivered to WMPO and NNWSI Project participants for review on May 22.

The planning schedules for the WBS elements, as provided by the participating organizations, were incorporated into the networks; a summary of the work done to each WBS element follows.

- o WBS 2.1 Systems - Status data was received in May and incorporated in the existing plan.
- o WBS 2.2 Waste Package - Major replanning of the Waste Package effort was completed in May. The revised network was sent to LLNL for review and approval. Final approval from LLNL is expected in June 1985.
- o WBS 2.3 Site - Revisions, reviews, and approvals to the network logic at LANL were completed in May. The network is now in conformance with the WPAS. New network plans for all but one of the USGS WBS categories have been prepared. Work on the summarization of the detailed networks is proceeding so that the networks will be more useful to the USGS and WMPO managers. The Geochemistry Modeling Code EQ3/6 network data, as provided by LLNL, was updated to reflect progress and status through April 1985.
- o WBS 2.4 Repository - SNL is continuing to add Level 1 and 2 milestones for FY 85 through FY 91. A GANTT Chart schedule continues to reflect more detail in the subelements of 2.4.

- o WBS 2.5 Regulatory and Institutional - A new summary network was created for all milestones identified in the FY 87 WPAS. Existing milestones and additional milestones for SCP out-years will be incorporated and verified through the data base.
- o WBS 2.6 Exploratory Shaft (ES) - New logic for shaft construction was completed in May. Approval by the ES construction committee is expected in June 1985.
- o WBS 2.9 Project Control - All Earned Value System Plan, Phase I activities scheduled for completion during May have been accomplished, with the exception of submittal of the Earned Value Implementation Recommendations Report (SAIC) to WMPO.

Project Documentation System

Comments on the Draft Project Management Plan and work plans, due on April 25, 1985 have been received from SAIC, LLNL, LANL, and SNL; still outstanding are comments from WMPO and the USGS. A copy of the Draft Project Management Plan was informally requested by Vince Cassella. Mitch Kunich has taken the request under advisement.

T&MSS Quality Assurance (QA)

The T&MSS Quality Assurance Program Plan (Rev. 2) and twenty Quality Assurance procedures were submitted to WMPO for review and approval on March 13, 1985. The review is still in progress.

The Site Characterization Plan Management Plan (SCPMP) Quality Level Assignment Sheet has been approved by WMPO, which completes the required approvals. The SCPMP is being implemented.

The Environmental Assessment Management Plan (EAMP) which provides for the final Environmental Assessment (EA) and the Comment Response/Appendix (CRA) is being implemented; however, the EAMP has not been finalized and the Quality Level Assignment Sheet has not been completed or approved. This has been brought to the attention of the T&MSS task manager concerned.

The NNWSI Quality Assurance Plan and four implementing procedures (02-01, 02-02, 03-01, and 15-01) are being revised. The revised documents will be sent to WMPO for approval the first week in July 1985.

The status of the unissued Project-wide implementing procedures (SOPs) are as follows:

1. NNWSI-SOP-17-01, QA Records Management

ESI and the USGS are in the process of setting up the pilot program.

2. NNWSI-SOP-03-02, Quality Assurance Software

A committee meeting was held on May 16. Two strawman SOPs developed by committee members were discussed and discarded. A new purpose, scope, and several definitions were approved. The committee decided to write a requirements document that will not go beyond the requirements of NUREG 0856. A new strawman will be developed and reviewed at the meeting in July 1985.

3. NNWSI-SOP-03-03, Non-NNWSI QA Plan Data or Interpretation Acceptance

The final technical committee draft was submitted to WMPO and QAD for review and approval. WMPO is postponing approval pending resolution of LLNL concerns.

NNWSI Surveillance

Because of other priorities, no surveillances were conducted in May.

NNWSI Project Audits

Status of FY 85 audits is as follows:

85-1 WMPO Internal - Audits & Surveillances

The audit was conducted on April 10-11, 1985. Three audit findings and two observations were reported. The findings are being resolved.

85-2 WMPO Internal - Organization and Training

The audit was conducted on May 1-2. Three audit findings and two observations were reported. The findings are being resolved.

85-3 WMPO Internal - NCR and CAR

The audit was conducted on May 8-9. One audit finding and three observations were reported. The finding is being resolved.

85-4 WMPO Internal - Document Control and Records

The audit was conducted on May 22. The report is being finalized.

85-5 WMPO Internal - Document Review

The audit was conducted on May 23-30. The report is being finalized.

Review of Project Participants' Quality Assurance Program Plans (QAPPs) and
Implementing Procedures

The status of reviews is as follows.

- LLNL Responses from LLNL to comments from WMPO on the LLNL QAPP were received April 16, 1985. WMPO met with LLNL on May 23 to resolve the items still in conflict. Agreements were reached and LLNL will resubmit its QAPP to reflect the changes.
- USGS The review was completed by SAIC on February 11, 1985. WMPO sent comments to the USGS on February 20 requesting resolution of comments within thirty days. A response from the USGS was received (letter dated March 22, 1985). The letter responded to the comments but indicated that the USGS would prefer to take additional time to prepare a new QAPP that includes the QPs and meets the requirements of NVO-196-17 rather than do a patch job of the existing documents. The USGS indicated an expected date of completion of the new documents by June 1985. The comment resolutions were reviewed and a letter was issued to the USGS on April 20, 1985, requesting clarification on several responses and accepting the June 1985 resubmittal date.
- LANL The review was completed and sent to LANL on February 25, 1985. A LANL letter dated March 6, 1985, was received by WMPO transmitting a completely new plan indicating that several of the concerns about the old plan are resolved by the new plan. The new plan was reviewed and comments sent to LANL on May 7.
- Westinghouse The review was completed on February 28, 1985. WMPO sent comments to WTSD on March 1, 1985, requesting resolution of comments. No response has been received.
- REECo The review was completed and sent to REECo on April 23, 1985. A letter with comments was received from REECo that informed WMPO of their intent to completely revise the existing QAPP and establish a series of Project-specific procedures in order to fully comply with the NNWSI QAP. The new QAPP will be submitted no later than July 31, 1985, and the procedures no later than October 31, 1985. REECo will meet with WMPO and SAIC on June 14, 1985, to discuss several possible problem areas.
- SNL The SNL review is complete and will be transmitted to WMPO for issuance to SNL.
- F&S The review was completed and comments sent to F&S on April 15, 1985. F&S met with SAIC and WMPO on May 3 for clarification of several comments. A response from F&S was received on May 30 indicating that they would completely review their QAPP and prepare specific NNWSI Project procedures as needed.

SAIC-T&MSS The review was completed on May 15 and sent to WMPO for issuance.

H&N The review has been completed and comments were sent to H&N on May 10. WMPO and SAIC met with H&N on May 31 to discuss proposed resolution of comments.

PLANNED WORK

Baseline approval for the WBS Dictionary is expected at either the June or July 1985 PM-TPO Change Control Board meeting.

The committee to develop NNWSI-SOP-03-02, Quality Assurance Software, will meet in July to review the next draft of the SOP.

PROBLEM AREAS

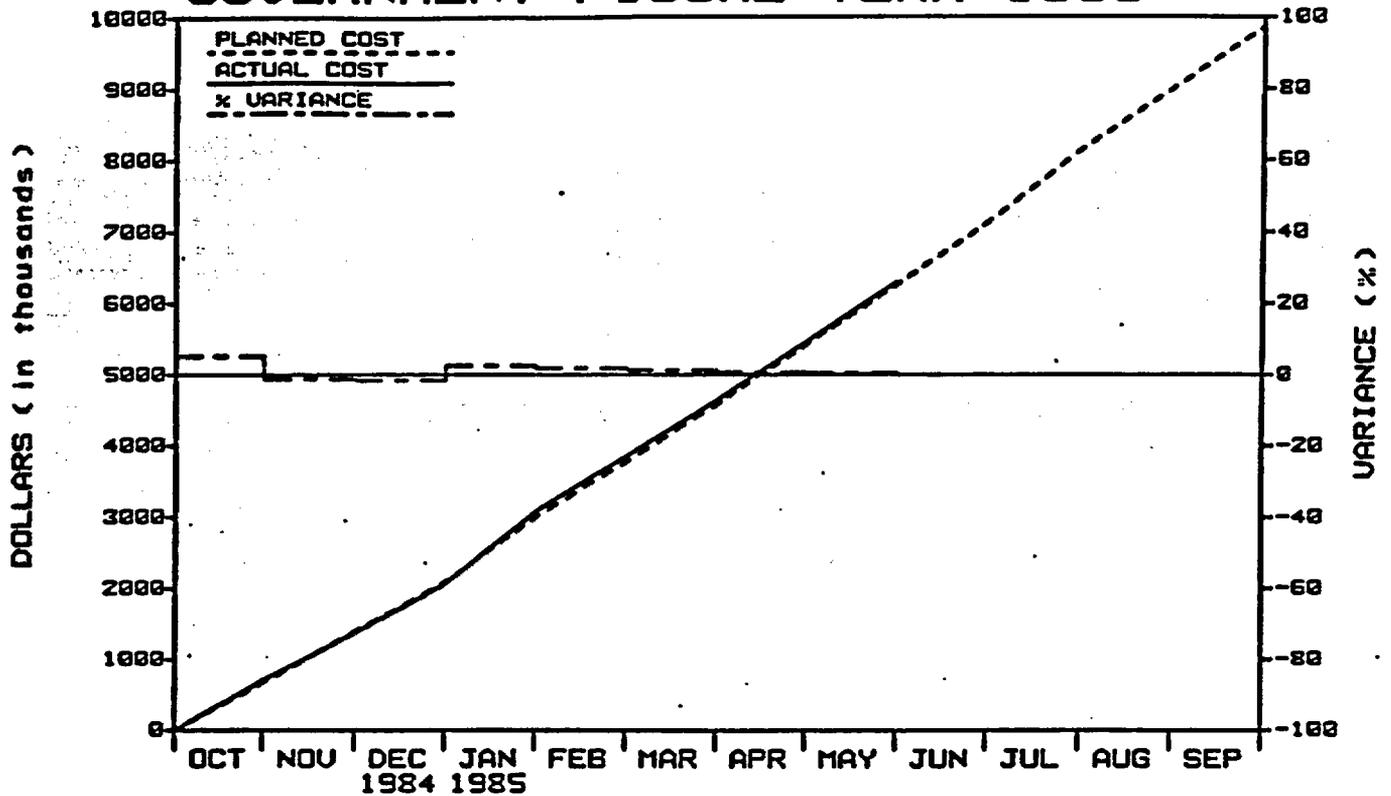
Submittal of the Earned Value Implementation Recommendations Report is being delayed pending receipt of USGS input which is expected by close of business on June 7, 1985. Completion of this activity is required for achievement of Milestone M716, Recommendations on Earned Value to WMPO, and completion of Phase I, scheduled for May 31. This phase includes initiation of the basic steps for SAIC internal implementation of an earned value/performance measurement system. The revised network plan for earned value implementation has been revised and will be incorporated into the final earned value report to WMPO.

The Project Plan, which was sent to WMPO for approval on April 19, 1985, has not yet been approved by WMPO or the DOE/NV Manager. When approved, the Project Plan will be distributed to Project participants.

The Meteorological Monitoring Plan (MMP) has not been formally approved by WMPO. In addition, although the Quality Level Assignment Sheet has completed the T&MSS approval chain, it has not been approved by the concerned WMPO Branch Chief as required by NNWSI-SOP-02-02. Implementation of the MMP is in progress; equipment for the monitoring system has been received and work has started on the foundations for the meteorological towers. T&MSS QA has been placed in the position of possible issuance of a nonconformance report against the T&MSS meteorological monitoring activity, which could culminate in a stop work order. The WMPO Project Quality Manager has been apprised of the problem by letter.

NNWSI surveillances for the remainder of FY 85 will not be performed because of the heavy workload in higher-priority areas and increased task activities. The elimination of these surveillances will inhibit to some extent the evaluation by WMPO of the implementation and effectiveness of the NNWSI Project QA system. The commitment from several organizations to completely revise their QAPP will extend the review process and possibly delay the FY 85 audits. The revisions and delays will impact the goal of complete NNWSI QA implementation in FY 85.

WBS X.2.9 PROJECT MANAGEMENT GOVERNMENT FISCAL YEAR 1985



PLAN (x1000)	663	1397	2086	2985	3764	4579	5415	6260	7127	8129	8993	9865
COST (x1000)	698	1380	2052	3061	3835	4635	5453	6293	0	0	0	0
VARIANCE (x1000)	-35	17	34	-76	-71	-56	-38	-33	0	0	0	0
% VARIANCE	5	-1	-2	3	2	1	1	1	0	0	0	0

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S		
M901	SAIC	12.9	Submit FY 1985 MNWSI Project Plan to DOE/HQ	████████████████████							▲						
M915	SAIC	12.9	Submit NVO-196-18 (Rev. 2) to DOE/HQ		▲												
M907	SAIC	12.9	Draft Project Management Plan	████████████████████								△					

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

U.S. DEPARTMENT OF ENERGY

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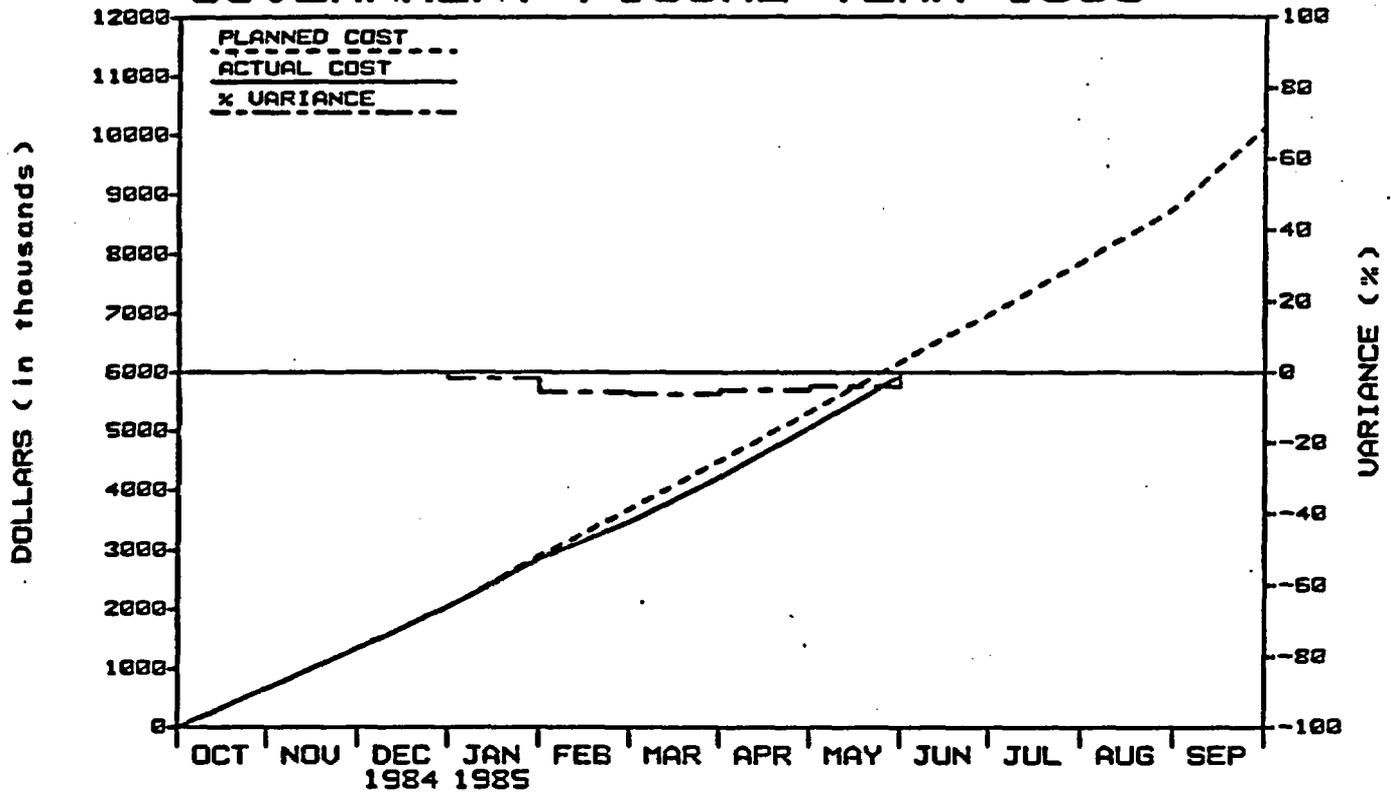
Nevada
Wuclear
Saste
Iorage
Investigations
PROJECT

**YUCCA
MOUNTAIN**

PARTICIPANT

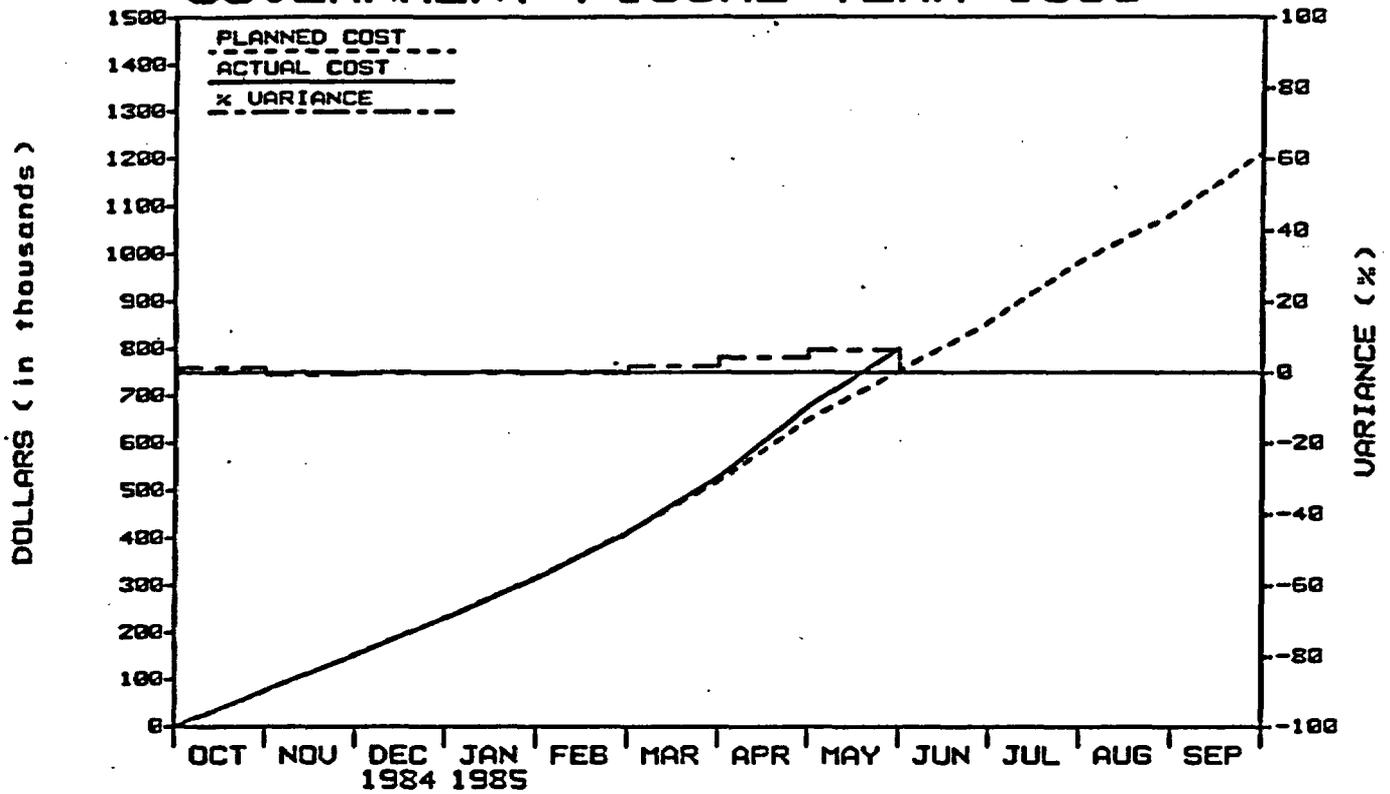
BUDGET vs COST

LOS ALAMOS NATIONAL LABORATORY GOVERNMENT FISCAL YEAR 1985



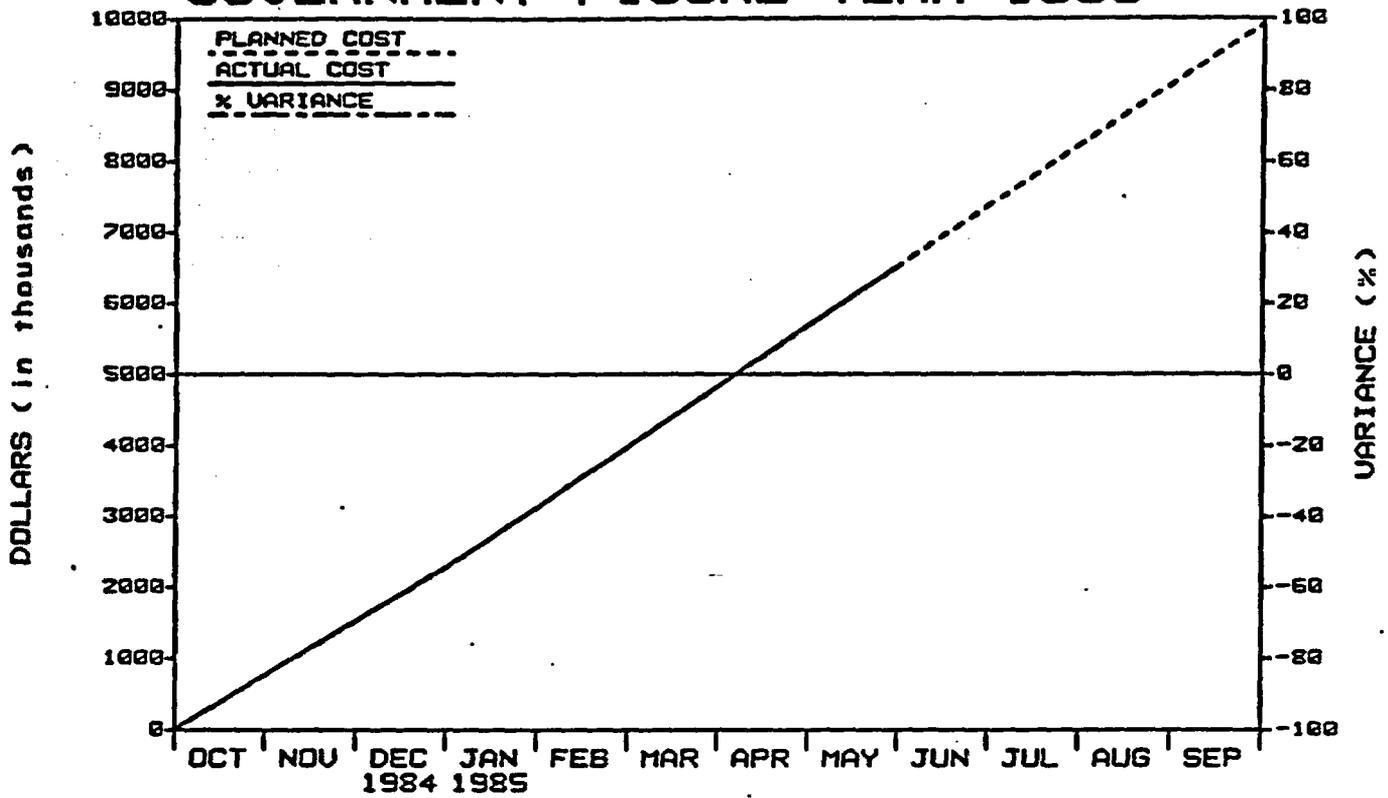
PLAN (x1000)	656	1354	2039	2892	3678	4491	5328	6187	6983	7859	8741	10130
COST (x1000)	656	1354	2039	2842	3471	4213	5060	5941	0	0	0	0
VARIANCE (x1000)	0	0	0	50	207	278	268	246	0	0	0	0
% VARIANCE	0	0	0	-2	-6	-6	-5	-4	0	0	0	0

FENIX & SCISSON, INC GOVERNMENT FISCAL YEAR 1985



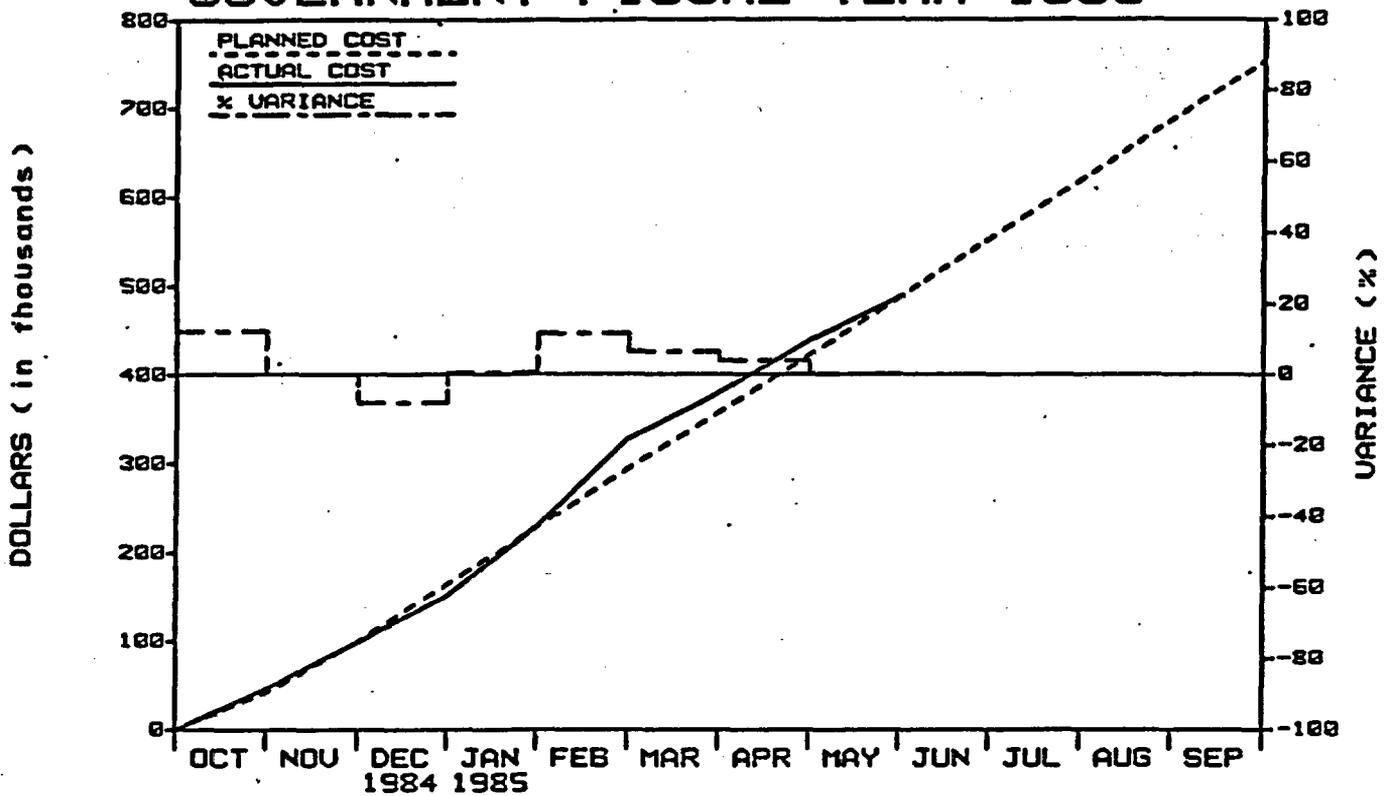
PLAN (x1000)	76	154	232	317	412	519	649	753	857	984	1083	1212
COST (x1000)	77	153	231	316	410	527	676	800	0	0	0	0
VARIANCE (x1000)	-1	1	1	1	2	-8	-27	-47	0	0	0	0
% VARIANCE	1	-1	0	0	0	2	4	6	0	0	0	0

U. S. GEOLOGICAL SURVEY GOVERNMENT FISCAL YEAR 1985



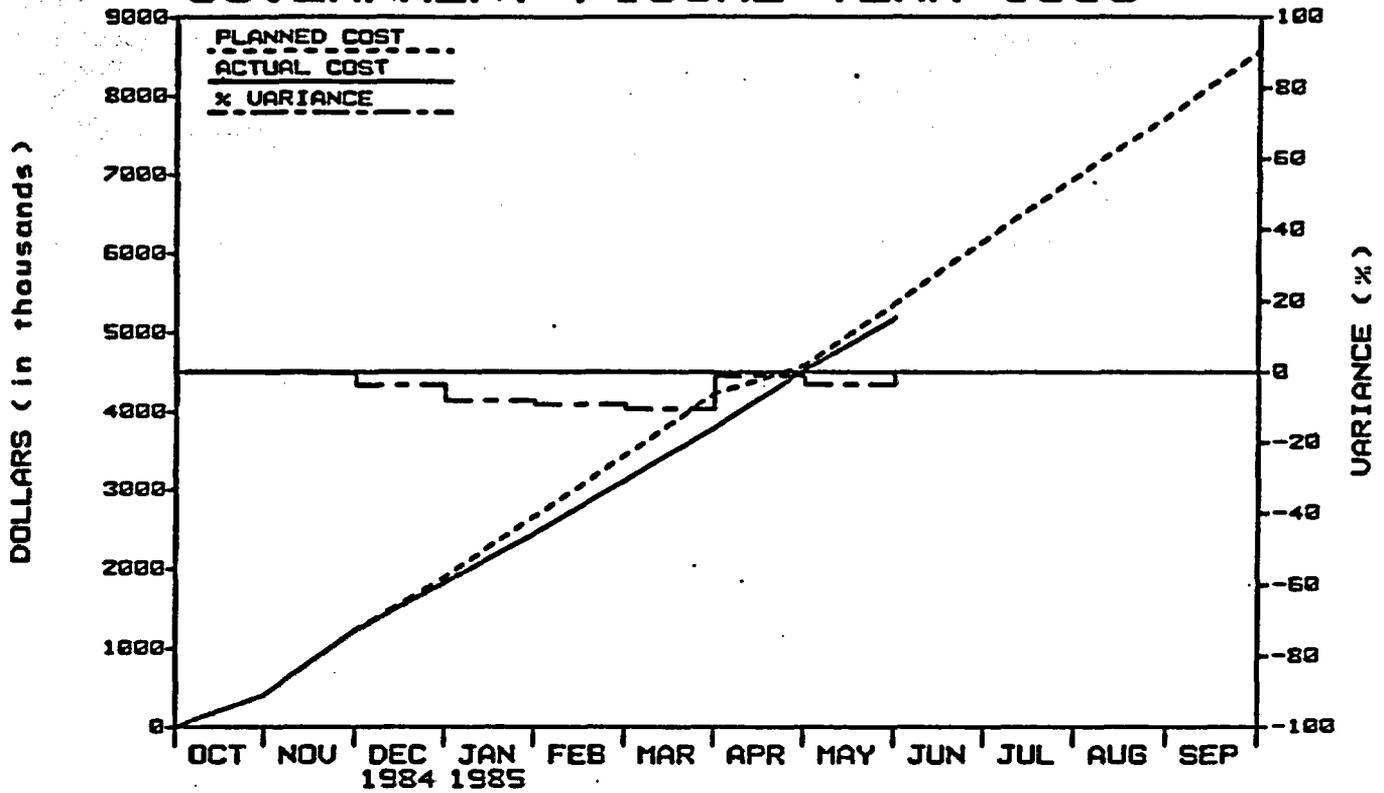
PLAN (x1000)	760	1520	2277	3125	3986	4830	5680	6525	7378	8226	9075	9922
COST (x1000)	760	1520	2277	3125	3986	4830	5680	6525	0	0	0	0
VARIANCE (x1000)	0	0	0	0	0	0	0	0	0	0	0	0
% VARIANCE	0	0	0	0	0	0	0	0	0	0	0	0

HOLMES & NARVER GOVERNMENT FISCAL YEAR 1985



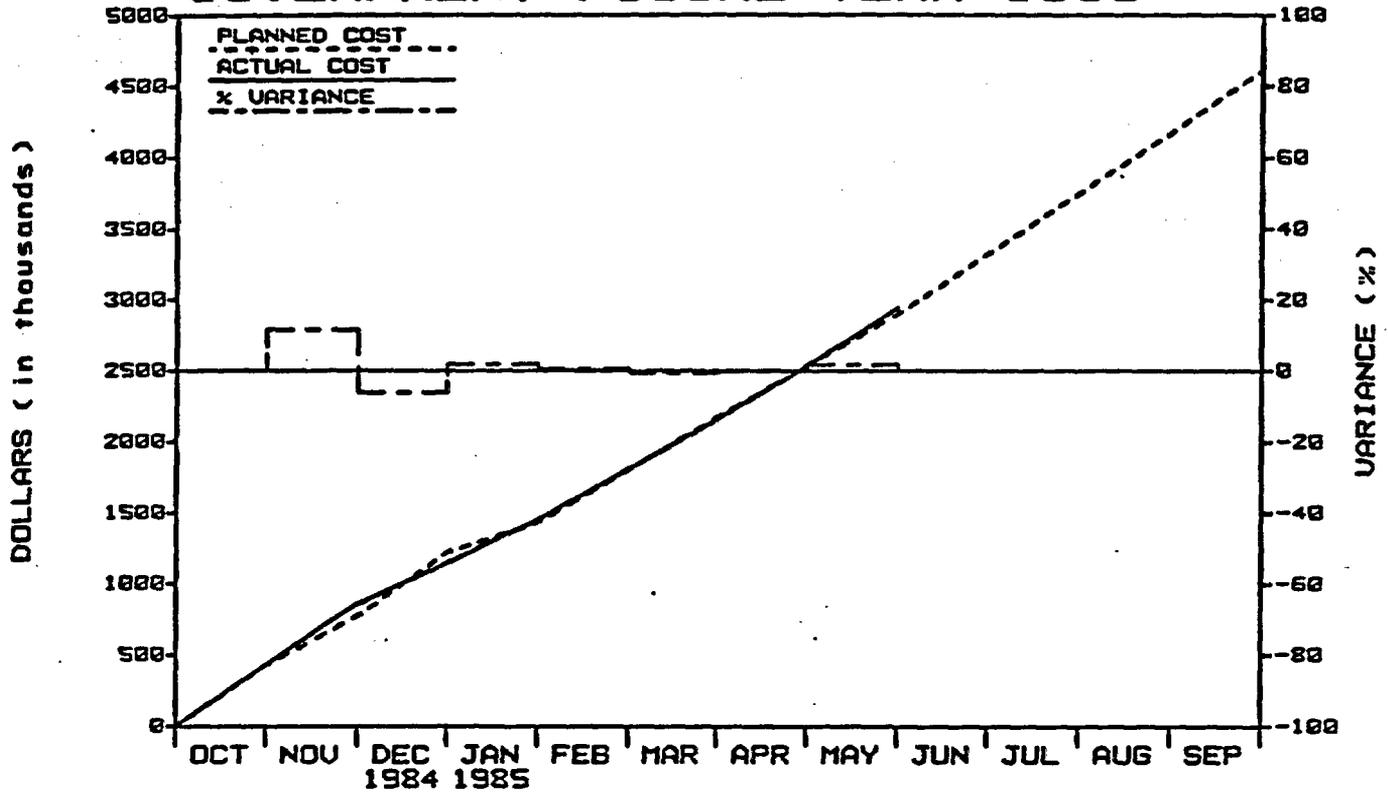
PLAN (x1000)	41	99	164	228	293	357	422	487	553	618	686	753
COST (x1000)	46	99	151	229	327	380	439	488	0	0	0	0
VARIANCE (x1000)	-5	0	13	-1	-34	-23	-17	-1	0	0	0	0
% VARIANCE	12	0	-8	0	12	6	4	0	0	0	0	0

LAWRENCE LIVERMORE NATIONAL LABORATORY GOVERNMENT FISCAL YEAR 1985



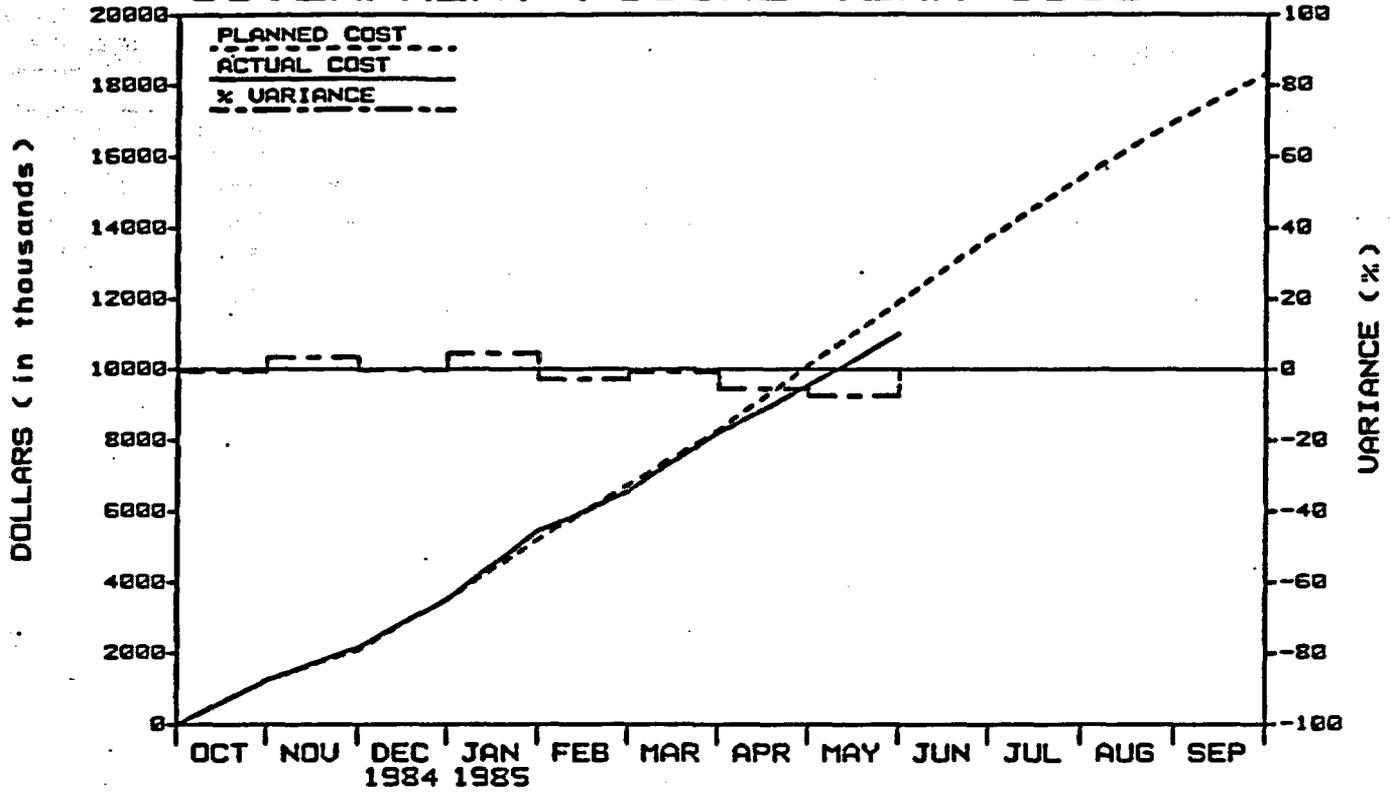
PLAN (X1000)	484	1229	1899	2655	3429	4230	4580	5372	6166	6955	7731	8565
COST (X1000)	484	1226	1829	2437	3113	3785	4526	5190	0	0	0	0
VARIANCE (X1000)	0	3	70	218	316	445	54	182	0	0	0	0
% VARIANCE	0	0	-4	-8	-9	-11	-1	-3	0	0	0	0

REECO GOVERNMENT FISCAL YEAR 1985



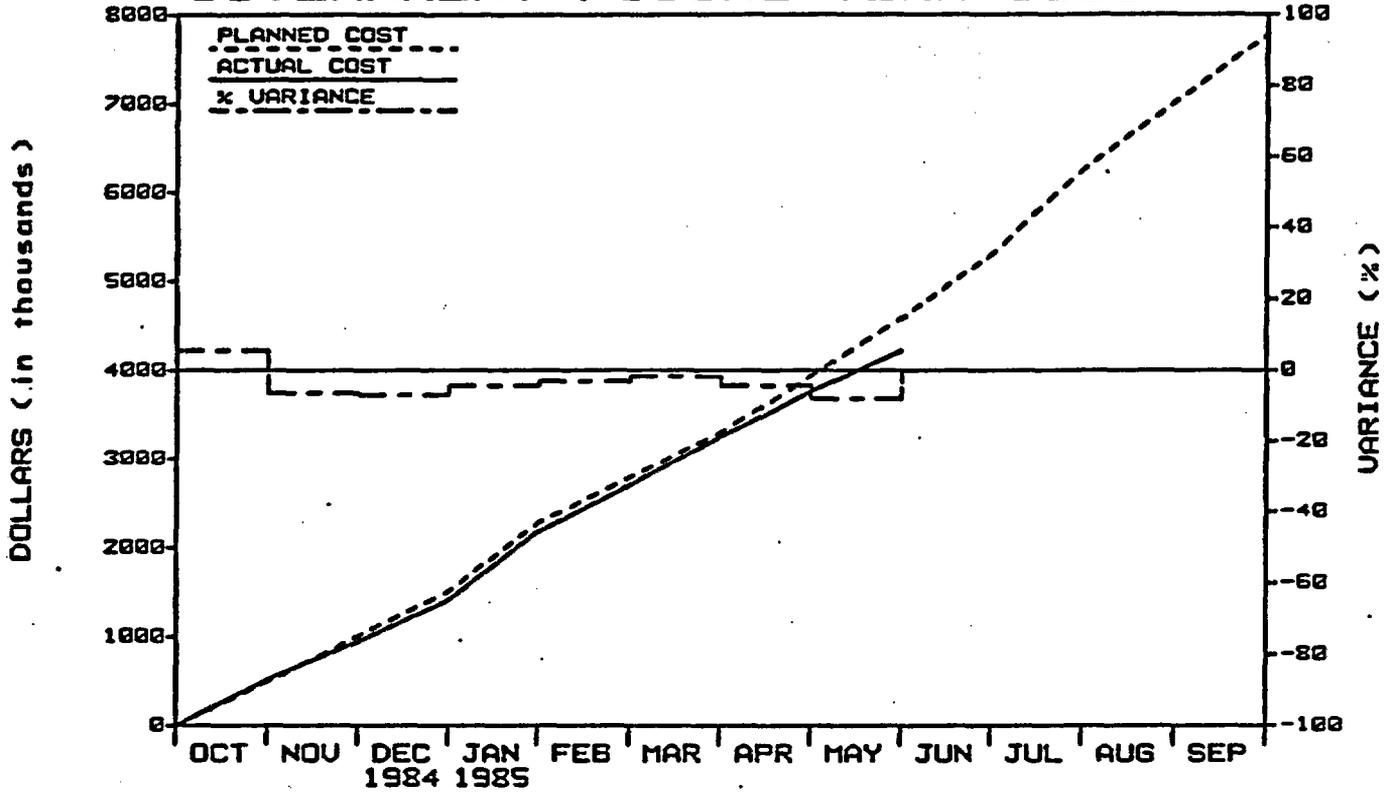
PLAN (x1000)	426	772	1222	1430	1802	2174	2538	2895	3325	3749	4172	4608
COST (x1000)	426	861	1148	1454	1812	2159	2533	2939	0	0	0	0
VARIANCE (x1000)	0	-89	74	-24	-10	15	5	-44	0	0	0	0
% VARIANCE	0	12	-6	2	1	-1	0	2	0	0	0	0

SANDIA NATIONAL LABORATORIES GOVERNMENT FISCAL YEAR 1985



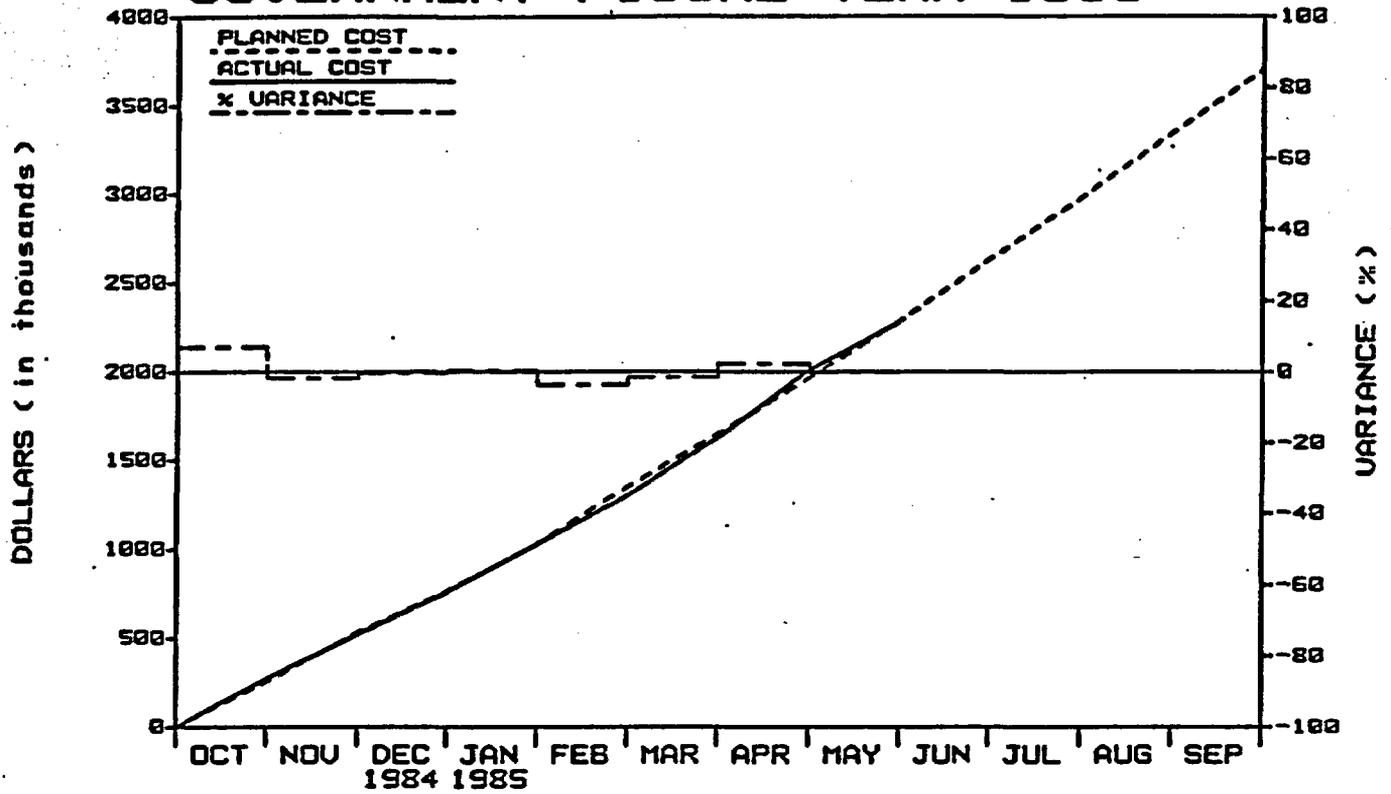
PLAN (x1000)	1240	2091	3527	5197	6736	8289	10115	11898	13722	15429	16976	18334
COST (x1000)	1230	2160	3511	5435	6546	8209	9544	10987	0	0	0	0
VARIANCE (x1000)	10	-69	16	-238	190	80	571	911	0	0	0	0
x VARIANCE.	-1	3	0	5	-3	-1	-6	-8	0	0	0	0

SCIENCE APPLICATIONS INT'L CORP. GOVERNMENT FISCAL YEAR 1985



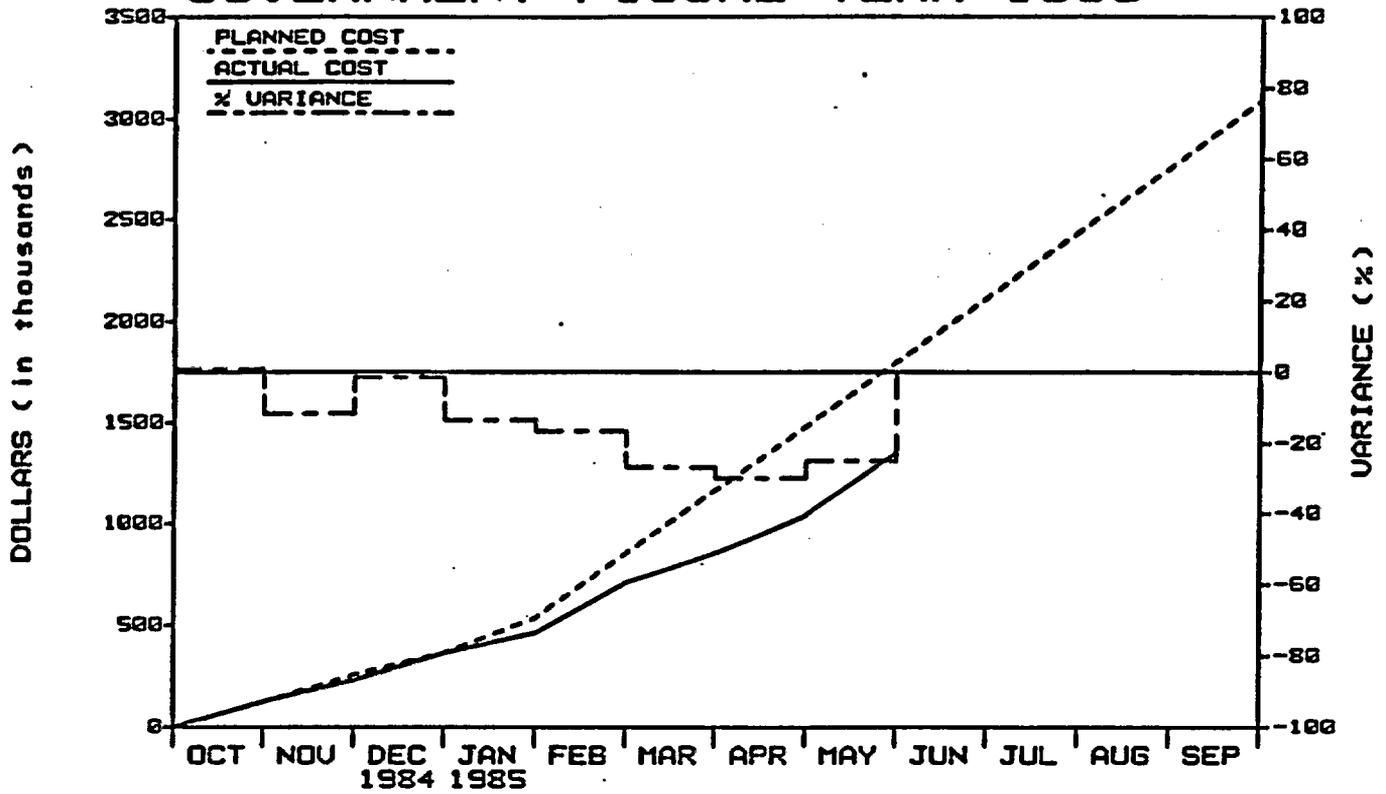
PLAN (X1000)	492	1005	1512	2276	2786	3298	3939	4588	5293	6253	7008	7775
COST (X1000)	519	942	1408	2177	2703	3246	3768	4222	0	0	0	0
VARIANCE (X1000)	-27	63	104	99	83	52	171	366	0	0	0	0
% VARIANCE	5	-6	-7	-4	-3	-2	-4	-8	0	0	0	0

E-MAD GOVERNMENT FISCAL YEAR 1985



PLAN (x1000)	255	533	764	1024	1346	1649	1966	2285	2627	2975	3342	3700
COST (x1000)	273	524	761	1028	1296	1624	2009	2279	0	0	0	0
VARIANCE (x1000)	-18	9	3	-4	50	25	-43	6	0	0	0	0
% VARIANCE	7	-2	0	0	-4	-2	2	0	0	0	0	0

MISCELLANEOUS CONTRACTORS GOVERNMENT FISCAL YEAR 1985



PLAN (x1000)	122	258	366	536	851	1167	1483	1799	2114	2436	2756	3091
COST (x1000)	123	228	361	463	709	854	1040	1348	0	0	0	0
VARIANCE (x1000)	-1	30	5	73	142	313	443	451	0	0	0	0
% VARIANCE	1	-12	-1	-14	-17	-27	-30	-25	0	0	0	0

May 1985

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
 LEVEL 1 MILESTONES IN A TIME WINDOW OF 01 Oct 1984 TO 30 Sep 1985
 Run Date: 24 June 1985

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL
System Engineering Management Plan (SEMP)	2.1.1.S	Witherill	1	SNL	M108	B	30 Aug 85
Performance Assessment Plan	2.1.1.S	Blanchard	1	SNL	M113	B	30 Sep 85
Yucca Mountain Mined Geologic Disposal System Description (System Requirements)	2.1.2.1.S	Witherill	1	SNL	M120	B	30 Jul 85
Establish Interim Product Specifications	2.2.3.1.L	Valentine	1	LLNL	M250	B	30 Aug 84 12 Apr 85
Input to DOE/HQ Report to Congress on Copper for Waste Packages	2.2.3.2.L	Valentine	1	LLNL	M222	B	01 Aug 85
Complete Waste Package Conceptual Design Criteria	2.2.4.L	Valentine	1	WMPO	M231	B	15 Jun 85
Initiate Waste Package Advanced Conceptual Design	2.2.4.L	Valentine	1	WMPO	M233	B	30 Jun 85
Pre-Closure Analysis of Selected Conceptual Designs	2.2.4.L	Valentine	1	LLNL	M251	B	28 Sep 84 20 Dec 84
Weapons Test Seismic Report	2.3.2.2.4.S	Blanchard	1	WMPO	M357	B	15 Jan 85 14 Jun 85
Progress Report on 3-Dimensional Mineralogic Model of Yucca Mountain	2.3.2.A	Blanchard	1	LANL	M355	B	31 Aug 84 10 Oct 84
Letter Report on Groundwater Chemistry Along Flow Paths	2.3.4.1.1.A	Blanchard	1	LANL	M354	B	30 Aug 84 14 Feb 85

May 1985

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
 LEVEL 1 MILESTONES IN A TIME WINDOW OF 01 Oct 1984 TO 30 Sep 1985
 Run Date: 24 June 1985

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL
Complete Report on Volcanic Hazards Analysis	2.3.6.1.A	Blanchard	1	LANL	M356	B	28 Sep 84 22 Jan 85
Implementation of Meteorological Monitoring Plan	2.3.6.1.T	Blanchard	1	SAIC	M364	B	01 Jun 85
Start Repository Conceptual Design	2.4.1.S	Skousen	1	SNL	N430	B	30 Sep 85
NNWSI Project Site Specific Repository Design Concepts Report	2.4.1.S	Skousen	1	SNL	N432	B	30 Sep 85
Horizontal Waste Emplacement Equipment Development Plan	2.4.2.2.1.S	Skousen	1	SNL	N406	B	30 Aug 85
Seal Development Plan for Repository to OCRWM for Review	2.4.2.3.1.S	Skousen	1	SNL	M447	B	12 Nov 84 17 Dec 84
Draft Environmental Assessment (Camera ready)	2.5.3.1.T	Blanchard	1	SAIC	M502	B	30 Nov 84 29 Nov 84
EA Comment/Response Document	2.5.3.1.T	Blanchard	1	SAIC	M503	B	30 May 85
Final Environmental Assessment	2.5.3.1.T	Blanchard	1	SAIC	M504	B	20 Jun 85
NNWSI Project References for EA Complete	2.5.3.1.T	Blanchard	1	SAIC	M523	B	01 Aug 84 06 Mar 85
Issue Exploratory Shaft Test Plan (ESTP) (NYO-244)	2.6.9.1.A	Witherill	1	LANL	M666	B	27 Sep 85

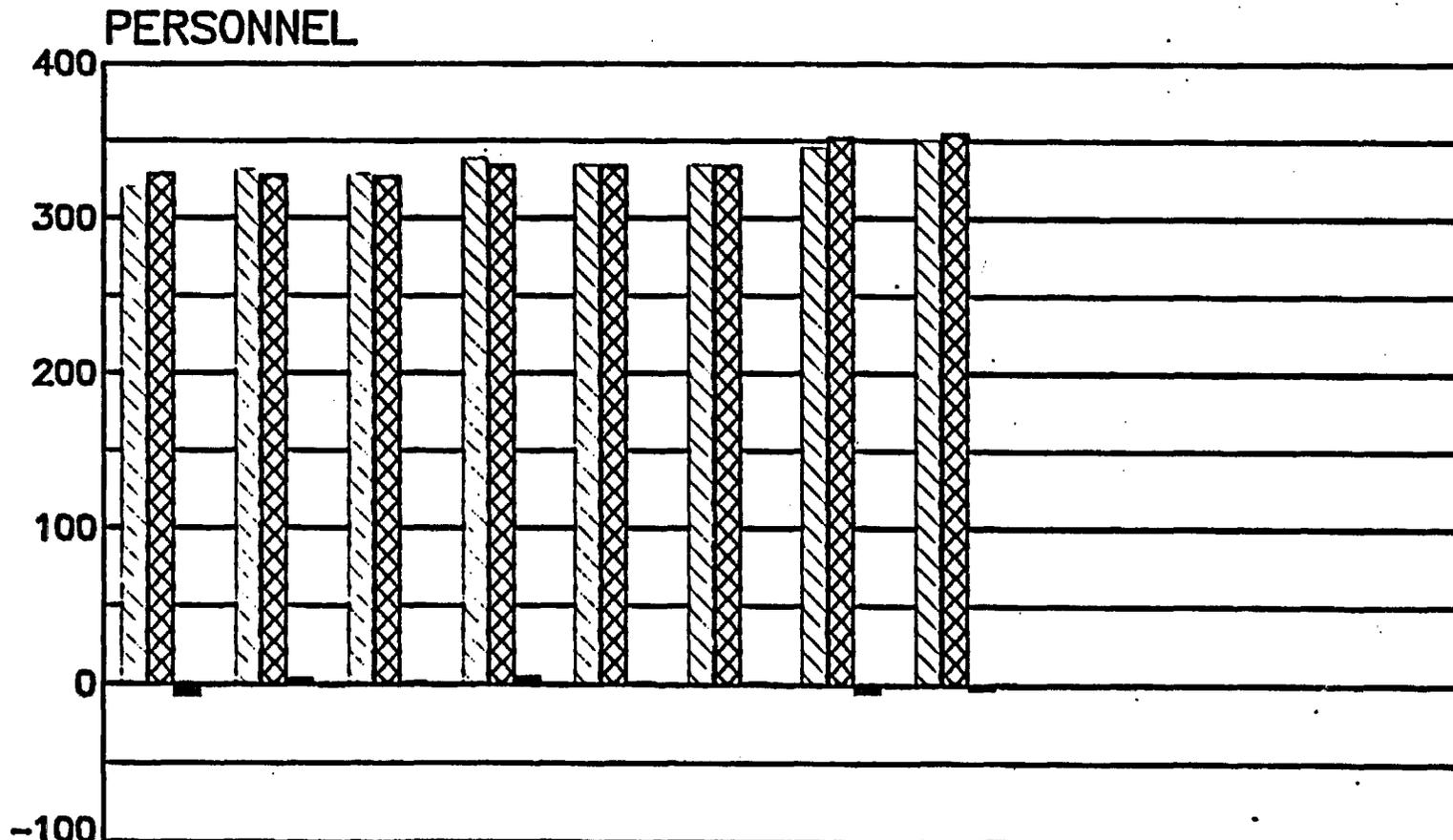
May 1985

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
 LEVEL 1 MILESTONES IN A TIME WINDOW OF 01 Oct 1984 TO 30 Sep 1985
 Run Date: 24 June 1985

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL
Complete Decision Analysis on Use of Climax Facility	2.7.1.L	Kunich	1	LLNL	M706	B	15 Oct 84 06 Jul 84
Final Report on the SFT-C	2.7.2.1.L	Valentine	1	LLNL	M708	B	30 Sep 85
Submit FY 85 NNWSI Project Plan to DOE/HQ for Approval	2.9.1.1.T	Vieth	1	SAIC	M901	B	15 Mar 85 09 Jan 85
Draft Project Management Plan	2.9.1.T	Kunich	1	WMPO	M907	B	29 Mar 85 07 Jun 85
Submit NVO-196-1B (Rev. 2) NNWSI Project Quality Assurance Program Plan and Implementing Procedures to DOE/HQ for Approval	2.9.3.T	Blaylock	1	SAIC	M915	B	30 Nov 84 30 Nov 84

NO. MILESTONES IN THIS REPORT: 27

- NNWSI PROJECT STAFFING -
FISCAL YEAR 1985



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
B	321	332	329	339	335	335	346	351				
A	329	328	327	334	334	334	352	355				
V	-8	4	2	5	1	1	-6	-4				