NNWSI PROJECT

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT

MONTHLY REPORT

FEBRUARY 1985

UNITED STATES DEPARTMENT OF ENERGY

NEVADA OPERATIONS OFFICE

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SUMMARY

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT

FEBRUARY 1985

KEY ACTIVITIES

WBS 2.1, SYSTEMS

A report on preliminary bounds on the expected postclosure performance of the Yucca Mountain repository site provides a basis for concluding that the site will be able to comply with all regulatory requirements for expected post-closure conditions.

The NNWSI Performance-Assessment Plan (PAP) was formulated. Project-wide review of the System Description Document continued. The Tuff Data Base Document was distributed and the User Manual for the Tuff Data Base Interface will be submitted to DOE/HQ in March 1985.

SNL prepared an outline for the PAP. Experiments and modeling at SNL that account for coupled effects will be documented for Project review in March.

WBS 2.2, WASTE PACKAGE

The large fractured Topopah Spring tuff samples went through two dehydration periods and one steam rehydration period at a temperature of 138°C. Impedance camera measurements consistently show the fracture as a drier area during dehydration periods, but during rehydration the images show no contrast between fracture and matrix.

Unexpectedly high levels of sodium, potassium, calcium, sulfate, and chlorine have been observed in the water analyses from the gamma irradiation-corrosion tests of both sensitized and non-sensitized 304 and 304L stainless steel U-bend samples. It appears that crushed rock added to the autoclave system is contributing to these solute species.

The testing of spent-fuel in J-13 water shows that lower releases of radionuclides are related to the J-13 water and not the fuel type.

The actinide-doped glass samples prepared for the unsaturated zone tests appear to be substandard; they have been sent to LANL for a more detailed examination.

WBS 2.3, SITE

Analysis of paleomagnetic samples from Topopah Springs Tuff give a mean direction that is thought to be a good representation of the geomagnetic field at the time of emplacement.

A tectonic model was developed where recent volcanic activity in the southern Great Basin is inferred to be concentrated at the intersection of northeast-trending left slip faults with northwest-trending right slip faults of the Walker Lake structural system.

Analysis of water-level data for response to earth tidal stresses indicates that the relationship is more complex than the linear relationship discussed in hydrologic literature.

A paleoclimate workshop held in Denver revealed evidence of wet- and dry-cycles in sediments from Kawich Playa, Desert Dry Playa, and Walker Lake.

WBS 2.4, REPOSITORY

The G-Tunnel Heated Block experiment and the Horizontal Small Diameter Heater experiment in welded tuff are being demobilized.

A model for both stress- and blast-induced damage in fractured Topopah Spring Tuff at a depth of 250 m has been prepared.

The conclusion has been made that for vertical emplacement, waste age and drift spacing are not important factors in determining horizontal-emplacement drift temperatures. The same standoff can be used for all waste ages to achieve the design goal of less than 50°C at 50 years.

WBS 2.5, REGULATORY/INSTITUTIONAL

A position paper on seismotectonics, with emphasis on the unique aspects of high-level nuclear waste disposal during both the preclosure and postclosure phases of a repository is being prepared for submittal to NRC.

A draft of the SCP Management Plan (SCPMP) was distributed at the February PM-TPO meeting. The final SCPMP will be available at the March PM-TPO meeting.

The EA Public Hearings were conducted on February 25, 26, and 28 in Las Vegas, the town of Amargosa Valley, and Reno, respectively.

WBS 2.6, EXPLORATORY SHAFT

Budget estimates for FY 85 through FY 91 were prepared for WPAS. Current estimates of surface facility needs at the ES site and of locations for IDS junction boxes were provided to LANL.

The formal design review of the IDS conceptual design is substantially complete. The design of the ESF is on schedule to meet the current design completion milestones.

A second phase of core drilling at the G-Tunnel HFEM site has been completed and tests are beginning in a sand pit at LLNL to replicate certain aspects of the G-Tunnel HFEM trials.

WBS 2.7, TEST FACILITIES

A 12-term general linear model was used successfully to analyze the data obtained from three of the four boreholes located in the pillars of the Climax facility. Models were developed for the fourth pillar borehole and for data obtained near two auxiliary heaters.

Assessment of available gas-sampling data indicates that the size of the defect in fuel assembly B02 has not increased since the fuel-rod breach occurred two years ago and that fission product contamination is not expected inside the Fuel Temperature Test.

WBS 2.8, LAND ACQUISITION

No activities were reported this month.

WBS 2.9, PROGRAM MANAGEMENT

The Project Management Plan (PMP) is being drafted. Comments to the Project Plan (PP) from the participants are being considered. Five QA procedures were approved and distributed.

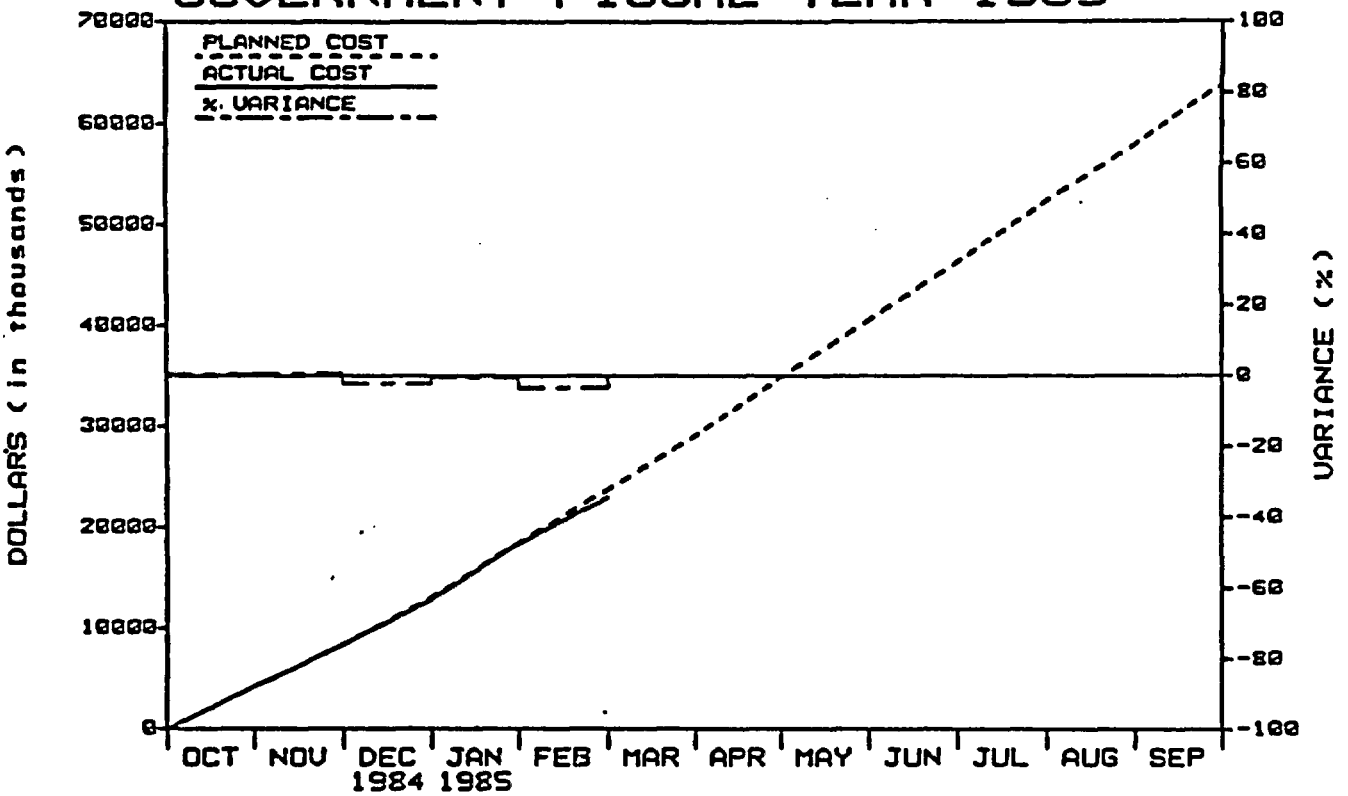
FUNDING OVERVIEW

The month-end programmatic estimated costs were 22,918,000 against a plan of $23,718,000 resulting in a cost underrun of $800,000 through the month of February. The total FY 85 budget for the NNWSI Project is $67,132,000 which breaks down to $64,390,000 in operating funds and $2,742,000 in capital equipment funds.

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

		Plan	Cost	Variance
2.1	Systems	$1,401,000	$1,349,000	$52,000
2.2	Waste Package	2,152,000	1,926,000	226,000
2.3	Site	7,262,000	6,996,000	266,000
2.4	Repository	4,492,000	4,256,000	236,000
2.5	Regulatory/Institutional	1,953,000	1,816,000	137,000
2.6	Exploratory Shaft	2,042,000	2,020,000	22,000
2.7	Test Facilities	817,000	879,000	<62,000>
2.9	Program Management	3,599,000	3,676,000	<77,000>
	Total	$23,718,000	$22,918,000	$800,000

WBS 1.2 NNWSI PROJECT
GOVERNMENT FISCAL YEAR 1985

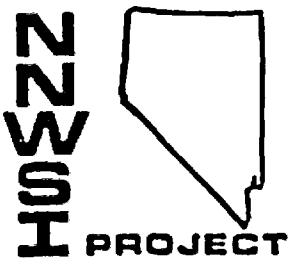


PLAN (X1000)	4183	8414	13143	18471	23718	29038	34800	40491	46235	52200	57781	53778
COST (X1000)	4206	8474	12860	18353	22918	0	0	0	0	0	0	0
VARIANCE (X1000)	-23	-60	283	118	800	0	0	0	0	0	0	0
% VARIANCE	1	1	-2	-1	-3	0	0	0	0	0	0	0

NNWSI PLANNING AND SCHEDULING
BUDGET DISTRIBUTION

FEBRUARY 1985

CONTRACTORS	($000) BEGINNING FUNDING	CHANGE	($000) ENDING FUNDING
SNL	$18,334	-	$18,334
LLNL	8,765	<200>	8,565
LANL	10,130	-	10,130
USGS	9,922	-	9,922
SAIC	7,775	-	7,775
REECo	4,421	3	4,424
H&N	753	-	753
F&S	1,212	-	1,212
WSI	200	-	200
PAN AM	50	-	50
STATE GRANT	1,883	-	1,883
MISCELLANEOUS	533	<3>	530
NTS ALLOCATION	412	-	412
RESERVE	-0-	<200>	200
SUBTOTAL	$64,390	-0-	$64,390
CAPITAL EQUIPMENT	2,742	-	2,742
TOTAL	$67,132	-0-	$67,132



PROJECT STATUS

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

Work leading toward initiation of the NNWSI Systems Engineering Management Plan (SEMP) consisted of contacts with DOE/HQ regarding the requirement that will be placed on the projects for systems engineering and systems-engineering management. An annotated outline and a schedule for writing the NNWSI Performance-Assessment Plan (PAP) was formulated. Personnel were assigned to the separate sections of the document and their time was allocated after a review of time required for high-priority tasks in other WBS elements.

Systems Engineering

Project-wide review of the System Description Document was started in January 1985 and continued in February. Clarified guidelines for the review of the document were sent to designated representatives from NNWSI Project organizations and to contractors participating in the review. Progress meetings were held with Bechtel National, Inc. (BNI), Parsons Brinkerhoff Quade and Douglas (PBQD), and Los Alamos Technical Associates (LATA), three contractors participating in a review of the requirements presented in the System Description.

Technical Data Base Management

The ninth quarterly Tuff Data Base Document, Milestone N101, was produced and distributed to Project representatives.

Version I of the User Manual for the Tuff Data Base Interface was peer-reviewed and is presently in line review. A copy of the manual will be ready for submittal to DOE/HQ during the first week of March 1985.

Two new branches were added to the Tuff Data Base Interface to allow users to report hole location information and references. A preliminary version of the software to create variable helps for the Interface was also completed. Both the help software and reference software are being tested.

Most graphics files of the IGIS were checked, verified (where appropriate), and assigned a release status in preparation for the transition from the old APPLICON Graphics System to the new CALMA System. The Interactive Graphics

Information System (IGIS) hardware has been installed, and GE Calma manufacturing representatives are conducting initial installations tests and software generation. Upon completion of the start-up tests, SNL will commence a 30-day acceptance test to verify hardware performance and compliance with the purchase specifications.

Total Systems Performance Assessment

A report entitled "Preliminary Bounds on the Expected Postclosure Performance of the Yucca Mountain Repository Site", (SAND84-1492J), was submitted for printing. This report provides a basis for concluding that the Yucca Mountain Site will be able to comply with all regulatory requirements for expected postclosure conditions, assuming that current understanding about site conditions is not significantly changed by data gathered during future characterization activities.

Parametric-modeling studies of the unsaturated and saturated flow systems at Yucca Mountain were continued using two finite-element meshes, digitized on the APPLICON graphics system during December 1984. Studies of the unsaturated zone progressed in the area of developing a preprocessing package for use with the finite-element code, SAGUARO. The saturated studies continued by performing runs of the ISOQUAD 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.

The Oklo-site phenomenon was discussed as a potential natural analog for a repository in a now-unsaturated zone to validate radionuclide-transport codes. It appears from early analysis that the majority of the nuclide transport at Oklo occurred during the water-moderated fission period and was due to thermally driven, saturated convection. This makes the Oklo site less attractive as a natural analog to Yucca Mountain because of the effects of hydrostatic pressure or temperature of vaporization.

A congressional paper entitled "Achieving Performance Objectives for the Engineered Barrier System" was reviewed for WMPO. The main conclusion of this congressional study was that at least one of the engineered-barrier components must individually satisfy the one part in 100,000 per year release requirement if the overall system is to meet this same requirement. The SNL review showed why the congressional analysis, and thus this conclusion, is not relevant for an actual EBS system.

A new contract was placed with LBL to initiate the studies to determine whether an equivalent fracture continuum model can satisfactorily be used in the prediction of the near-field environment over a wide range of conditions.

An outline for the PAP was prepared by SNL. One chapter of this document will be devoted to the verification, validation, and documentation of Performance Assessment (PA) codes. The PA models and data needs were summarized for input to Rev. 1 of the Exploratory Shaft Test Plan (ESTP).

Modeling of the experiment for investigating air, water, vapor, and heat flow through tuff was initiated with SAGUARO. An outline was written for the NNWSI Project position paper on coupled testing and modeling. All experiments and modeling at SNL that account for coupled effects were reviewed during February and summarized for input to the position paper. A draft will be completed by March 18, 1985 for Project review.

Work continued on the first volume of the TOSPAC report. Drafts were completed of the sections on the physical and mathematical models for water movement in the unsaturated zone at Yucca Mountain. Calculations and graphics were completed for an example problem: a 200,000-year, two-member chain transport of radionuclides through the unsaturated zone.

PLANNED WORK

Systems Management

A draft of the Program SEMP will be sent by OGR to the projects for comment during March 1985. Following a three-week review, a workshop will be held at DOE/HQ to discuss comments. After any revisions resulting from the comments and workshop, the generic SEMP will be baselined and will impose implementation requirements on the projects. Depending on the outcome of these activities, work on the NNWSI Project SEMP will be started.

Systems Engineering

Project and contractor comments on the System Description will be collected in a workshop or during individual meetings with reviewers in the latter part of March 1985. Review and revision will then start in anticipation of the June 30, 1985 submission of the System Description for Project baselining.

Technical Data Base Management

A preliminary version of the software maintenance manual for the Tuff Data Base Interface will be written in March 1985.

Total Systems Performance Assessment

Work during March and April 1985 will focus on initial modeling of the movement of fluids through the Yucca Mountain site, based on the studies of the unsaturated and saturated zones.

Installation and debugging of the new graphics system will occur during the next few months. Several key staff members will participate in formal training courses for the new system offered by CALMA. When the new system is running correctly and the key graphics-support personnel are trained, the graphics data base will be transferred to the new system.

A meeting has been scheduled for March 18, 1985 at LBL to coordinate the next phase of the near-field hydrological problem evaluation and to review the active participants' steady-state solutions to the geothermal gradient and the saturation profile. In addition, locations and times for common results will be selected, and a schedule for completing this activity will be agreed upon.

In a meeting on February 19, 1985 to discuss the verification and validation studies planned for TOSPAC, the isothermal, one-dimensional infiltration problem was redefined using stratigraphy from USW G-4; this problem will be given to the HYDROCOIN group for benchmarking and to LBL to run with the integrated finite- difference code, TRUST. The major difficulty in doing the calculation with the finite-element code SAGUARO has been the long computer times and residual oscillations in velocities at interfaces, which result when the 4mm/yr

case is run. Similar runs with NORIA, which uses a different numerical solution procedure, even though it is also a finite-element code, do not appear to have the same difficulties as SAGUARO in converging to the steady-state solution provided by TOSPAC. This will continue to be investigated. In addition, the need to couple the hydrologic results to a transport problem was recognized; this work will be defined and run with FEMTRAN as part of COVE.

The water- retention and saturated-conductivity tests of 40 samples from drillholes USW G-1, GU-3, and G-4 and the tests to determine the unsaturated conductivity of tuff samples via a "gas drive" technique developed in the 1950s by the oil industry, and via an "imbibition" technique have begun. Samples for these tests are being obtained and a contract for the testing is being written.

PROBLEM AREAS

Systems Management

Uncertainty regarding DOE/HQ requirements for the SEMP and recent commitments to the Site Characterization Plan (SCP) may require rescheduling Milestone M108 which is currently scheduled for completion on August 30, 1985.

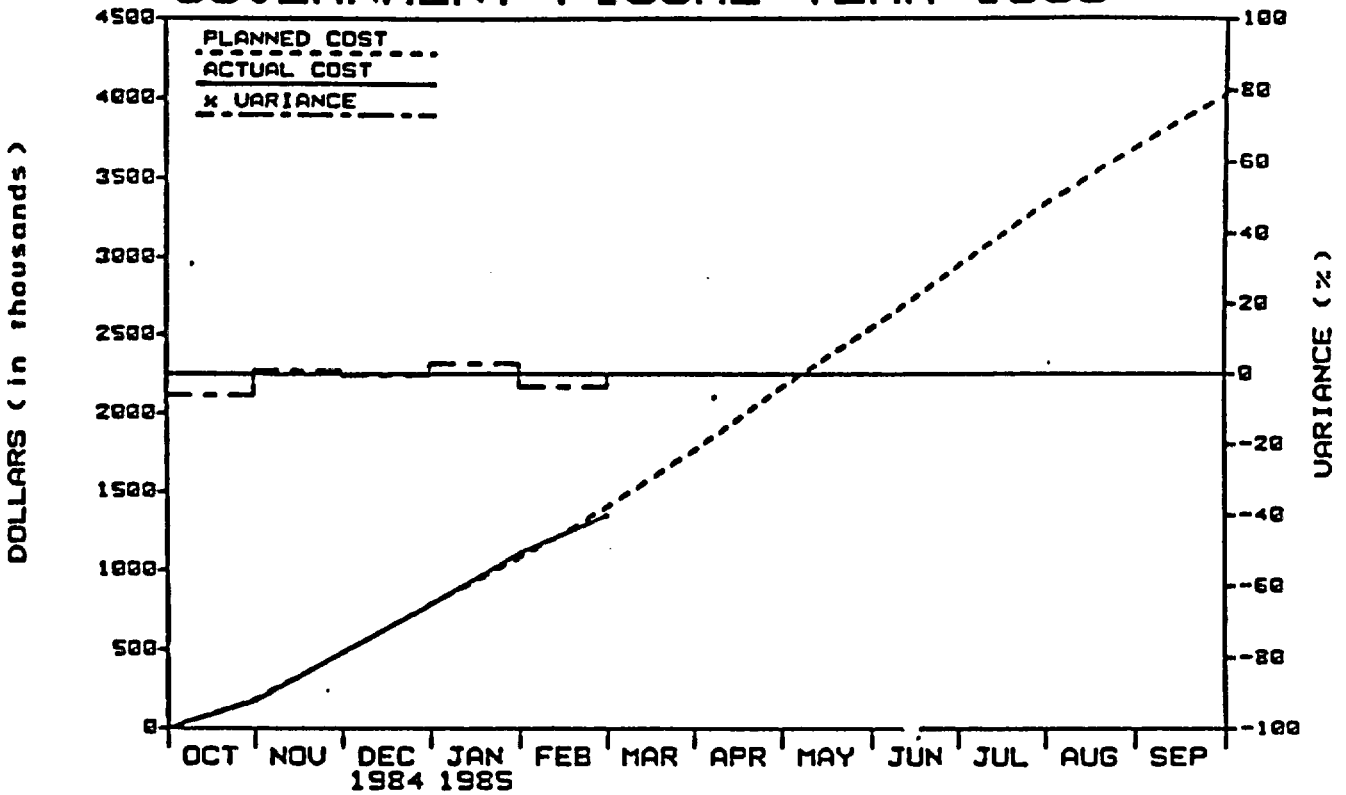
Total Systems Performance Assessment

Progress towards completion of technical work continues to be delayed by other higher priority tasks. In particular, definition of the HYDROCOIN infiltration problem and completion of the COVE1 report are both six weeks behind schedule because higher priority has been given to working on PA input to the SCP, ESTP, the PAP, and work plans at SNL.

Work will continue on the first draft of the TOSPAC report but, because of higher priority planning tasks, the report will not be completed on schedule or in the form originally conceived. A new outline of the report has been made and work assignments for all authors have been changed.

All fracture testing related to hydrological properties has stopped at SNL because staff members who are qualified to run the equipment have been diverted to other work such as QA of data, budgeting, writing "plans," writing WPAS, etc.

WBS 1.2.1 SYSTEMS
GOVERNMENT FISCAL YEAR 1985



PLAN (X1000)	185	477	786	1078	1401	1761	2164	2540	2941	3335	3690	4024
COST (X1000)	174	482	781	1108	1349	0	0	0	0	0	0	0
VARIANCE (X1000)	11	-5	5	-30	52	0	0	0	0	0	0	0
% VARIANCE	-6	1	-1	3	-4	0	0	0	0	0	0	0

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
M151	SNL	1.2.1	Preliminary System Description		△										
M120	SNL	1.2.1	YM Mined Geologic Disposal System Description (System Requirements)										△		
M108	SNL	1.2.1	System Engineering Management Plan											△	
N113	SNL	1.2.1	Performance Assessment Plan												△

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

[WBS.CRF:03/18

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

The two long-term (300 day) experiments currently in progress in the Dickson-type, gold-cell, rocking autoclaves continued with no problems. These experiments will be sampled and terminated at day 303. Solution analyses are complete through the last sample taken at day 241 and are in extremely good agreement with the short-term (66 day) experiments run under identical conditions. The characterization by scanning electron microscope/electron microprobe (SEM/EMP) of the solid core wafers from these long-term experiments will begin immediately.

Sample processing was begun for 10 samples from air-drilled hole UZ-1. The shallowest sample was found to contain large quantities of strongly magnetic material, fragments of which were large enough to be identified as pieces of drill bit and/or drill pipe. Additional samples from air-drilled hole UZ-6 should be received in the near future. Similar experiments will be performed using these later samples.

Solid monoliths (wafers) of the first two samples have been prepared to be run in hydrothermal interaction experiments in the Dickson-type gold-cell rocking autoclaves. The wafers are being polished prior to starting experiments next month at 90°C and 150°C using J-13 water as the reacting fluid. Splits of these samples are being analyzed by x-ray diffraction and neutron activation analysis as part of the characterization process. This research effort will complement previous field studies to evaluate the susceptibility of vitrophyre to thermal alteration by emplacement of HLW in Yucca Mountain.

A draft report documenting techniques for identifying and evaluating potentially unstable rock blocks was completed this month. The draft report shows how the Keyblock Method can be used to identify blocks and compares block occurrences in tunnels of different orientations. A number of approaches for calculating the stability of identified potential blocks were also reviewed, but none include the capabilities that the LLNL models have for treating blocks and stress fields as fully three-dimensional, and for incorporating thermal stresses and nonlinear discontinuity behavior. The draft report documents these models and their development. It also includes back-analyses of blocks that were observed in tunnels at NTS and back-analyses of physical models of blocks that were tested at Imperial College. The report is undergoing technical review and revisions are being prepared.

During February 1985 the larger, fractured Topopah Spring tuff sample went through two dehydration periods and one steam rehydration period all at a temperature of 138°C. The sample is in the fourth rehydration period at 91°C. Electrical resistance was measured continuously from four pairs of electrodes mounted along the sample axis and LLNL continued testing the impedance camera concept by measuring electrical resistance occasionally during dehydration and rehydration periods. Steam permeability was measured twice a day during the steam rehydration period. In this period the steam flow had been steady (almost three days after the application of steam to the sample).

Impedance camera measurements consistently show the fracture as a drier area during the dehydration periods (three images of this have been processed so far); however, images during the rehydration periods still show no contrast between fracture and matrix. In the present rehydration period the water flow direction has been reversed to test the effect of water flow distance on the rehydration image. The measurements have been taken but the images have not yet been processed.

Waste-Form and Materials Testing

Testing of spent fuel in J-13 water is continuing on schedule. The Series 2B tests using Turkey Point Fuel in J-13 water were completed at 181 days and restarted in fresh J-13 water. Analyses of the Series 2A end-of-run samples (H. B. Robinson fuel in J-13 water, completed last month) have been completed and analyses of the Series 2B end-of-run samples are in progress. Ceramographic examination of Series 2B post-test bare fuel particles did not reveal significant intergranular attack.. Neither the Turkey Point nor the H. B. Robinson bare fuel tested in J-13 water showed the extensive intergranular attack which was observed in Series 1 bare fuel particles after the second test run in deionized water. Results from the Series 2A terminal analyses indicated lower total fractional radionuclide release for H. B. Robinson fuel in J-13 water relative to Turkey Point fuel in deionized water. Initial Series 2B results also show lower fractional release, indicating that the lower release is related to the J-13 water and not the fuel type.

Polished cross sections cut out of selected sections of spent-fuel cladding from the 6-month electrochemical scoping test cladding bundle were completed. Optical evaluation is underway and will be completed next month; no corrosion has been observed to date. The 12-month test has continued with no apparent problems except the organic carbon levels have risen to 20 ppm in the one month since the water was completely changed in early January; pH levels remain in the 8.6 - 8.9 range.

The paper, "Low Temperature Spent Fuel Oxidation Under Tuff Repository Conditions," for the Waste Management '85 meeting was submitted for clearance after incorporation of comments by LLNL. "Evaluation of the Potential for Spent Fuel Oxidation Under Tuff Repository Conditions," was cleared for release.

Samples of DWPF glass reacted for 56, 91, and 182 days in the parametric testing program were sent to Argonne National Laboratory (ANL) for analysis of the reaction layer products.

A preliminary examination was conducted of the actinide-doped glass samples prepared by the Materials Characterization Center for use in the unsaturated test method. Because the samples appeared to be substandard, with scratched and chipped surfaces and bubbles in the glass, they have been shipped to ANL to allow a more detailed evaluation.

An LLNL sub-contract to Hanford Engineering Laboratory to study the corrosion of copper and copper alloys in irradiated environments started officially on January 16. Initial tests are expected to be in place by the first week in April. The alloys to be tested are CDA 102, 613, and 715. Weight loss, U-bend, and crevice specimens will be exposed to gamma radiation fields.

LLNL is continuing to investigate the mechanisms by which radiolytic products affect corrosion processes by making measurements of radiolytic products following exposure of sealed ampules containing J-13 water with austenitic stainless steels or copper alloys to a gamma field. Comparison of these measurements with control samples will yield information about the role of the metal surface in the production of radiolytic species and will provide insight into some of the observed contrasts in the radiation-electrochemical behavior of stainless steels and copper alloys which have been noted previously.

Some interesting electrochemical effects were recently noted in the radiation-corrosion of CDA 102 and 715. Under the preliminary experimental conditions, CDA 715 was found to be the more noble of the two materials and galvanic actions were evident between CDA 102 and 715. Care will therefore be taken in long-term corrosion testing (with and without irradiation) to isolate these two materials from each other. More extensive measurements of electrochemical-corrosion parameters (e.g., corrosion potentials, crevice effects) on copper alloys are planned in the near future.

The gamma irradiation-corrosion tests of both sensitized and non-sensitized 304 and 304L stainless steel U-bend samples are continuing at PNL. A 10-month exposure examination has recently been performed. The specimens exhibited no further obvious cracking failure. The specimens were stressed further by tightening the restraining bolts one-half turn each. The 90°C test has now accumulated 12 months and the 50°C test has accumulated 14 months exposure time. The results of water analysis from these tests in the past have been erratic, and unexpectedly high levels of some species, notably sodium, potassium, calcium, sulfate, and chlorine have been observed. It appears as if the crushed rock added to the autoclave system is contributing to these solute species. In the future crushed rock will not be added to the system between specimen examinations.

The 200°C boil-down test was opened for the 6-month specimen examination. Of the thirty 304L stainless steel specimens and the two 304 specimens remaining in the test, none showed any further signs of stress-corrosion cracking. The U-bend specimens were stressed further by imposing a half-turn on the restraining bolt. Another examination is scheduled at 10 months exposure.

The four point-bent stress-corrosion specimens (304, 304L, 316L, and 321 , all in the cold-worked, welded, and sensitized condition) reached 8080 hours of tests with no failures reported. These specimens, each condition represented in triplicate, are being tested in 100°C J-13 well water and steam at stresses

which slightly exceed their yield. Similar tests on cold-worked, welded plate (non-sensitized) of the same four alloys are in the environmental chamber at 150°C with saturated humidity and also in 100°C J-13 water and steam. Again, no specimen failures were reported after 5000 hours.

Experiment 11: In this experiment to determine general corrosion rates and localized corrosion tendencies for 304L, 316L, 321, and I825 (in J-13 water at 50°C, 70°C, 80°C, 90°C, and 100°C), 10,000 hours of examination were completed and all results are recorded on Lotus TUFF disks as well as the Experiment 11 file. The next evaluation is scheduled for May 1985 at 15,000 hours.

Experiment 17: In this experiment to determine corrosion rates of cast iron, 1020, and 9 Cr - 1 Mo under four-point load bent-beam stress conditions in J-13 water at 90°C, the evaluation on February 13, 1985 produced two fractured samples, both nodular iron. The next evaluation is at 15,000 hours on March 28, 1985.

Experiment 21: In this experiment to determine upset resistance welded specimens of 304L stainless steel for stress corrosion, initially only one sample was introduced to a J-13 water medium. This sample was stressed to 50 percent of yield strength and had been checked daily. This sample was restressed to 75 percent of yield and, as of January 23, 1985, has 2080 hours of stress time. Two more samples were added on January 2, 1985; these were both stressed to 75 percent of yield strength and have 1000 hours since January 25, 1985.

Experiment 22: In this experiment to determine corrosion rates of 1020, A36, 9 Cr - 1 Mo, 409, 304, 316L, 317L, 321, 347, and I-825 in J-13 water and steam (100°C), the 10,000 hour examination was completed and all results are summarized in both the file and the computer storage disks. Six new samples of 304L were added to this experiment on February 5, 1985. The 15,000 hour check is scheduled for August 18, 1985 (this will be a 4000-hour evaluation for the 304L samples just added).

Experiment 23: In this experiment to determine four-point load bent-beam survey of 304, 304L, 316, and 321 in 100°C J-13 water and steam, due to a miscalculation in the stress required of these samples, new curves have been generated and have been approved. No fractures were found in the 8000 hours examination of February 21, 1985.

Experiment 33: In this experiment to determine corrosion rate of 304, 304L, 316L, and 321 in humidity chamber of deionized water (150°C) suspended as sensitized four-point bend alloys, no fractures have resulted as of February 21, 1985 (6000 hrs). The next check is April 4, 1985 (7000 hrs).

Experiment 38: In the Gleeble experiment using 304, 304L, 316L, and 321, these samples were introduced to the steam environment on February 8, 1985 and had their 312 hour check on February 21, 1985. No fractures were found. More rack modifications are necessary. The next examination is April 4, 1985 at 1300 hrs.

Experiment 39: In this experiment to analyze canister D-34 from the Nevada Test Site, metallographic sections have been removed and examined. The potential corrosion site has turned out to be an arc strike. An assembly weld that was made from both inside and out has turned out to be incomplete. All information necessary for the report has been collected with completion scheduled in early March.

Experiment 45: In this experiment to prepare specimens and test stress corrosion of thermomechanically processed austenitic stainless steels, the following types of specimens have been cut from each of sixteen plates: slow strain rate, bent beam, weight loss, and electrochemical. The bent beam and weight loss specimens will go on test as soon as the new specimen chambers are installed. The slow strain rate specimens will be tested at PNL under the direction of S. Pitman. The heavily sensitized type 304 will be tested in irradiated and non-irradiated conditions as the "shake-down" tests. The following test will involve 304L and 316L. The 304 tests are now underway.

Experiment 46: In this experiment to test pre-flawed specimen corrosion of copper alloys and austenitic stainless steels, alloys will be "pre-flawed" by electrochemically pitting the samples. The alloys to be studied include 304 (both sensitized and unsensitized), 316L, and CDA 102, 613, and 715. The pre-flawed samples including U-bends, crevice, and weight loss will subsequently be exposed to J-13 water and its concentrated forms at $90^{o}C$. These experiments will begin some time in April.

Design, Fabrication and Prototype Testing

Work continued to evaluate the feasibility of collocating contaminated spent-fuel hardware in the same container with spent-fuel rods. SNL is assessing the feasibility of a resistance welding process for the space frame and is consulting with a major welding company. At LLNL work is now beginning to assess the welding processes and nondestructive evaluation of the final closure weld. Basic engineering analyses are also being done to quantify the space frame performance during routine handling and spent-fuel consolidation operations. At SNL work has been completed on detailed drawings of full-scale waste-package cross-sectional models which will be used for feasibility assessment of the design.

A package of data on the elevated temperature and mechanical properties of copper metals has been received from the Copper Development Association, is being studied, and will be used in the feasibility evaluation of copper container designs to satisfy regulatory requirements.

A waste container design proposed by SNL was thermally analyzed. An analysis was done on the container under the assumption that it contained 10-year-old PWR spent fuel with a decay heat of 5 kW at the time of emplacement. It was found that a peak fuel temperature of $332^{o}C$ occurred 6 years after emplacement and a peak borehole temperature of $239^{o}C$ occurred 12 years after emplacement.

A three-dimensional thermal analysis is underway on a container/space frame for six reactor-consolidated assemblies of PWR spent fuel collocated with spent-fuel hardware (four-module space frame design).

An analysis was done utilizing the three-dimensional, large-deformation, finite element code NIKE3D for modeling of a fully-loaded spent fuel container dropped horizontally 8 feet onto an unyielding rail. After .034 seconds, very substantial plastic deformation to the container and space frame resulted in the area of impact. The level of damage sustained by the container during the simulated impact is too great to meet the performance requirements and a less severe accident scenario will be used for future analyses.

Performance Assessment

Work is in progress to model the hydrothermal boundary conditions at the waste package/host rock interface and to develop and verify a one-dimensional waste-package system model. The near-field hydrothermal emplacement environment is being analyzed with WAFE. Currently, a one-dimensional sealed, horizontal emplacement problem is being used to refine WAFE for long term predictions. A two-dimensional, steady-state problem, the first phase of a model comparison activity involving SNL, LANL, LLNL, and LBL, is also being tested. The results of this test will be discussed by the participants at a meeting tentatively scheduled for March 18, 1985 at LBL.

Work continued to develop specifications and design of a driver routine for the waste-package system model; however most efforts in this area have been directed toward preparation of a system model description and status report for Section 7.4, Research and Development Status - Waste Package Design and Geochemical Interactions, of the NNWSI Project SCP. An outline of the subsection "NNWSI Waste Package Performance Assessment Modeling" has been completed and a draft of this input is in preparation.

PLANNED WORK

Waste Form and Materials Testing

Final assembly and checkout of the "C-ring" stress-corrosion cracking test apparatus is underway with completion expected in March. Installation in the hot cell is expected in April.

A revised version of the report on functions of packing material in the unsaturated zone will be prepared. Permeability and pore fluid chemistry of a core sample of Topopah Spring tuff in a temperature gradient will be measured.

PROBLEM AREAS

Waste Form and Materials Testing

The report entitled "Hydrothermal Interaction of Crushed Topopah Spring Tuff and J-13 Water at 90°C, 150°C, and 250°C using the Dickson-Type, Gold Cell Rocking Autoclaves" had been rescheduled for delivery to WMPO on March 31, 1985; a further one month delay may be necessary due to time spent writing the SCP.

The actinide-doped unsaturated test method samples prepared by the MCC may not be usable due to poor quality of the samples.

LLNL has still not received fabrication reports from the MCC for ATM-1c, 8, and 12 glass materials. The report for ATM-1c was originally promised for April 1984. Numerous verbal and written requests to MCC for the reports have been made. LLNL has experimental data obtained using the glasses that form the subject matter for several milestones. One milestone was slipped six months because of late delivery of the glass from MCC to LLNL. The report cannot be finished without complete fabrication data and the milestone cannot be rescheduled because of no schedule for obtaining the information from MCC.

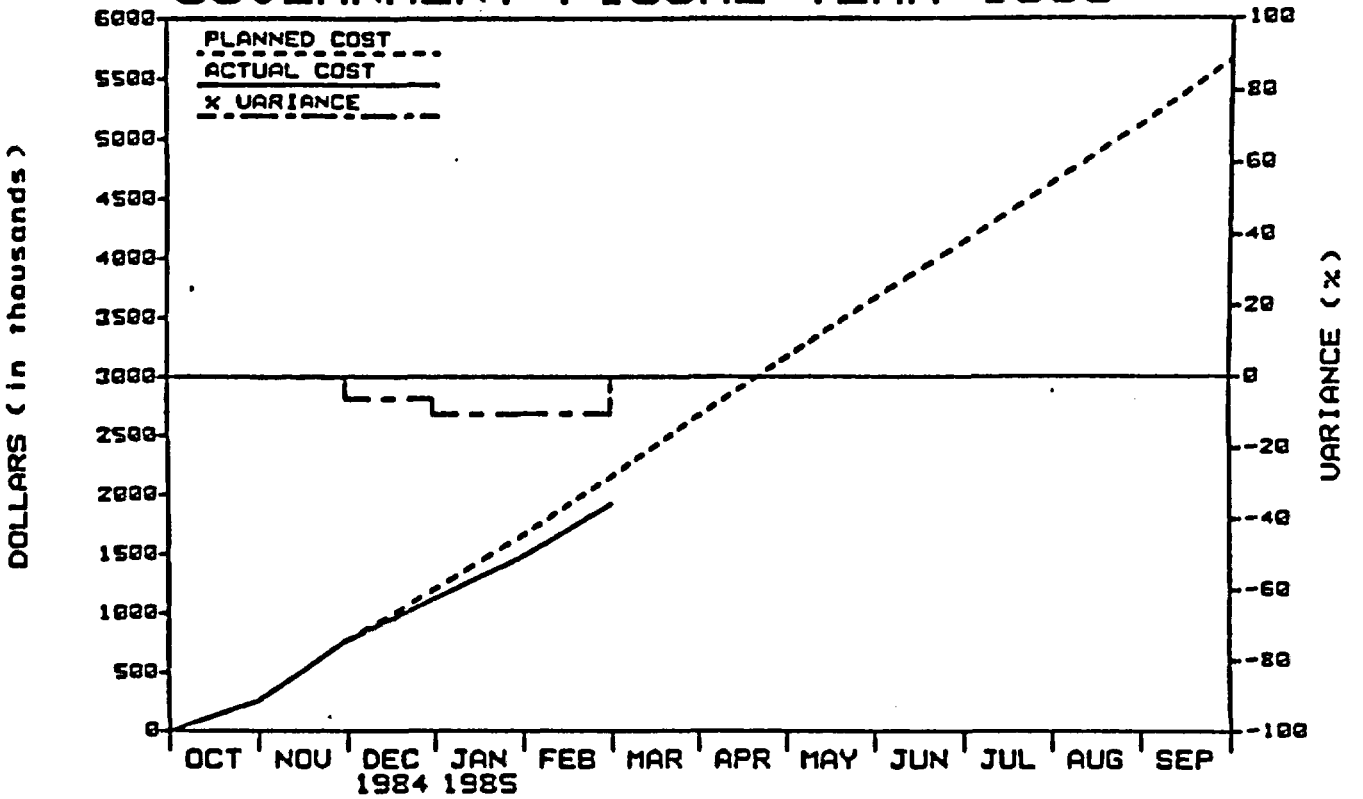
All milestones that involve glass specimens supplied by MCC to LLNL are in jeopardy.

Milestone M235 entitled "Results of Testing Conceptual Design Metal Barrier Materials under Relevant Environmental Conditions for a Tuff Repository" was scheduled as a draft report deliverable to NV on February 28, 1985. Test data are available and the report is in preparation, but recent program administrative requests have delayed completion of the report.

Developing and implementing a test program for copper has had a major impact on personnel in the Metal Barrier subtask. More recently, requests for detailed budget inputs for FY 86 through FY 89 and an extensive update of Chapter 7 and Section 8.3 of the SCP from the 1983 draft have further delayed writing of programmatic deliverables. The delivery date for milestone M235 will therefore be rescheduled after completion of the Metal Barrier parts of the SCP. The estimated delivery date will be May 31, 1985.

Work on the experiments for the other materials subtask is being delayed because of inability to get the needed drill core sample.

WBS 1.2.2 WASTE PACKAGE
GOVERNMENT FISCAL YEAR 1985



PLAN (X1000)	252	771	1200	1657	2152	2657	3157	3651	4143	4631	5113	5662
COST (X1000)	252	769	1124	1480	1926	0	0	0	0	0	0	0
VARIANCE (X1000)	0	2	76	177	226	0	0	0	0	0	0	0
% VARIANCE	0	0	-6	-11	-11	0	0	0	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	1.2.2	Establish Interim Product Specifications			◇									
M222	LLNL	1.2.2	Input to DOE/HQ Rpt. to Congress on Copper for WP											△	
M251	LLNL	1.2.2	Pre-closure Analysis of selected Conceptual Designs			◆									
M231	LLNL	1.2.2	Complete WP Conceptual Design Criteria						△						
M233	LLNL	1.2.2	Initiate WP Advanced Conceptual Design							△					

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

[WBS.GRP:03/18/

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

Geology

Fracture logging of test hole USW G-4 and increasingly refined mapping of existing bedrock pavements continued. Preparation of reports on fracture networks mapped on the pavements has begun. Final editorial revisions con-t'nued on two QA procedures, mapping fractures on pavement outcrops and along traverses and logging fractures in core.

A request was submitted to USGS, Denver for the 400-ft aeromagnetic drape survey data in the southwest NTS. When the material arrives, profiling and modeling of the aeromagnetic data near Yucca Mountain will be possible.

The reports "Comparison of Survey and Photogrammetry Methods to Position Gravity Data, Yucca Mountain, Nevada, and Handtc a FORTRAN Program to Calculate Inner-zone Terrain Corrections" received Director's approval for publication.

An array of about 10 seismometers located generally along the southern part of Calico Hills received signals from each of ten 2000-lb shots located at about 5-mile intervals along Fortymile Wash during the period February 15-17. Travel time and amplitude analyses will be undertaken primarily to help determine the structure causing the tenfold focusing of seismic energy in Jackass Flat from nuclear explosions in Pahute Mesa reported by Vortman.

Paleomagnetic samples collected at 2 to 3m stratigraphic intervals from five 100 to 350 m thick sections of the Topopah Spring Tuff have been analyzed. Remanent directions from a partially welded section located near the distal margin of the ash-flow sheet are well grouped and give a mean direction that is thought to be a good representation of the geomagnetic field at the time of emplacement. In the thicker more densely welded sections, inclinations from the upper parts of the sheet are steep but flatten with depth to values as low as 20^{0}, and then steepen abruptly as the degree of welding decreases near the base of the unit.

Thermal demagnetization demonstrates the existence of multiple components of remanence in samples from the vitric base of the ash-flow sheet. The high temperature (early) components have low inclinations which progressively steepen with decreasing blocking temperature. An "inclination error" (analogous to that in some sediments), produced by post-blocking temperature rotation of the magnetic grains, can account for the observed variations. It is inferred that magnetic grains from the interior of the sheet have high blocking temperatures and so undergo a large proportion of the total grain rotation due to welding (flattening) after acquiring their magnetization.

A report on a new technique to correct sonic logs for cycle-skipping and misidentification errors in the first arrival travel time was submitted for DOE approval. The method substantially increases the reliability of some log velocities. Further tests are needed to draw final conclusions, but it can be speculated that the correction curve generated by application of the new method can be used to identify possible water producing zones prior to pumping tests and to trace some fractured zones between drill holes.

Site Stability

Data on the tectonic setting of volcanism in the southern Great Basin was reviewed using the newly published work on the tectonic setting of Yucca Mountain by W. J. Carr. A tectonic model was developed where recent volcanic activity in the southern Great Basin is inferred to be concentrated at the structural joint of northeast-trending left slip faults with northwest-trending right slip faults of the Walker Lane structural system.

Peer review for the regional tectonic synthesis project was conducted. It was concluded that studies of pre-volcanic basin configurations are needed to establish amounts of Late-Cenozoic displacement and detailed studies are needed of slip direction along master fault systems throughout the region surrounding NTS to gain understanding of past and present state of stress in the region.

The Rock Valley trench logs, which have received two peer reviews, have been revised before being sent to the third and final review.

A report on uranium-series ages of calcite, opal, and stable isotope composition of calcite and from drill cores at Yucca Mountain was sent to WMPO for approval. The report on uranium-trend dating of Quaternary age deposits in the Nevada Test Site area, Nevada and California, is still in the review process.

Field reconnaissance of possible Quaternary surface faulting at high seismicity areas in the region of NTS was conducted. Operation of the seismic network for seismic risk analysis continued.

The Weapons Test Seismicity task will acquire seismic data to document ground motion at Yucca Mountain due to weapons testing at the Nevada Test Site (NTS) to establish design criteria for surface and underground facilities and to support the safety analysis of these facilities.

Hydrology

Analysis of water-level data for response to earth tidal stresses indicates that the relationship is more complex than the linear relationship discussed in the hydrologic literature. Higher frequency components appear to be attenuated and shifted in phase, as the diffusion equation predicts. Techniques for correcting water-level data using the spectral characteristics of the data are being developed.

A program for reconfiguring the UE-25c tracer site for both drift/pumpback and convergent tracer tests was developed and work will be done during March. A bridge plug and low-yield pump will be installed in UE-25c#2, for the drift/pumpback test. The pump will be replaced by a larger pump for the convergent tests. Packers will be installed in c#1 and c#3 for isolation of permeable zones so that different tracers can be introduced into these zones, and breakthrough observed in c#2 at a later date.

Kriging has been completed on data from drillers' logs and VES resistivity data from the Amargosa Desert. Results will be used to determine correlation between the data sets, to estimate permeability variations from the resistivity data for refinement of models predicting water-level rise beneath Yucca Mountain during periods of greater recharge.

Hourly measurements representative of water-level changes are automatically recorded at five wells (UE-25b#1, UE-25 WT#13, and USW H-1, H-4, and H-5) and automation at additional wells is continuing.

The water-level data typically show daily fluctuations of up to 5 cm, and fluctuations on the order of 0.25 meter for periods of up to a week. The data appear to show effects of pumping of UE-25c#3 during October 30 - November 15, 1984 at USW H-4 (2.6 km away) and at UE-25b#1 (3.1 km away).

Data from USW H-4 show a decline of several meters in head during late February. The change has not been confirmed by independent measurement methods, and the probable cause for a significant decline is not known.

The preliminary UZ hydrology numerical model draft report was completed and is undergoing an SAIC/Golden internal review. The report is scheduled to be submitted to the USGS for review and comment by the end of March.

(The following report was received too late for inclusion in the January 1985 monthly progress report, but because of its relevance, it is reported this month.) On January 22 and 23, 1985, a paleoclimate workshop was held in Denver, Colorado. The following is a summary of those findings:

1. Evidence of wet- and dry-cycles was found in sediments from Kawich Playa, Desert Dry Playa, and Walker Lake.

2. The accumulation of sediment in playas in a discontinuous fashion and the fact that playas lack a continuous source of water-borne sediment even in "pluvial" periods result in low rates of sedimentation relative to present-day deep-lake systems.

3. Perennial deep-lake systems provide a relatively equitable environment in which a large variety of flora and fauna persist even in "dry" periods. Changes of climate may, therefore, entail significant changes in, but not the complete destruction of, the biotic assemblage. Playa ecosystems, however, tend to react more strongly to changes in climate. When climate becomes arid, the playa often desiccates with the consequent destruction of the entire biotic system. During a period of aridity the playa may suffer loss of paleoclimate information as the result of sediment deflation and disruption.

4. Desert Dry Playa sediments were found to contain no diatoms, ostracods, or pollen, which may indicate a lack of preservation and massive information loss during periods of desiccation, or it may indicate that the climate of the region has been characteristically dry for the past several hundred thousand years.

5. Various lines of evidence indicate that Walker Lake has desiccated several times in the last 350,000 years. More work needs to be done to determine if certain of these desiccations resulted from the capture of the Walker River by the Carson River Drainage and were therefore not climate-related. This will involve the coring of Owens Lake and the southeast shore of Walker Lake.

6. Two playas (Frenchman and Yucca Flats) located near Yucca Mountain should be trenched and hand augered, to determine the existence (or absence) of paleo-lake sediments.

7. To relate changes in diatom, pollen, and ostracod populations observed in core samples to changes in past climate, it will be necessary to calibrate present-day population distribution with climate.

8. A preliminary reconnaissance of the region which lies between Yucca Mountain and Walker Lake and Owens Lake indicates the existence of a large number of pack rat middens. Several samples from each of those middens should be analyzed and age-dated to provide information on the degree of synchroneity of change in paleoclimate.

9. A sedimentologist who can devote at least a half man-year of time to this program is needed to interpret the paleoclimate implications of the playa and lake depositional records, and to provide and implement quality-assurance procedures that protect against the taking of unreliable samples from core sections.

Geochemistry

Filtration of particulates from water being pumped from Well J-13 is continuing. A serial filtration through seven parallel sets of 0.4- and 0.05-μm Nuclepore membranes is being attempted. A peristaltic pump has been sent to the NTS for installation in-line with the membranes to provide a constant pressure to the water to the filter assembly.

A summary of a paper entitled "^{36}Cl Measurements of the Unsaturated Zone Flux at Yucca Mountain" was submitted for the International Topical Meeting on High-Level Nuclear Waste Disposal, to be held in Pasco, Washington, from September 24-26, 1985.

The chlorine-36 data obtained from soil samples at Yucca Mountain to measure infiltration during the past 30 years indicate that much of the chlorine-36 bomb pulse at the Exploratory Shaft (ES) site has been removed by washout since deposition. Additional data would help define the extent of vertical recharge at that site. The Yucca Wash-6 data do not show any loss by washout.

The chlorine-36 Water Movement Tracer test for the ES has been rewritten for inclusion in NVO-244, Rev. 1.

The thermodynamic model for analcime has been revised. Contributions to the entropy of mixing from mixing on different sets of sites can be calculated separately and can then be summed to obtain the total configurational entropy. There is considerable scatter in the data, but they suggest that water content increases with increased silica content. Although the data indicate the unlikelihood of invariant water content of analcime, they do not completely rule out this possibility. If the water content is invariant, there would still be no contribution to the configurational entropy from the distribution of water in the structure, but the free energy of the solid solution and the chemical potentials of the end members would be affected.

A number of batch sorption measurements were made using feed solutions prepared by spiking J-13 water with specific oxidation states of plutonium in a bicarbonate solution. The core sample was highly zeolitized. The measured sorption ratios were very low.

Work with pure minerals has begun and two crushed samples of high-purity clinoptilolite were treated to convert them to the sodium form. Both samples are being analyzed to measure the conversion. When conversion is complete, sorption isotherm measurements will begin.

The test plan for the in situ measurement of diffusivity coefficients in the ES was approved for inclusion in NVO-244, Rev. 1. This test plan is being rewritten to include the results of TRACR3D modeling of the experiment and a sensitivity analysis of the expected data.

The uranium thermodynamic data in the data base are being updated and compared with data from experimental determinations of the solubility of the uranium mineral schoepite and from recent experiments done at Stanford and HEDL.

Problems in the thermodynamic data base encountered during validation calculations of pH buffer solutions used for single mineral dissolution kinetics studies have been corrected.

Retardation Sensitivity Analysis

Solicited contributions from the task force organized to identify and characterize the significant of coupled processes affecting the performance of a potential nuclear waste repository at Yucca Mountain, were reviewed at Los Alamos. A detailed outline was written for the position paper concerning coupled processes at Yucca Mountain.

A statistical sensitivity study is being conducted of the three-dimensional mass and tracer transport code, TRACR3D.

Data on the effect of particle size, concentration, and sorption time on sorption values suggest the presence of an additional influential factor affecting the measurements. The Statistical Group is designing two experiments to determine the effects of tuff particle size and of mineralogy on measurements of R_d values.

Results for chlorine-36 dating of pore water indicate that while small velocities (about 1 mm/yr) will be estimable within a few percent for the range of measurement errors considered (up to 20 percent), the expected accuracy of velocity estimates decreases rapidly with velocity. Diffusion experiment results, by comparison, can be quite precise even for measurement errors as large as 50 percent because the predicted concentration distribution in the overcored sample changes dramatically as diffusivity increases.

Mineralogy and Petrology

Software modifications have been made to the Siemens x-ray diffraction system so that instrument contribution to the diffraction profiles can be deconvoluted from the profiles obtained on tuff samples to improve accuracy. Work proceeded on the collection of strontium-87/strontium-86 data that will be interpreted in light of differing zeolite formation hypotheses. A report on past hydrothermal alteration at Yucca Mountain is now 90 percent complete; results of this report place thermal limits on past alteration and on zeolite and clay stability based on the geologic record at Yucca Mountain. Poorly crystallized erionite has been positively identified in a fracture from drill core UE-25a#1 at 1296 ft. This occurrence is significant because of health and environmental concerns that relate erionite to mesothelioma.

PLANNED WORK

Geochemistry

The chlorine-36 in two samples collected last June at the ES site will be measured to help define the extent of vertical recharge at that site. The next available time for such measurements at the University of Rochester tandem accelerator is likely to be in May or later.

The assembly of laboratory equipment, clean reagents, and radioactive tracers will continue. Analyses will be performed on the blank solution and a J-13 water sample to develop the analytical techniques and counting methods necessary.

The report on the thermodynamic model for analcime will be updated to extend modeling of kinetic controls on the distribution of silica polymorphs in Yucca Mountain and to make a detailed examination of the feasibility of using solubility measurements to determine thermodynamic properties for zeolites.

Statistical Analysis

A sensitivity analysis of analytic solution to the radionuclide transport problem for major parameters with probable extension to the TRACR3D model for several layers is being planned.

Kriging programs to accommodate major faults in the exploratory block will be revised.

Involvement with coupled testing and Performance Assessment will result in a slight delay in delivery of Milestone M323 which is due April 15.

The preparation of NVO-244, Rev. 1 will require participation by the Principal Investigator (PI) of the ES diffusion test at the "edit-in" to be held March 11-15.

Mineralogy and Petrology

During March, most mineralogy/petrology effort will go into writing and revising the Work Plans that will form the basis of Chapter 8 of the SCP, the technical input for Chapter 4 of the SCP, and a scope-of-work statement for studies necessary to resolve the origins of fault-related minerals at Yucca Mountain.

Out-year milestones are being revised to accommodate the impact of fault-related mineralogy studies.

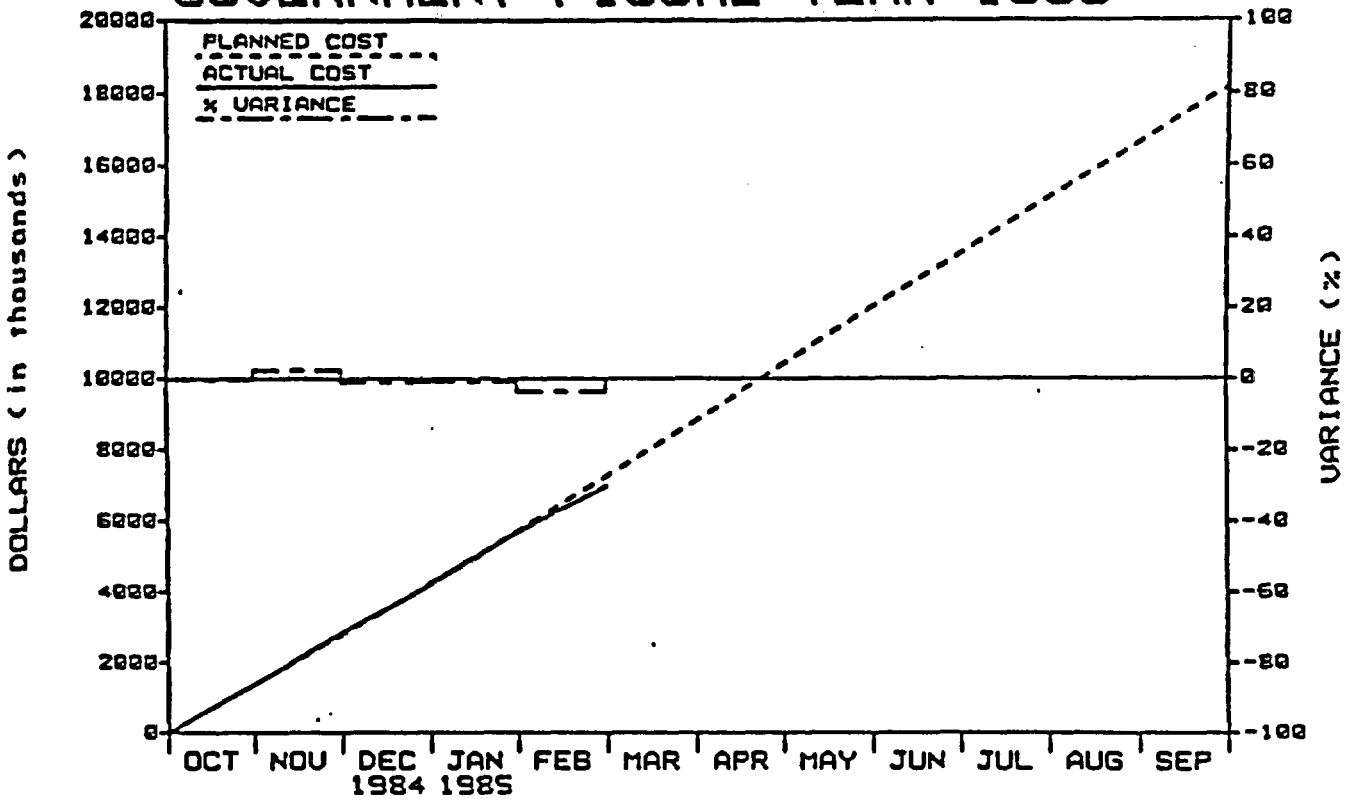
PROBLEM AREAS

Experimental problems have caused a delay in gathering the data for the Milestone M318 report. A final decision on the date of the report will be made soon, but it will certainly be delayed.

Milestone M331 is being delayed because it is dependent on the x-ray diffraction studies, which have also been delayed.

X-ray diffraction data collection has been delayed because WMPO/NV requested that personnel be used to obtain data on fault-related mineralogy instead.

WBS 1.2.3 SITE INVESTIGATIONS
GOVERNMENT FISCAL YEAR 1985



PLAN (X1000)	1392	2797	4244	5733	7262	8795	10393	11995	13497	15086	16615	18153
COST (X1000)	1386	2861	4200	5685	6996	0	0	0	0	0	0	0
VARIANCE (X1000)	6	-64	44	48	266	0	0	0	0	0	0	0
% VARIANCE	0	2	-1	-1	-4	0	0	0	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	1.2.3	Letter Rpt. on Groundwater Chemistry along Flow Path	◆											
M357	SNL	1.2.3	Weapons Test Seismic Rpt.				△								
M358	USGS	1.2.3	Complete Paleobotany Study of Yucca Mountain	△											
M356	LANL	1.2.3	Complete Rpt. on Volcanic Hazards Analysis		◆										
M355	LANL	1.2.3	Progress Rpt. on 3-D Mineralogic Model of YM	◆											
M364	SAIC	1.2.3	Implementation of Meteorological Monitoring Plan									△			

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

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

Development and Testing

An internal SNL review of the Conceptual Design Report (CDR) annotated outline was completed and review comments have been incorporated into the outline. The outline now has a one-to-one correspondence between CDR sections and subsections and the design activities identified in the WBS. A draft document of the Conceptual Design Plan has been prepared and submitted for internal review.

BNI and PBQD were directed to begin work on the Functional Design Criteria (FDC) on February 25, 1985. A preliminary FDC table of contents and a preliminary document development schedule have been prepared.

Plans for Bow Ridge (and other) fault characterization include development of a strategy and methods for the field and analytical studies needed to safely site repository facilities near the Bow Ridge and other possibly active faults. The work will proceed in parallel with the development of the seismic position paper, which will develop a rationale and licensing approach for the investigations. BNI will perform the work needed to develop the plan in concert with SNL.

Rock Mechanics

"Analysis of the Elastic and Strength Properties of Yucca Mountain Tuff, Southern Nevada" presents an up-to-date summary of elastic and strength property measurements of tuff from Yucca Mountain and their relationship to porosity. The abstract "Implications About In Situ Stress at Yucca Mountain" presents a summary of regional geologic studies that pertain to the stress state at the NTS, stress measurements at the test site and finite-element calculations of the gravity-induced component of in situ stress at Yucca Mountain. These papers will be presented at the 26th U.S. Symposium on Rock Mechanics in Rapid City, SD.

A paper entitled "Thermal Cycle Testing of the G-Tunnel Heated Block" was sent to WMPO for policy review.

Work has started on the demobilization of the G-Tunnel Heated Block Experiment. Part of the elevated floor has been removed, as has instrumentation. A drill crew has moved in and four cores will be obtained. Work has also started on the demobilization of the Horizontal Small Diameter Heater Experiment in welded tuff.

The horizontal-drill development program plan has been completed.

The paper entitled "Retrieval of Spent Fuel from a Repository in Tuff" is in formal peer review.

Sealing

LANL has completed a revision of the fault seal/boundary dissolution model and is working on the seal degradation position paper.

Penn State has revised and is reviewing its report on the dissolution model to calculate the dissolution rate of a grout seal in a tuff environment.

The report entitled "Repository Sealing Plan for the Nevada Nuclear Waste Storage Investigations--Fiscal Years 1984 through 1990" has been sent to the printers. The report entitled "Hydrologic Calculations to Evaluate Backfilling Shafts and Drifts for a Prospective Nuclear Waste Repository in Unsaturated Tuff" has been sent to WMPO for policy review. A report entitled "Numerical Analyses to Evaluate Backfilling Repository Drifts in Unsaturated Tuff" has been prepared for submission to Waste Management '85.

Milestone N411, Response to LANL on QA Levels for the Exploratory Shaft, has been completed. A presentation describing the results of this milestone was given at the February 1985 TPO meeting and reviews on this milestone were requested from the TPOs by the latter part of February.

Permeability testing of the tuff concrete was completed. Testing of four concrete cylinders and their simulated borehole specimens was conducted using the Hossler-type permeability rig. The tests were made using the steady-state technique as well as the pulse-transient technique for permeability determination.

Revisions to the hydrological-analyses report are in progress. Activities completed in this reporting period include addition of a brief description of flow mechanisms in fractured tuff, calculation of flow from the sump using the method of Reynolds et al., and editorial revisions. The sections of the report describing shaft and drift analyses are about 95 percent completed. The first phase analysis, in which no flow is allowed to occur through the rock mass, was completed. A second phase analysis, which examines the significance of flow through the rock mass, is in progress. Additional thermodynamic calculations are in progress to evaluate the conditions under which thermal instability (i.e., convection) will develop in the rock.

A model for both stress-induced and blast-induced damage in fractured Topopah Spring tuff at a depth of 250 m has been prepared.

Facilities

Milestone N449 was completed by the forwarding to WMPO the report, "Location Recommendation for Surface Facilities for Prospective Yucca Mountain Nuclear Waste Repository." The reference conceptual site east of Exile Hill is recommended for use during Conceptual Design and will be described in the SCP.

Work for the surface facilities has been postponed until FY 86 due to the realignment of CDR schedules by DOE/HQ to bring all Project activities to a uniform program timetable.

The paper entitled "Yucca Mountain Repository Monitoring Development Methods" will be reviewed for acceptance at the International Topical Meeting on High-Level Nuclear Waste in Pasco, Washington to be held in September 1985.

A brief design and cost study for ramped entry into the exploratory facility has been completed.

An underground area and facility identification has been developed with areas identified and described as Spent Fuel (SF) disposal area, DHLW disposal area, special test and training area, West Valley high-level waste disposal area, performance confirmation areas, and contact handled low-level waste (CHLW) emplacement area.

Standards for work-day length, working shifts per day, work days per year, etc. have been established. These standards will be used for crew sizing and operational costing of underground operations.

Emplacement and retrieval ventilation philosophy has been documented. This document dictates design criteria pertinent to normal inspection, cooldown for retrieval, number of simultaneous operations (emplacement or retrieval), etc.

Decommissioning

Three memos, based upon thermal-decay data supplied with Appendix B of the GR have been submitted to peer review: they are "Allowable Thermal Loading as a Function of Waste Age," "Effect of High Burnup Fuel on Underground Facility Design," and "Thermal-Decay Curves for Pressurized Water Reactor (PWR) and Boiling Water Reactor (BWR) Spent Fuel Waste."

Borehole and rock-temperature calculations based upon the new thermal-decay functions and the latest description of the waste have continued. A conclusion drawn from work in February 1985 is that for vertical emplacement, waste age and drift spacing are not important factors in determining horizontal-emplacement drift temperatures; hence, the same standoff can be used for all waste ages to achieve the design goal of less than $50^{o}C$ at 50 years.

The work plan for Preclosure Safety Analysis is being revised in accordance with the revision of plans for the repository design activities and the revision of the NNWSI Issues Hierarchy that are underway.

PLANNED WORK

Development and Testing

Milestone N430 will be renamed "Start Advanced Conceptual Design" to differentiate it from the design that will be identified as the conceptual design in support of the SCP. Work will begin in June 1985.

A network will be developed during the week of March 4, 1985 to establish a work plan for NNWSI Project Site-Specific Repository Concepts Report, Milestone N432.

The revised CDR annotated outline will be submitted on March 11, 1985 to SNL staff, BNI, PBQD, and LATA for review and comment.

Various sections of the Functional Design Criteria will be written, coordinated, and reviewed for correctness to satisfy Milestone N433.

The final draft of the seismic-design-basis report will be reviewed by SNL on March 11-12, 1985 and then be prepared by J. A. Blume for formal draft presentation in Albuquerque on April 2, 1985. The final draft report will be submitted to SNL on April 22, 1985 to complete Milestone N446.

Rock Mechanics

The personnel ramp to connect the U12g.12 drift and the working area in the welded tuff at G-Tunnel should be completed in March 1985.

Considerable effort will be devoted to support (through writing and editing) sections 6.1.2, Repository Design Basis, and 6.3.4, Strength of the Rock Mass, of Chapter 6 of the SCR.

Draft reports on the mechanical properties of the Topopah Spring Member in USW G-4 and in USW G-2 will be completed.

Laboratory-testing characterization of the bulk, thermal, and mechanical properties of tuff samples from existing deep core holes at Yucca Mountain will be completed.

Work will be initiated on conceptual design of a system to emplace and retrieve Defense High-Level Waste (DHLW).

Sealing

Low-temperature minerals compatible with sealing material bulk chemistry will be identified.

The analyses for the LANL Milestone N411 will be modified, if appropriate, following the reviews from the Project. A presentation on the hydrologic calculations used to develop the sealing concepts will be presented at Waste Management '85.

Work will continue on the preparation and revision of the dissolution and degradation models and on the identification of low-temperature mineral phases important to sealing-materials evaluation.

Work will begin on a position paper on the impact of mineral precipitation on seal performance.

Further definition of flow and transport mechanisms in heated conditions, evaluation of silting potential in the shaft sump, floor drainage in the ramps, borehole analyses, and consideration of the effects of boreholes or shafts penetrating into or through the Calico Hills is required to complete hydrological analysis.

The problems using UNSAT 2 will be considered for future analyses. These include groundwater inflow to a shaft in extreme infiltration conditions, flow towards a drift in a fault zone and the effect of grouting in a horizontal emplacement hole.

Facilities

The Seismic Position paper outline was reviewed, and comments have been returned to WMPO; a working outline will be prepared in Las Vegas on March 1, 1985.

Development of a Scope of Work (SOW) for a new contract with the surface facility A/E will begin in late April 1985 to assure that a new contract can be placed by the first of FY 86.

Decommissioning

A lapse in money on the RE/SPEC contract has caused a slowdown in calculational support from them. A new contract has been written and is currently in line review.

In March 1985, further thermal calculations will be done to determine functional design criteria for the underground facility layout.

PROBLEM AREAS

Development and Testing

The work load for both BNI and PBQD is such that several tasks require deliverables at approximately the same time as the NNWSI Site Specific Repository Concepts Report, Milestone N432. Both contractors have asked for some schedule relief, if it can be arranged. This activity is currently on schedule but may be influenced by the contractor's work load.

A tight production schedule will require special attention on Milestone N433, Initial Functional Design Criteria.

Rock Mechanics

The draft report on the G-Tunnel Heated Block Experiment, (Milestone M433) will not be ready in time to meet the April 30, 1985 deadline. The principal investigator is heavily involved in Exploratory Shaft Test Plan activities and continued heavy involvement is anticipated through at least March 1985. Also, the demobilization effort will take additional time because of unavailability of a drill crew until late February 1985.

Recent personnel departures from SNL have resulted in an indefinite delay in the SNL portion of the parameter effects (temperature, pressure, saturation, strain rate) mechanical testing. The correlative work at RE/SPEC has begun, with equipment calibration approximately 90 percent completed.

Shakedown measurements of the normal and shear response of induced tensile fractures in tuff will continue with a view towards perfecting techniques and evaluating stress-displacement functional relationships currently being used in the compliant-joint material model. The recent loss of a technician from SNL will impede this experimental program.

Because of other commitments, the draft SNL report analyzing in situ stress at Yucca Mountain was not completed this past month. Continued work in this area is not planned for next month because contractor support has lapsed. A detailed outline has already been developed and the report's completion is contingent upon time commitments to other tasks.

Facilities

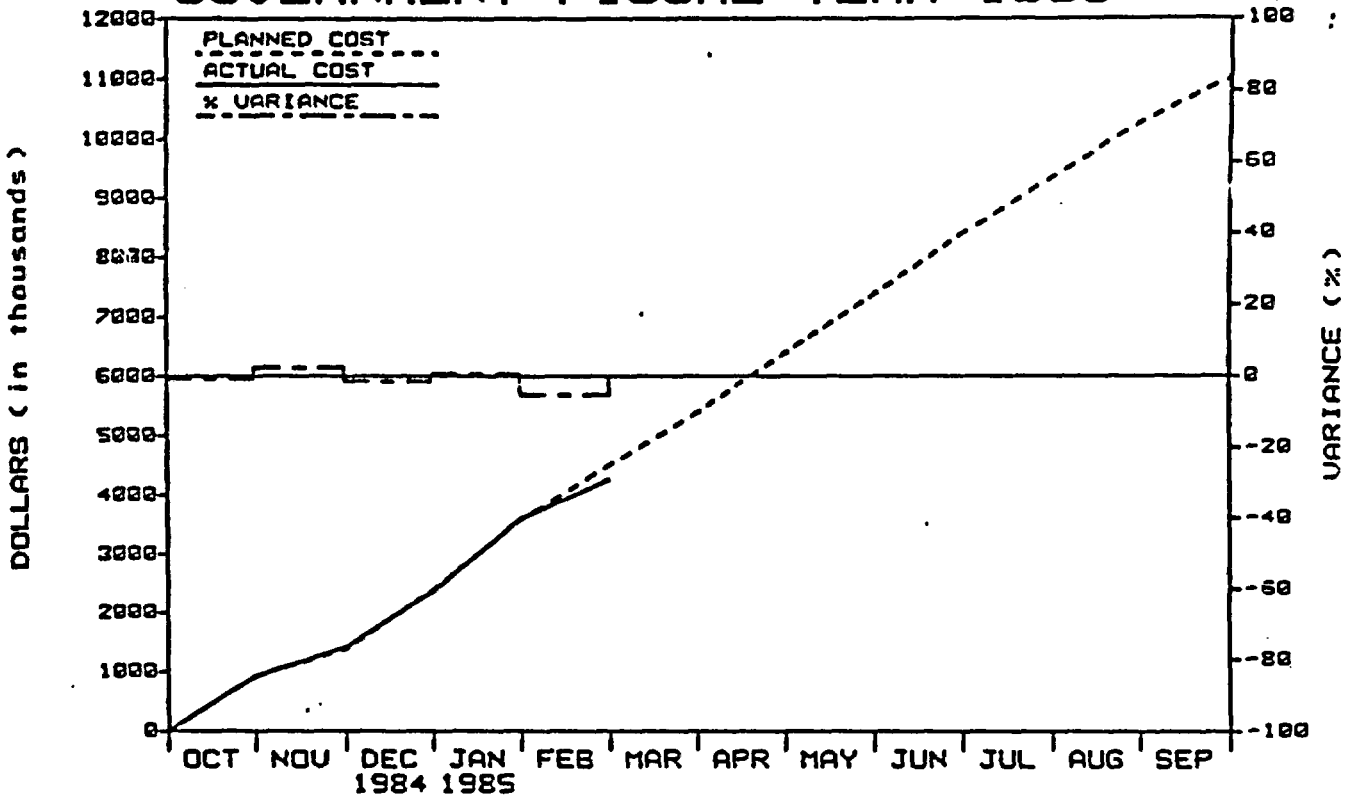
REECo advises that they may not be able to begin work on Milestone M448 entitled "Preliminary Validation of Subsurface Conditions for Repository Surface Facilities," until the end of April 1985, pending completion or a hiatus in the USGS unsaturated-zone program. The work includes three shallow boreholes to be used for subsequent uphole/downhole seismic-velocity determinations. This delay is crowding the schedule such that completion of this work in FY 85 may be jeopardized.

Decommissioning

The peer review of "Parametric Study of the Underground Excavations for a Nuclear Waste Repository in Tuff" (SAND83-7451) is delayed because of commitments to other milestones.

Decommissioning has been postponed until FY 86 due to the realignment of CDR schedules by DOE/HQ to bring all Project activities to a uniform program timetable.

WBS 1.2.4 REPOSITORY INVESTIGATIONS
GOVERNMENT FISCAL YEAR 1985



PLAN (X1000)	917	1359	2380	3565	4492	5386	6374	7362	8384	9329	10253	11011
COST (X1000)	909	1392	2344	3592	4256	0	0	0	0	0	0	0
VARIANCE (X1000)	8	-33	36	-27	236	0	0	0	0	0	0	0
% VARIANCE	-1	2	-2	1	-5	0	0	0	0	0	0	0

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	NNWSI Project Site Specific Repository Design Concept Rpt.												△

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

[WBS.GRF:03/

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 Protection Act (NEPA) of 1969, and the Nuclear Waste Policy Act (NWPA) of 1982, 10 CFR Part 60, and 40 CFR Part 191.

ACTIVITIES

Regulatory Interactions

The first meeting of the NNWSI Project Seismotectonics Working Group was held in Las Vegas on February 8 to begin preparation of a NNWSI Project position paper on seismotectonics, with an emphasis on the unique aspects of high-level nuclear waste disposal during both the preclosure and postclosure phases of a repository. The position paper will be submitted to the NRC.

The draft guidance package for Regulatory and Institutional WBS elements was completed and sent to WMPO on February 15 with copies of the draft site guidance package.

A meeting among NNWSI Project representatives and NRC and ORNL personnel was held at the USGS core library in Mercury, Nevada, on February 4 to arrange for transmittal of core samples to ORNL for geochemical studies and to discuss analytical and sample control procedures. As a result, a mutually acceptable protocol for sample distribution and preparation was developed and the requested material was shipped to ORNL during the month. NRC and ORNL staff members toured G-Tunnel on February 5.

The Licensing Process briefings that were scheduled tentatively for February 12, 13, and 14 at NNWSI Project participant locations were cancelled due to logistics problems. NRC has provided DOE with videotapes of the presentation that are being copied along with the related NRC viewgraphs and will be provided to each participant organization.

The DOE/NRC Site-Specific implementation procedures were transmitted to QA for review. The BWIP-originated proposed draft for Appendix 7 of the agreement (NRC-OR interface) was reviewed and comments were provided to WMPO.

Site Characterization Plan

The second draft of the SCP Management Plan (SCPMP) that incorporated changes suggested by the TPOs was distributed at the PM-TPO meeting on February 21. This draft included a restructuring of the entire Management Plan, the inclusion of an updated QA chapter, and a change in the schedule which now reflects a March 1986 completion date. Additional comments will be accepted until March 12 and the final SCPMP will be made available to WMPO and the TPOs at the March PM-TPO meeting.

As a result of the Issues Hierarchy Working Group meeting on February 13 and 14, changes to the SCP Annotated Outline (AO) were suggested as a means of better correlating the Issues and Information Needs with the contents of Section 8.3 of the SCP. A program-wide SCP planning meeting was held in Las Vegas on February 20. The Issues Hierarchy is scheduled for completion in draft from on March 29.

During the week of February 11, meetings were held with OCRWM and NRC to discuss the SCP Annotated Outline (AO) and to resolve major concerns of the NRC.

Additional comments concerning the NRD's Issue-Oriented Site Technical Positions (ISTPs) for Yucca Mountain were sent to OCRWM.

Environmental Compliance

Activity requirements identified in the 10CFR960 Siting Guidelines, the preliminary Issues Hierarchy, the Draft NNWSI Project Management Plan work plans, and the WBS were incorporated into an environmental compliance network schedule, milestone chart, and descriptive text. This information was transmitted to assist WMPO to provide management guidance to contractors and to track NNWSI Project progress. The draft Issues Hierarchy was updated. Work plans were revised for WBS work elements, Environmental Regulatory Interaction, and Environmental Monitoring, for inclusion into the NNWSI Project Management Plan.

The Environmental Compliance Plan and the Environmental Data-Base Management Plan are being reviewed internally.

Environmental Assessment

A DOE/HQ training session was held in Washington, D.C., on February 1 to finalize logistics arrangements for EA public hearings (including court reporters) and final information to WMPO.

Letters of announcement were drafted for the public hearings to be sent to State and local elected officials, planners, and persons who attended the EA public briefings.

A training session for NNWSI Project hearing panel members was held February 20 at the NTS.

The EA Public Hearings were held on February 25, 26, and 28 in Las Vegas, the town of Amargosa Valley, and Reno, respectively to provide the public with an opportunity to make formal comments on the EA.

The DOE/HQ Draft Management Plan for the preparation of Final Environmental Assessments was reviewed, and a NNWSI Project version was drafted.

Work continued on EA references. The outstanding DOE/HQ references were received. Arrangements were made to have microfiche made of the remaining DOE/HQ references. Hard-copy and microfiche sets will be distributed as soon as they are assembled.

Review of Chapter 5 of the Environmental Assessment (EA) to remove internal inconsistencies and provide additional text addressing the repository description was begun to ensure that the EA Chapter 5 is consistent with the Mission Plan, the GR Document, and the current design descriptions.

PLANNED WORK

The Project SCP Working Groups are scheduled to meet on March 14 in Las Vegas to discuss the contents of the SCP and the work instructions for preparing the SCP.

With the SCP Annotated Outline and the NNWSI SCP Management Plan as guidance, SNL is proceeding with preparation of Chapter 2, Geoengineering; Chapter 6, Conceptual Design, and portions of Chapter 8, the Site Characterization Program. Preparation of supporting documents (Performance Assessment Plan, Repository Sealing Plan, Rock Mechanics Plan, and SNL portions of the Exploratory Shaft Test Plan) is also in progress.

References for the EA will be reviewed to ensure that they support the EA appropriately. Recommendations for revisions will be made as required. Comments received will be addressed and a log will be maintained of the resolution of each comment. Revisions of the EA sections that are the responsibility of SNL will be prepared.

PROBLEM AREAS

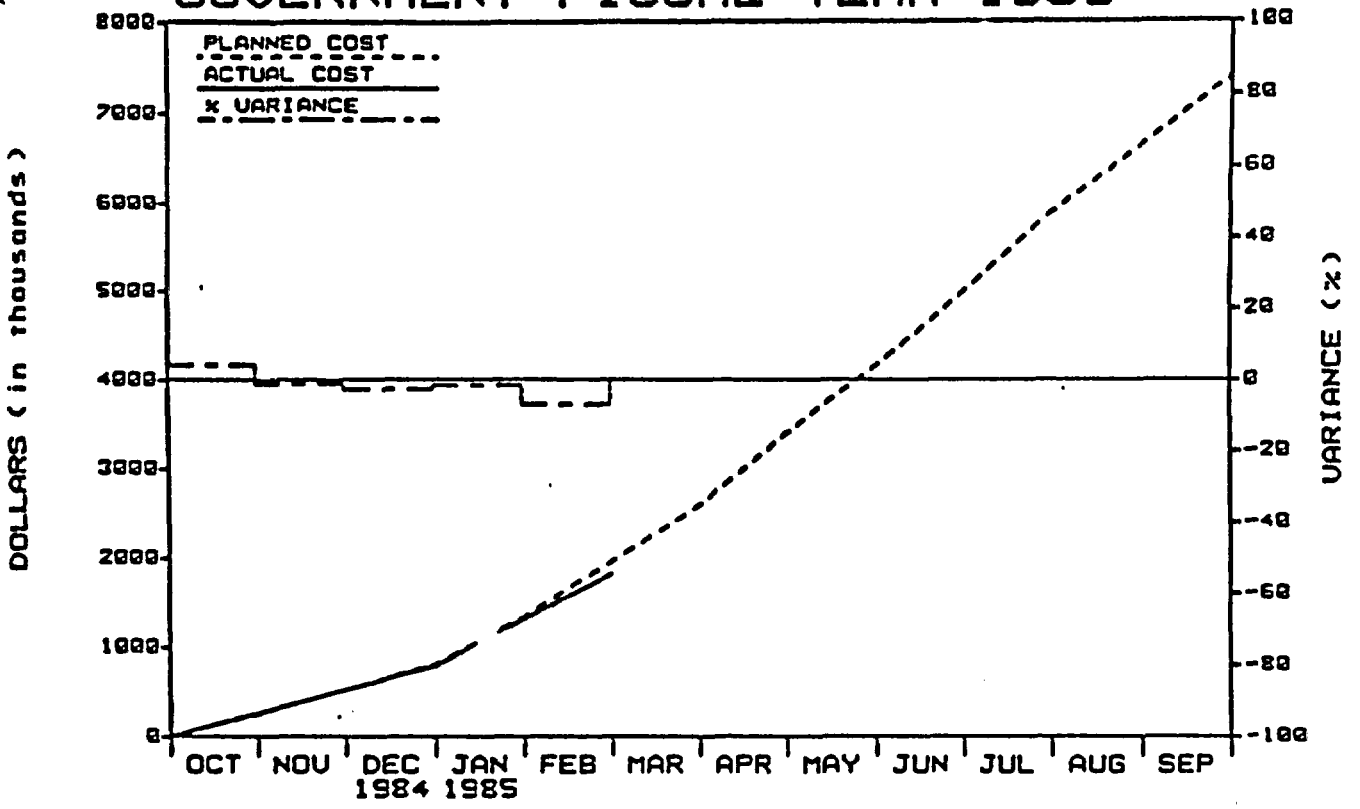
The milestones, N416, N417, N418, and N419 (reviews of NRC Repository Design Data) were established based on NRC and DOE developing a schedule of reviews. This schedule has not been provided.

The original schedule for the EA comments was March 19, 1985 with a milestone date for EA revisions of June 28, 1985. This is a very tight schedule. Any delay in receipt of comments will jeopardize this milestone.

To meet the schedule for public release of the SCP, very careful scheduling of the writing and reviewing (both Project internal and HQ reviewing) will be necessary. In addition very early resolution of detailed wording of the information needs of the Issues Hierarchy will be necessary, as well as a detailed list of responsibilities and interactions between writers, reviewers, and organizations for each section of the SCP.

At this time, the June 28, 1985 milestone date for delivery of the draft to WMPO is considered reasonable. However, the present SCP preparation schedule indicates several formal reviews by both WMPO and DOE/HQ personnel in advance of the June 28, 1985 milestone date. These reviews are possible only if DOE will establish special onsite review policies which assure that Chapter 6 will not be circulated outside the working group until it has completed internal SNL review.

WBS 1.2.5 REGULATORY & INSTITUTIONAL
GOVERNMENT FISCAL YEAR 1985



PLAN (X1000)	245	522	805	1328	1953	2576	3387	4149	4979	5880	6635	7394
COST (X1000)	255	515	783	1306	1816	0	0	0	0	0	0	0
VARIANCE (X1000)	-10	7	22	22	137	0	0	0	0	0	0	0
% VARIANCE	4	-1	-3	-2	-7	0	0	0	0	0	0	0

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
M521	SAIC	1.2.5	Draft Site Characterization Plan										△		
M522	SAIC	1.2.5	Site Characterization Plan											△	
M523	SAIC	1.2.5	NNWSI Project References for EA Complete		◇										
M502	SAIC	1.2.5	Draft Environmental Assessment		▲										
M504	SAIC	1.2.5	Final Environmental Assessment								△				
M503	SAIC	1.2.5	EA Comment/Response Document								△				
M453	SNL	1.2.5	SCP Chapter 6 - Conceptual Design											△	

△ PLANNED MILESTONE COMPLETION DATE
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◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

[WBS.GRP-03/16

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

A second phase of core drilling at the G-Tunnel HFEM site for confirmation of experimental results has been completed, and recovery of the large-diameter core was much improved over that in the earlier drilling. Comparison of the evidence found in the cores with anomalies in the alterant tomographs is in progress.

Tests in a sand pit are beginning at LLNL to replicate certain aspects of the G-Tunnel trials to examine the ability of HFEM methods to resolve known saturation contrasts in a porous material. Scoping calculations completed last month to compare various layouts of boreholes for the HFEM technique in the Waste Package Environment Tests are being revised; a letter report will document the results of the calculations. A paper outlining the G-Tunnel trials of the HFEM technique was submitted to the organizers of the 26th U.S. Symposium on Rock Mechanics to be published in the Symposium proceedings.

Budget estimates for FY 85 through FY 91 were prepared for the WPAS. Activity descriptions were also developed or revised, as appropriate. The activity descriptions reflect two new NNWSI numbers: WBS 2.6.1.1.L, and WBS 2.6.1.2.L which correspond to test management and integration, and test quality assurance, respectively. The concerns about the ESTP schedule and budget raised while December estimates were being formulated for LANL use were partially resolved this month.

Current estimates of surface facility needs at the ES site and of locations for IDS junction boxes were developed and provided to LANL for use in facility design and planning.

The formal design review of the IDS conceptual design is substantially complete. Only minor comments have been received to date.

A Design Criteria Letter, DCL-11, was issued giving revised criteria for the Visitors' Center at the ESF.

DCL-12, giving criteria for the ESF underground power, communications, and instrumentation systems, was issued.

DCL-13 was issued requesting a revised cost estimate for ESF design, construction, operations, and maintenance. The revised cost estimates by Holmes & Narver, Fenix & Scisson, and REECo were completed on February 22. The estimates were made according to an expanded version of the new WBS and are currently being summarized for presentation to WMPO.

Design review comments on the revised Site Plan by Holmes & Narver and the ES-2 Liner Study by Fenix & Scisson were delivered to DOE/NTS and the NTS Support Contractors. A decision on whether the liner will be poured concrete with jump forms, shotcrete, a steel liner, or rockbolts and wire mesh has not yet been made because additional information is required on the construction feasibility of each concept for the 6-ft-inside diameter shaft and on the relative safety of each concept.

The design of the ESF is on schedule to meet the current design completion milestones by the end of June 1985.

A revised section on rationale and purpose of the Waste Package Environment Tests was prepared by LLNL and submitted to LANL for use in the ESTP. Revision of the conceptual test plan for the Waste Package Environment Tests was nearing completion at the end of February. This revision will be sent to LANL for use in the ESTP prior to internal LLNL review because of the deadline for Revision 1 of the ESTP.

Cost estimating and reporting forms were prepared for the 28 approved ES tests. The forms are being generated by a newly developed portion of the SAIC PERT program and will be sent to the PIs and SNL, USGS, LLNL, and LANL for review and update, if necessary. The information will eventually appear in an appendix to the ESTP, Rev. 1.

First drafts for nine test plan sections for Rev. 1 of the ESTP have been completed. The documents are undergoing internal editing at SNL and will be submitted to LANL for integration into the master document.

The Introduction to the ESTP and the nine rewrites for the tests which are being reviewed at LANL by the ESTP committee have been completed by USGS personnel.

PLANNED WORK

Instrumentation for the measurement of stress changes, rock mass deformations, temperatures, moisture contents, and pore pressures will be evaluated for possible use in the Waste Package Environment Test. Prototype testing of selected instruments will begin as soon as appropriate. Scoping calculations using heat transfer and thermomechanical models will start in March to define expected magnitudes of stress changes and rock mass deformations.

Work will continue on preparation of the ESTP, Rev. 1 draft document throughout March. The ESTP Committee will meet at Los Alamos on March 11-15 to review, revise, and integrate the draft Rev. 1 input available and to plan further work leading to delivery of the complete Rev. 1 draft to WMPO and to the TPOs. Test plan changes that are required by internal LLNL reviews through that data will be incorporated at that time. The March 29 delivery date is still the target, but whether it can be achieved will not be known until mid March.

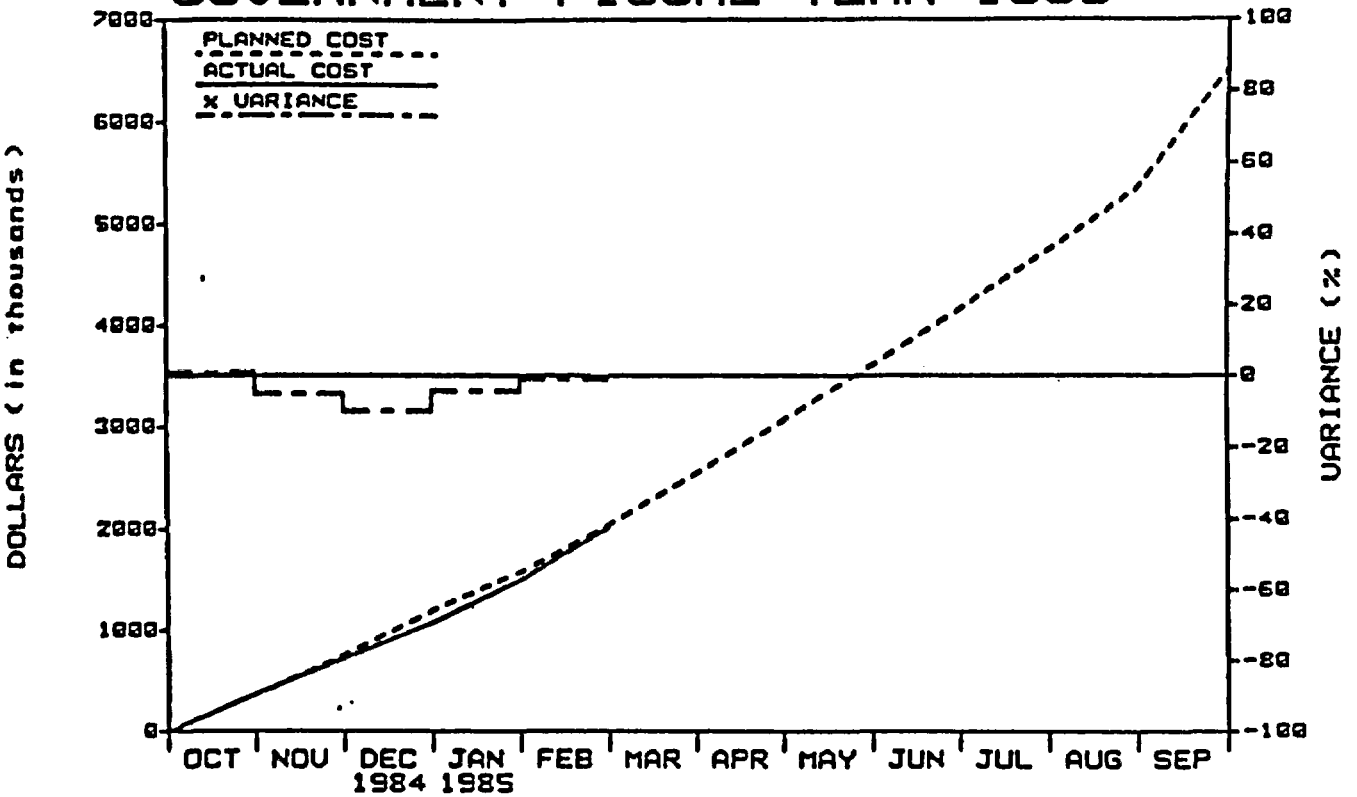
The ESTP delivery date to DOE/HQ, a Level I milestone, is planned to be concurrent with the SCP.

The new WBS, which was expanded below the fourth level for the ES, will be modified to better accommodate the NTS work order system.

PROBLEM AREAS

None

WBS 1.2.6 EXPLORATORY SHAFT
GOVERNMENT FISCAL YEAR 1985



PLAN (X1000)	366	762	1194	1573	2042	2546	3061	3601	4157	4746	5356	6505
COST (X1000)	370	724	1076	1504	2020	0	0	0	0	0	0	0
VARIANCE (X1000)	-4	38	118	69	22	0	0	0	0	0	0	0
% VARIANCE	1	-5	-10	-4	-1	0	0	0	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

[WBS.CRF:03/18/

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

Efforts continued to develop appropriate statistical models for the deformation modulus data which was obtained at the SFT-C. As noted last month, a 12-term general linear model, applicable for both pre-heating and post-heating data sets, was found to properly treat the data obtained from three of the four boreholes located in the pillars of the facility. Models were developed for the fourth pillar borehole and for the data obtained near two auxiliary heaters where rock temperatures reached 60°C. A significant thermal effect was observed in each of these data sets. Furthermore, analysis of the data from NHH10 reveals an effect on the modulus due to a nearby fault zone. Three data sets remain for which statistical models must be developed.

Two approaches were tried to improve the agreement between measured and ADINAT-calculated temperatures around the SFT-C facility. First, the feasibility of driving the ADINA structural analysis code directly with measured temperatures rather than with ADINAT-calculated temperatures was considered and found to be time consuming and crude because of the relative sparseness of temperature data and the commensurate need to interpolate or extrapolate. Second, ADINAT was used to parametrically study the sensitivity of calculated temperatures to the values of pertinent input properties. Because ADINAT does not explicitly treat internal radiation and ventilation, the parametric study was also used to evaluate the influence of "pseudo-properties" which are used to simulate these two phenomena. Preliminary results indicate that this approach will be successful.

In processing the backlog of displacement data obtained at the SFT-C, it was discovered that the data were being inconsistently treated by the two data reduction techniques. Early in the test, air temperatures were believed to be fairly uniform, so a nearby RTD was used to provide a temperature reading for the portions of instrumentation which were exposed to the air. This approach was found to be inadequate midway through the test and additional temperature sensors were deployed to more accurately measure the required temperatures. Initial efforts to develop a relationship between the two were unsuccessful because the data were obtained when the time rate of change in temperatures was rapid and the two measurement systems, each with different time constants, did not track each other very well. By using data acquired later in the test, in

particular during the cooling phase of the test which followed retrieval of the spent fuel, better relationships between the two measurement systems was obtained. Necessary modifications have been made to the database of conversion parameters for these instruments.

Post-test evaluation of Climax Materials Interaction Test (CMIT) capsules containing samples of 304L stainless steel, zircaloy-2 and -4, Iconel 625, Monel 400, Ti-Code 12, and Ebrite 26-1, as well as Climax granite, were extracted, decontaminated, and evaluated by radiation surveying, visual examination, photographic documentation, profilometry and length measurements, weighing, and neutron and x-radiography. No significant changes other than some radioactive contamination were observed. The residual gas in the capsules was analyzed and the gas volumes and pressures were evaluated. The dissolved species in the water from two of the capsules were measured and compared with those in archive (control) samples. The metal samples were measured and weighed. The rock samples were examined by optical microscopy. The solution analyses showed significantly higher concentrations of dissolved inorganic species in the archive capsules than in the irradiated capsules, which may have resulted from reactions which deposited mineral species on the rock and metal samples. Considerable degradation of the silica glass had occurred, and the silica no doubt contributed to the observed precipitation or deposition on rock and metal samples.

Quantitative analyses of corrosion of the metals was not possible because of the limited amount of corrosive medium in these small, sealed capsules. Nevertheless, from visual examination the stainless steel and Zircaloy samples were found to have little corrosion, while the Monel and carbon steel samples were significantly corroded. Although not quantitative, these results support findings from other corrosion tests, and are generally in agreement with what one would have predicted for such a system.

Footage for an educational film which is being sponsored by the Atomic Industrial Forum was obtained in a filming at the SFT-C facility on February 21, 1985.

A decision was made against developing a composite report which would present all core logging data that was acquired on the SFT-C, as was originally planned because a recently released report on post-test core logging and two previous reports on pretest core logging describe all but 70 m of the total 1970 m of core.

In preparation for analyses of the effect of nearby geologic structure on the measurement of in situ states of stress, fracture data from the pertinent in situ stress (ISS-series) boreholes were reformatted to be compatible with HP9000-series statistical software. Fracture logs and in situ stress values from a total of nine boreholes will be used in these analyses.

"Logging of Post-Test and CCH Record Core Samples for the SFT-C" was reviewed by WMPO and submitted for prepublication processing.

"Mineralogic and Petrologic Investigation of Post-Test Core Samples from the SFT-C" was reviewed by WMPO and submitted for prepublication processing.

Internal and external peer reviews of "Instrumentation Report #3: Performance and Reliability of Instrumentation Deployed for the SFT-C" were completed this month and revisions are in progress. A March 20, 1985 submittal to WMPO is anticipated.

"Overcoring and Calibration of IRAD Gage Stress meters at the Spent Fuel Test in Climax Granite" was printed and distributed this month.

"Observations of Borehole Deformation Modulus Values Before and After Extensive Heating of a Granitic Rock Mass" was written, reviewed, and submitted to the organizing committee for inclusion in the proceedings of the 26th U.S. Symposium on Rock Mechanics.

E-MAD

The plans for shipment of the fuel assemblies from E-MAD to the Idaho National Engineering Laboratory (INEL) and the subsequent shutdown of the facility were revised to provide an option for loading the GNS cask with the E-MAD fuel for the Vepco Cask Storage Demonstration Test Number 4 (air-filled intact fuel).

The proposed task assignments for WTSD-Nevada Operations FY 85 were approved by DOE/NV, and the final task descriptions were issued.

The Month 22 and 23 Fuel Temperature Test (FTT) temperature profiles were completed and Month 24 was initiated. The test is scheduled for completion on March 11.

A special one-month series of FTT gas sampling operations was completed at the request of Battelle Pacific Northwest Laboratory (PNL). The FTT krypton release rate was measured at different system pressures in an attempt to determine the size and nature of the defective fuel rod or rods in the fuel assembly (B02) which is being utilized in the test. PNL completed their assessment of available gas-sampling data and their evaluation indicates that the size of the defect has not increased since the fuel-rod breach occurred two years ago, and that they do not expect fission product contamination inside the FTT.

With the exception of fuel assembly B02, which is being utilized in the Fuel Temperature Test, all E-MAD fuel assemblies are now stored in the Hot Bay Lag Storage Pit. 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 final incremental krypton release gas sampling from the helium filled canister containing fuel assembly B41, which is suspected of having one or more defective fuel rods, was completed. The incremental release of krypton is being measured to determine the current condition of the fuel assembly.

The canister containing fuel assembly D22 was cut open. Prior to the cutting, gas and full-volume filtration samples of the canister atmosphere were taken. Following cutting, the integrity of the fuel was checked and documented by visual examination, photo documentation, videotaping, and by taking surface contamination swipes from designated fuel rod surfaces. The fuel assembly was then placed in a temporary canister and returned to the Lag Storage Pit.

PLANNED WORK

Spent Fuel Test-Climax

Staff efforts will continue to focus on analysis of test data and preparation and review of project reports. The recently completed study of the U.S.B.M. stress relief overcore cell will be documented. The influence of nearby fractures on the results of in situ stress measurements will be analyzed. Efforts will continue on post-test thermal and thermomechanical calculations of the response of the facility to excavation, heating, and subsequent cooling.

To better understand the behavior of the NX (Goodman) borehole jack, a series of laboratory evaluations are being planned. These evaluations will be conducted in a large block of aluminum and will focus on the effect of borehole diameter on the apparent deformability of the block, as measured by the borehole jack. This borehole will later be enlarged to provide for testing of the NX jack.

E-MAD

Evaluation of potential E-MAD activities, review and revision of WTSD-Nevada Operations procedures, preparations for reference run of calorimeter and calorimetry of fuel assemblies D34, D04, D15, D22, and B43 and monitoring fuel assemblies B02, B41, and D06 will continue.

The FTT and post-test calibration run will be completed.

Procedures for disassembly of the FTT will be prepared.

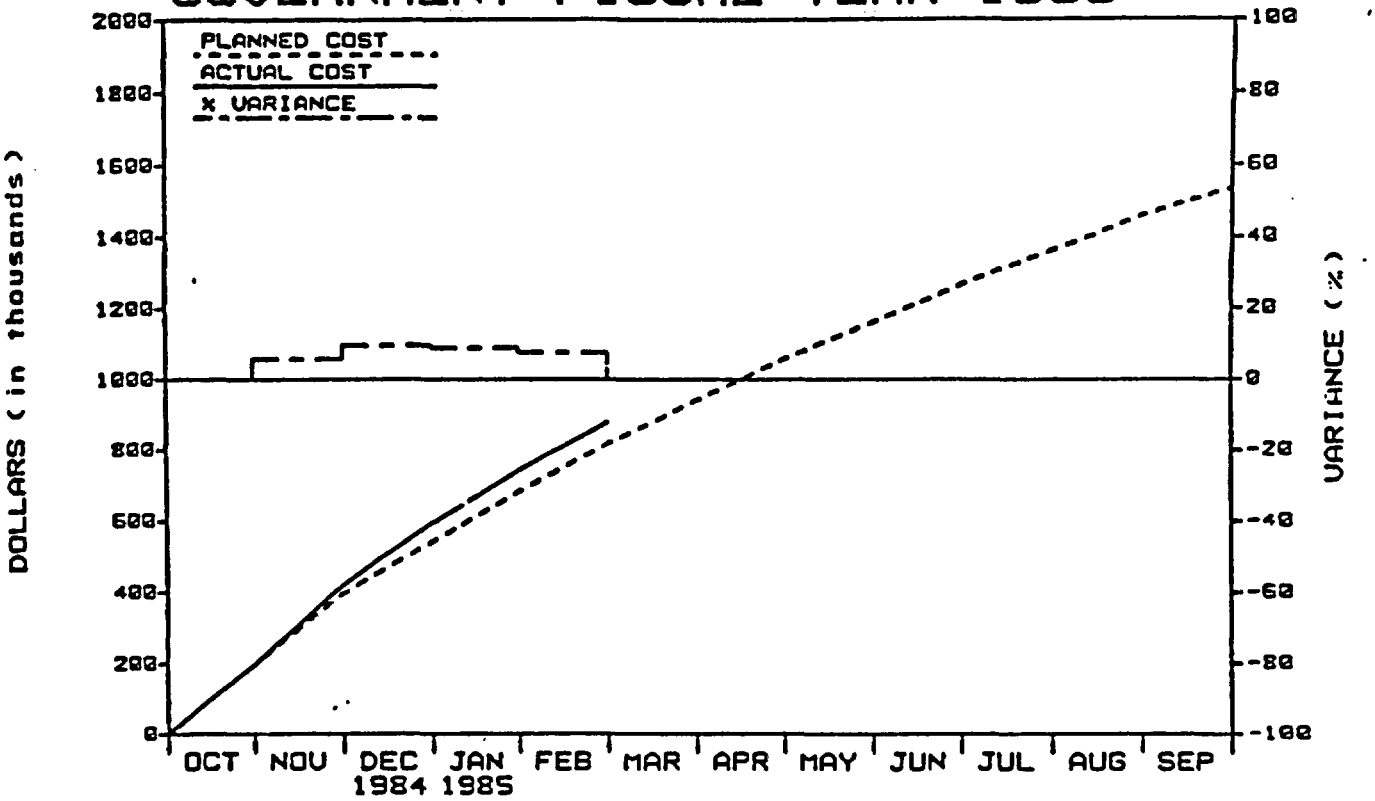
Operations to obtain canister gas and full volume filtration samples will be performed, the canister will be cut open, the fuel assembly D09 will be removed, post-storage inspection will be performed, and the fuel assembly will be in a temporary canister and placed in the Lag Storage Pit.

The Thermal Monitoring Report will be issued.

PROBLEM AREAS

None

WBS 1.2.7 TEST FACILITIES
GOVERNMENT FISCAL YEAR 1985



PLAN (X1000)	197	397	543	682	817	941	1057	1161	1267	1362	1459	1535	
COST (X1000)	197	420	595	742	879	0	0	0	0	0	0	0	
VARIANCE (X1000)	0	-23	-52	-60	-62	0	0	0	0	0	0	0	
% VARIANCE	0	6	10	9	8	0	0	0	0	0	0	0	

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

[WBS.CRF:03/

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.

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

Management Support

Preparation for implementing an earned-value system for the NNWSI Project starting in FY 86 will continue to occupy a significant percentage of the project monitoring system staff's time. A first earned-value orientation session for the USGS/SAIC Golden staff was conducted on February 28, 1985. An earned-value study staffing plan has been prepared, and a detailed network plan and schedule has been developed to guide the efforts of a special task force that will perform the study for the NNWSI Project.

Initial teleconferences have been concluded with DOE representatives for the Performance Measurement System at both the BWIP and the SALT projects and a written description of the Rockwell operating procedures is being studied by PMS staff. A first meeting among DOE/RL, Rockwell, and SAIC, took place at Richland on February 25.

As a result of two Change Control Board (CCB) meetings during February, numerous changes were made to the Planning and Scheduling (P&S) baseline. The following is the status as of the end of February:

1. The WBS was adjusted to reflect changes requested in 2.3, Site; 2.4, Repository; 2.5, Regulatory and Institutional; 2.6 Exploratory Shaft; and 2.7, Test Facilities.

2. The WBS Dictionary has been delayed due to lack of input from NNWSI Project participants.

3. The FY 85 milestones were placed under the formal change control process during February for all participants except the USGS. No input for FY 85 has been received for the USGS.

4. Revised plans received during February are being incorporated and are expected to be submitted to the CCB for baseline approval during March.

5. A set of planning guidance for WBS elements 2.3 and 2.5 is being prepared by WMPO.

6. The status of the planning schedules for the WBS elements, as provided by the participating organizations, was incorporated into the networks.

The Project Management Plan (PMP) is being drafted. Because of the volume of Work Plans, it was proposed to summarize the work plans within the PMP and place the work plans in a separate binder as an appendix to the PMP.

Comments to the Project Plan (PP) draft from the NNWSI Project participants have been received and are being transferred to a master comments copy of the Draft PP. Comments that require resolution are being compiled on a list so the NNWSI Project Manager can address them.

No adverse comments have been received from any of the participants on the NNWSI Administrative Procedures Manual that was distributed in January.

Project Control

The FY 85 versions of the USGS schedules were released for use by the Project PMS. These are being updated at SAIC/Golden; however, they will be updated monthly for status through the PMS in the near future.

It appears that a new iteration of updates to the USGS schedules will occur simultaneously with the expansion of the Work Plans. Modifications have been made to Site Geology. Indications from several other PI's suggest that modifications will be forthcoming from almost all Tasks/Subtasks.

Quality Assurance

A Los Alamos QA audit of Menlo Park personnel was conducted. Project Chiefs in Regional Geology, Seismology, and Tectonophysics were audited. A summary will be presented on Friday, March 8.

Work continues by SAIC/Golden on the preparation of USGS Technical Detailed Procedures. Assistance is also being given to the completion of documentation for the QA program plan. The USGS Quality Assurance Program is being evaluated against compliance with NVO-196-17, Rev. 3.

Two TDP's (GP-10 and GP-12) have been reviewed and signed off by the USGS reviewers. Final review copies were delivered for "Logging Fractures in Core" and "Diatom Enumeration Studies".

On February 19, 1985, a training workshop was held for the WMPO staff which emphasized WMPO's implementation of the QAP and SOPs that have been issued for the WMPO staff. Another training workshop will be held March 8, 1985.

The WMPO QAPP, Revision 2, and twelve QMPs were issued on November 30, 1984, the effective date for implementation was December 10, 1984. In December, a controlled copy of the P was transmitted to OGR for review and approval; WMPO is awaiting the results.

On February 22, 1985, a training workshop was held for the WMPO staff which emphasized WMPO's role and responsibilities for implementing the requirements contained in the WMPO QAPP and QMPs. Another training workshop will be held March 4, 1985.

The QASC spent considerable time reviewing, providing comments, and resolving problems associated with the SCPMP. This included completely rewriting the

Quality Assurance section of the plan and preparing materials for a thirty-minute presentation at the SCPMP Kick-off meeting to be held on March 6, 1985. QASC also assisted with and consulted on the assignment of the appropriate Quality Level to the SCP task including selection of the quality criteria to be invoked for accomplishing the work scope in a quality manner and in a way that would provide adequate records for traceability.

WMPO's comments on the LLNL QAPP were received this month and revisions are currently being made to the draft.

Five QA procedures were approved and distributed to NNWSI QA procedure book-holders. Twenty copies of a compilation of documents regarding QA requirements were distributed to ESTP Committee members. An up-to-date list of QA and technical procedures was transmitted to WMPO/NV.

The status of the project-wide implementing procedures, SOPs, are as follows:

1. NNWSI-SOP-17-01, QA Records Management. ESI presented a QA records' management specification to WMPO and the TPOs at the February 1985 TPO meeting. The concept of the specification was accepted, but it was noted that implementation would require additional manpower and equipment. WMPO is evaluating the specification and will issue a letter to the TPOs if it is acceptable. SAIC is proceeding with the development of a draft SOP based on the system specification presented by ESI. This draft will be completed by March 29, 1985; then it will be sent to the TPOs for comment.

2. NNWSI-SOP-03-02, Computer Code Assessment. At the February 1985 TPO meeting, SAIC informed WMPO of a plan and the effort required to redraft this procedure. The procedure will be redrafted by a committee with representatives from the NNWSI Project participants.

3. NNWSI-SOP-02-01, QAPP Requirements, Revision 0, was issued.

4. NNWSI-SOP-15-01, Nonconformance Control System, Revision 0, was issued.

5. NNWSI-SOP-03-03, Non-NNWSI QA Plan Data or Interpretation Acceptance. A final committee meeting was held on March 1, 1985. The NRC accepted an invitation to the meeting based on their interest expressed at the December 1984 DOE/NRC QA workshop. The final committee meeting resulted in an increase in the scope of the procedure and a change in the system description. The procedure will be modified to reflect these changes and will be sent to WMPO and QAD by April 30, 1985, for comments and approval.

6. NNWSI-SOP-02-02, Assigning Quality Levels, Revision 0, was issued to the NNWSI Project participants with an effective date of March 1, 1985.

Status of NNWSI Project Audits for FY 84

Audit No.	Participant Audited	Status
84-1	USGS	Closed May 5, 1984.
84-2	LLNL	Closed May 3, 1984.
84-3	SNL	Closed June 6, 1984.
84-4A	F&S	Closed October 10, 1984.
84-4B	H&N	Closed November 14, 1984.
84-5	USGS-Menlo Pk.	A letter was sent to USGS-Menlo Park on February 13, 1985, to remind them of their open items on Audit 84-5. As of this date SAIC has not received an answer. The five findings shall remain open until the procedures are received by WMPO to clear the audit. This audit is still open.
84-6	LANL	WMPO received responses from LANL on open items 846-1, 846-2, and 846-3 from Audit 84-6. Final disposition of these responses is under review by WMPO. This audit is still open.
84-7	W/WTSD	Closed October 12, 1984.
84-8	REECo	Closed January 25, 1985.
84-9	SAIC/T&MSS	Audit finding responses were received and accepted by WMPO; WMPO is awaiting implementation of the findings. This audit is still open.

PLANNED WORK

Pacific Northwest Laboratory (PNL) Procedure GREDZ REVO, which establishes hydraulic test requirements for rock samples was reviewed; it was found that deficiencies exist in the procedure. These deficiencies will be corrected in the next version of the procedure.

The first meeting among DOE/Columbus, Battelle, and SAIC is scheduled for March 12, 1985; to provide time for PMS staff to review the Battelle summary documentation.

The work plans are being expanded by SAIC/Golden to include input for the SCP and QA. Interviews are being scheduled with the PIs to collect and to verify the additional information.

PROBLEM AREAS

Surveillances for the remainder of FY 85 may not be performed because of the heavy workload in other higher-priority areas and increased task activities. The elimination of these surveillances will inhibit somewhat WMPO's evaluation of the implementation and effectiveness of the NNWSI Project QA system.

Verification and close-out of action taken on the Audit Finding Reports (AFRs) for T&MSS Audit 84-2 was not completed because of problems in the coordination of approval and issue of related T&MSS APs. It is anticipated that the APs will be approved and issued in early March 1985. This will allow close-out of both T&MSS Audit 84-2 and NNWSI Audit 84-9.

Status of FY 85 Audits

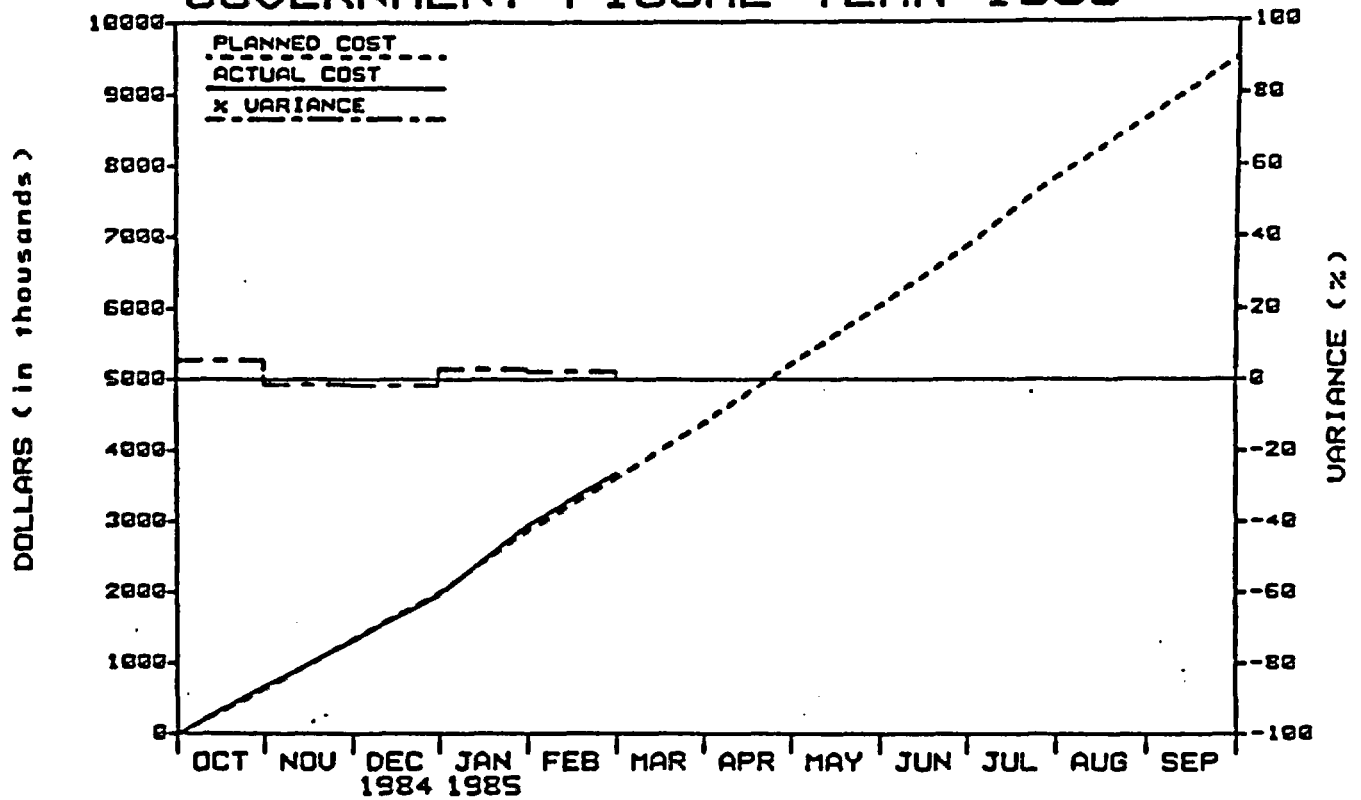
A revised schedule for FY 85 audits was issued by WMPO on January 10, 1985. This schedule was revised because the QASC review of the NNWSI Project Participants QAPPs and implementing procedures were not completed within the original time estimate due to two factors: (1) the participants are continuing to submit revised material after the original cut-off dates of September 19, 1984, for their QAPP and December 12, 1984, for implementing procedures; and, (2) the QAQSC has been assigned additional higher-priority work.

If the reviews of the participants' QAPPs are not completed by March 22, 1985, and timely resolution comments are not received, it may be necessary to postpone the audits again. WMPO must convey to the participants the level of priority of developing and implementing acceptable QAPPs, or the NNWSI QA program may be compromised.

PARTICIPANT

BUDGET vs COST

WBS 1.2.9 PROJECT MANAGEMENT
GOVERNMENT FISCAL YEAR 1985



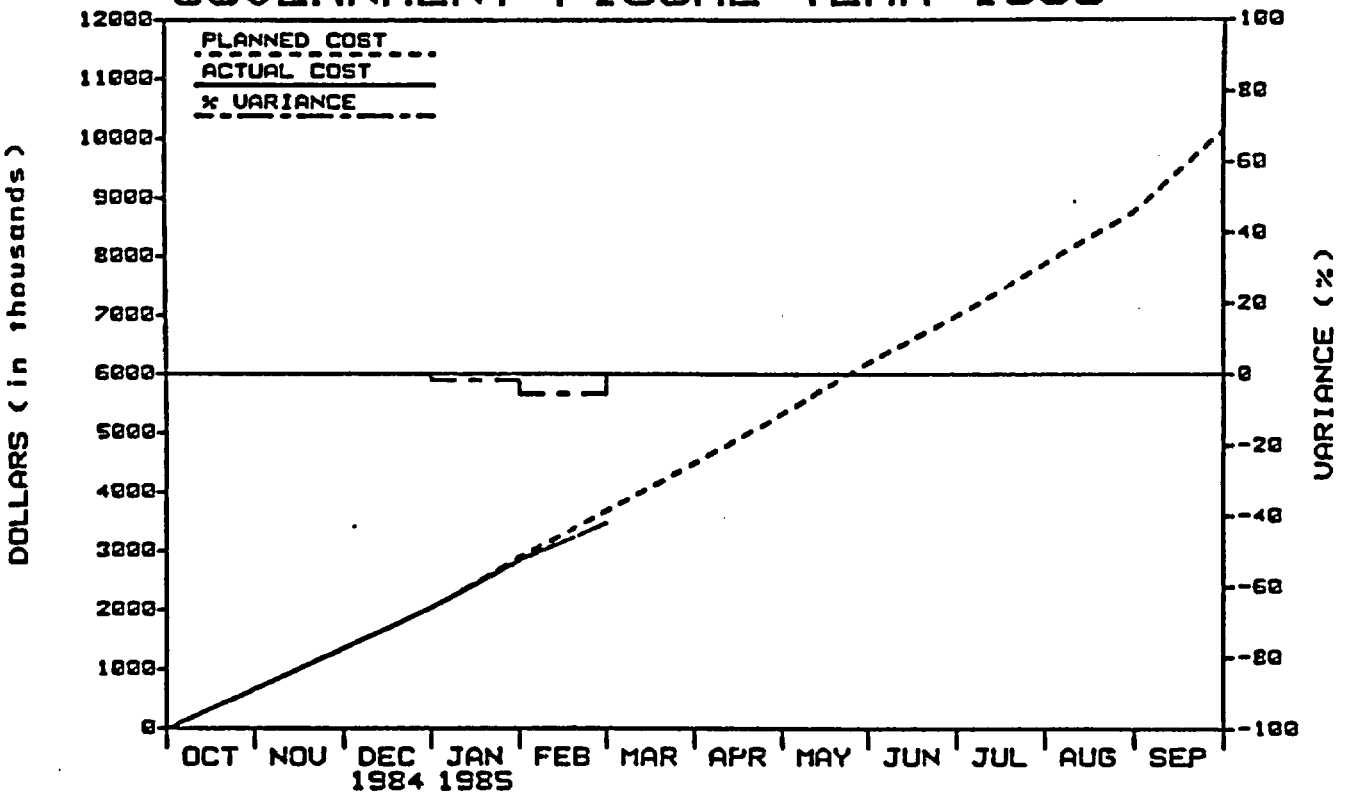
PLAN (X1000)	629	1329	1991	2855	3599	4382	5207	6032	6867	7831	8660	9494
COST (X1000)	663	1311	1957	2936	3676	0	0	0	0	0	0	0
VARIANCE (X1000)	-34	18	34	-81	-77	0	0	0	0	0	0	0
% VARIANCE	5	-1	-2	3	2	0	0	0	0	0	0	0

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
M901	SAIC	1.2.9	Submit FY 1985 NNWSI Project Plan to DOE/HQ						▲						
M915	SAIC	1.2.9	Submit NVO-196-18 (Rev. 2) to DOE/HQ		▲										
M907	SAIC	1.2.9	Draft Project Management Plan						△						

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

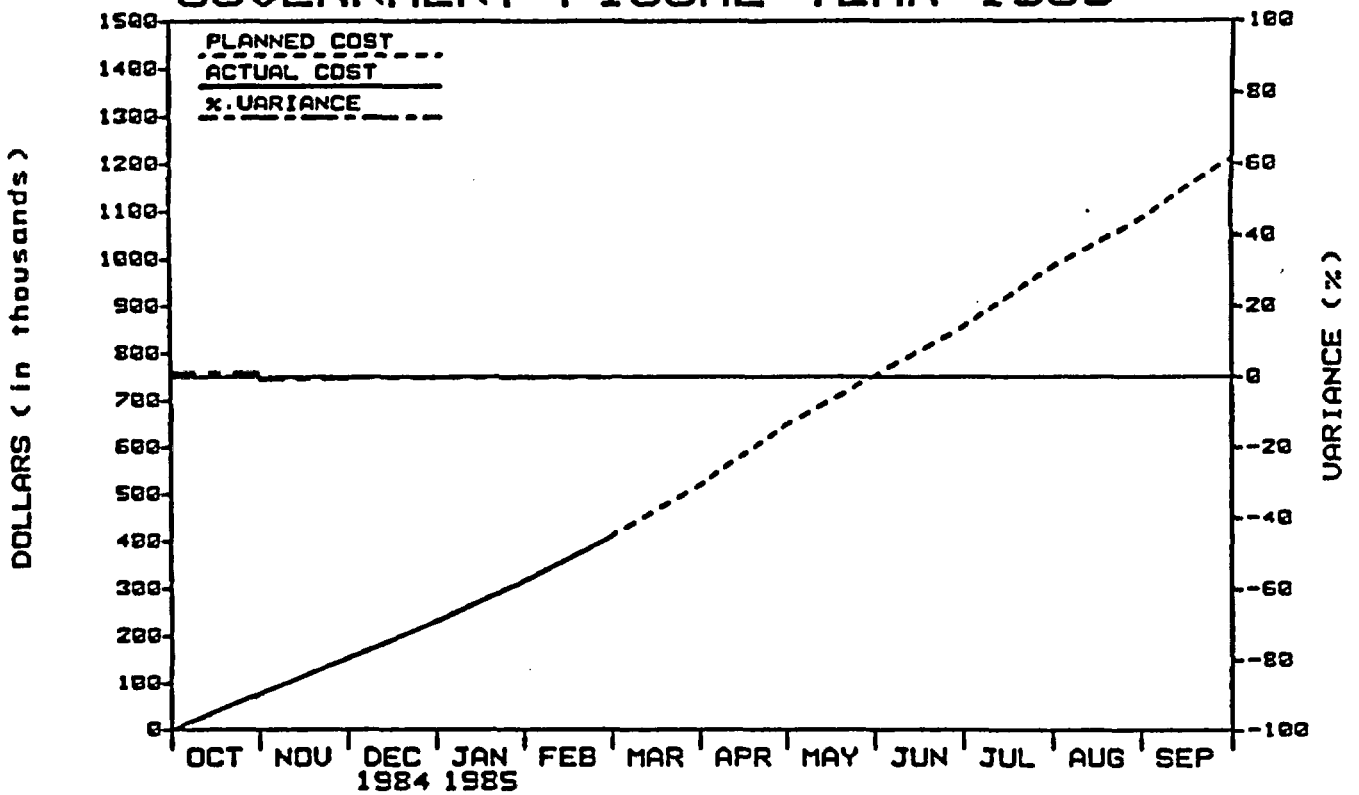
◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

LOS ALAMOS NATIONAL LABORATORY
GOVERNMENT FISCAL YEAR 1985



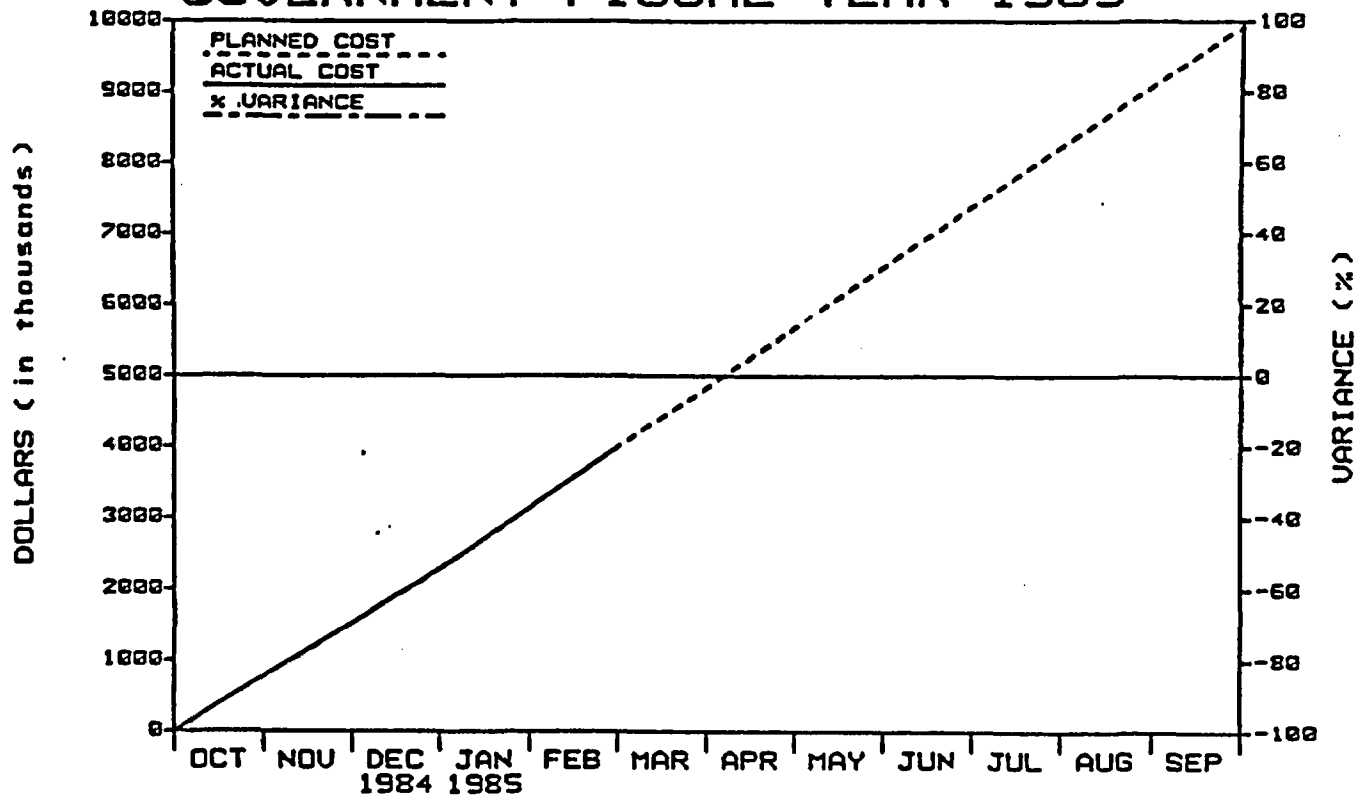
PLAN (X1000)	656	1354	2039	2892	3678	4491	5328	6187	6983	7859	8741	10130
COST (X1000)	656	1354	2039	2842	3471	0	0	0	0	0	0	0
VARIANCE (X1000)	0	0	0	50	207	0	0	0	0	0	0	0
% VARIANCE	0	0	0	-2	-6	0	0	0	0	0	0	0

FENIX & SCISSON, INC
GOVERNMENT FISCAL YEAR 1985



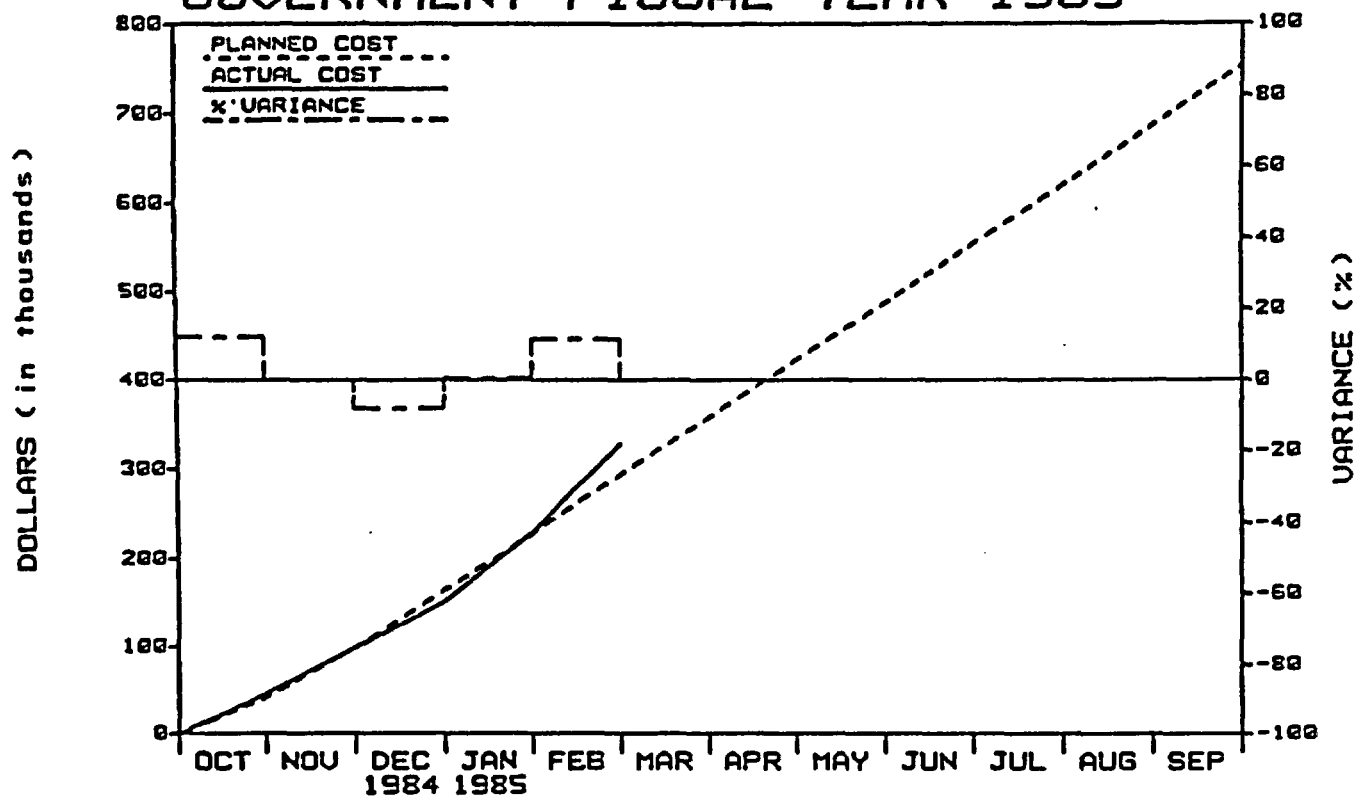
PLAN (X1000)	76	154	232	317	412	519	649	753	857	984	1083	1212
COST (X1000)	77	153	231	316	418	0	0	0	0	0	0	0
VARIANCE (X1000)	-1	1	1	1	2	0	0	0	0	0	0	0
% VARIANCE	1	-1	0	0	0	0	0	0	0	0	0	0

U. S. GEOLOGICAL SURVEY
GOVERNMENT FISCAL YEAR 1985



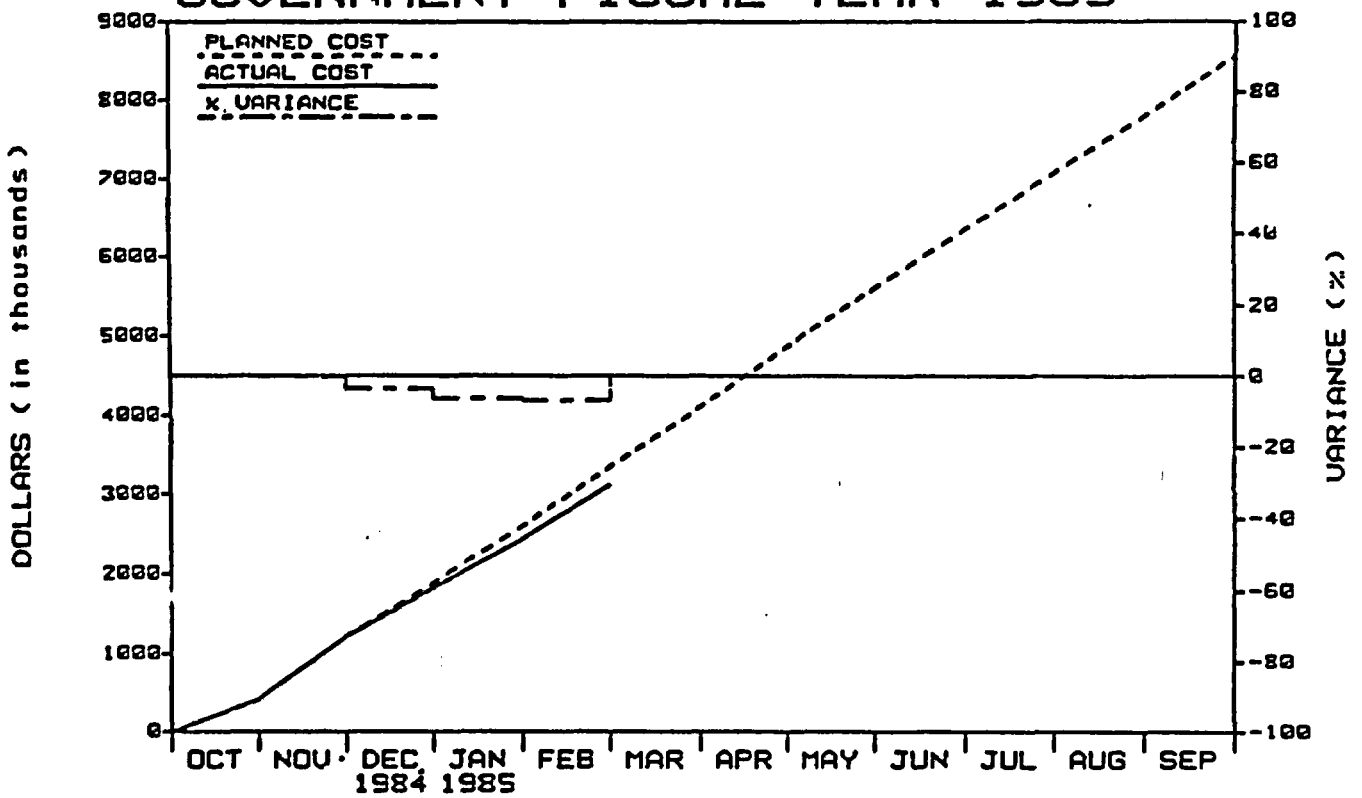
PLAN (X1000)	760	1520	2277	3125	3986	4830	5680	6525	7378	8226	9075	9922
COST (X1000)	760	1520	2277	3125	3986	0	0	0	0	0	0	0
VARIANCE (X1000)	0	0	0	0	0	0	0	0	0	0	0	0
% VARIANCE	0	0	0	0	0	0	0	0	0	0	0	0

HOLMES & NARVER
GOVERNMENT FISCAL YEAR 1985



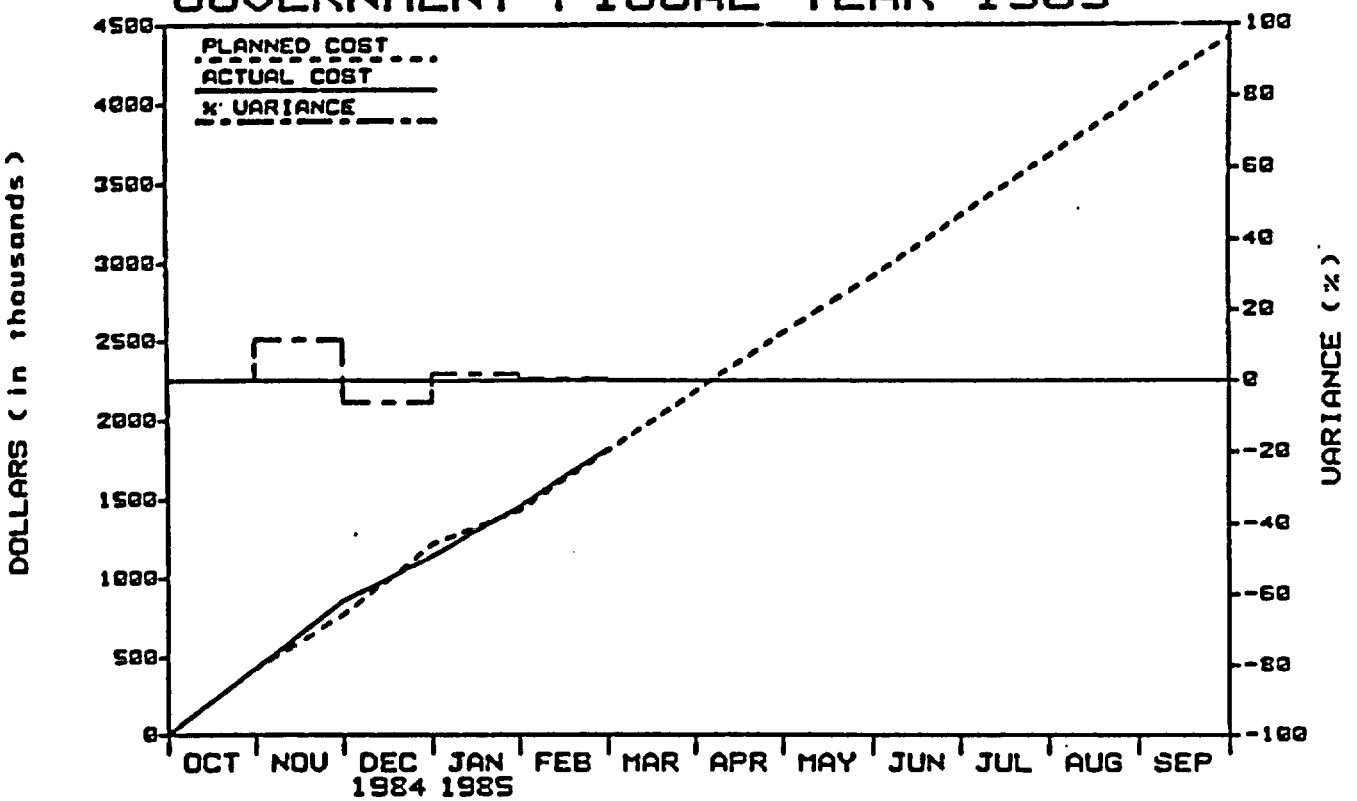
PLAN (X1000)	41	99	164	228	293	357	422	487	553	618	686	753
COST (X1000)	46	99	151	229	327	0	0	0	0	0	0	0
VARIANCE (X1000)	-5	0	13	-1	-34	0	0	0	0	0	0	0
% VARIANCE	12	0	-8	0	12	0	0	0	0	0	0	0

LAWRENCE LIVERMORE NATIONAL LABORATORY
GOVERNMENT FISCAL YEAR 1985



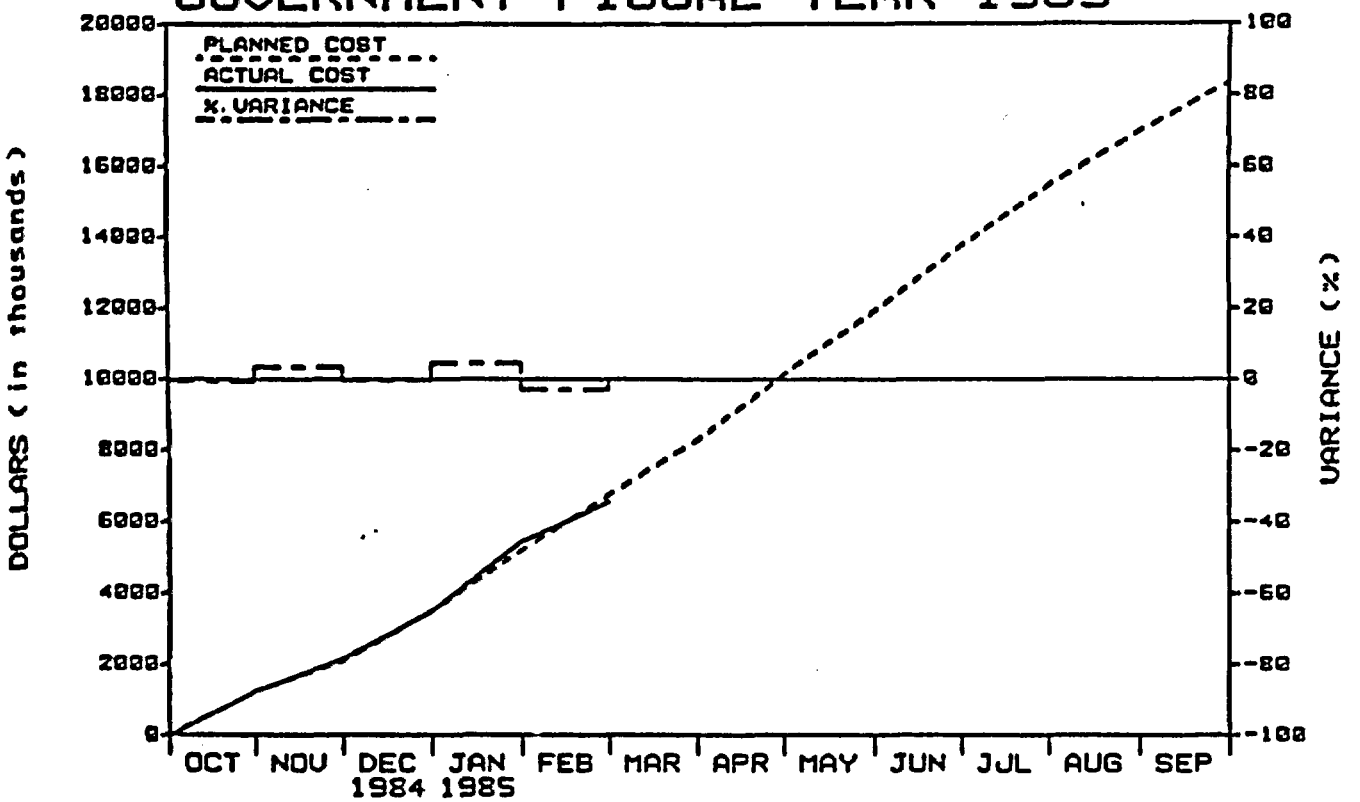
PLAN (X1000)	404	1229	1899	2600	3339	4110	4871	5612	6346	7066	7788	8565
COST (X1000)	404	1226	1829	2437	3113	0	0	0	0	0	0	0
VARIANCE (X1000)	0	3	70	163	226	0	0	0	0	0	0	0
% VARIANCE	0	0	-4	-6	-7	0	0	0	0	0	0	0

REECO
GOVERNMENT FISCAL YEAR 1985



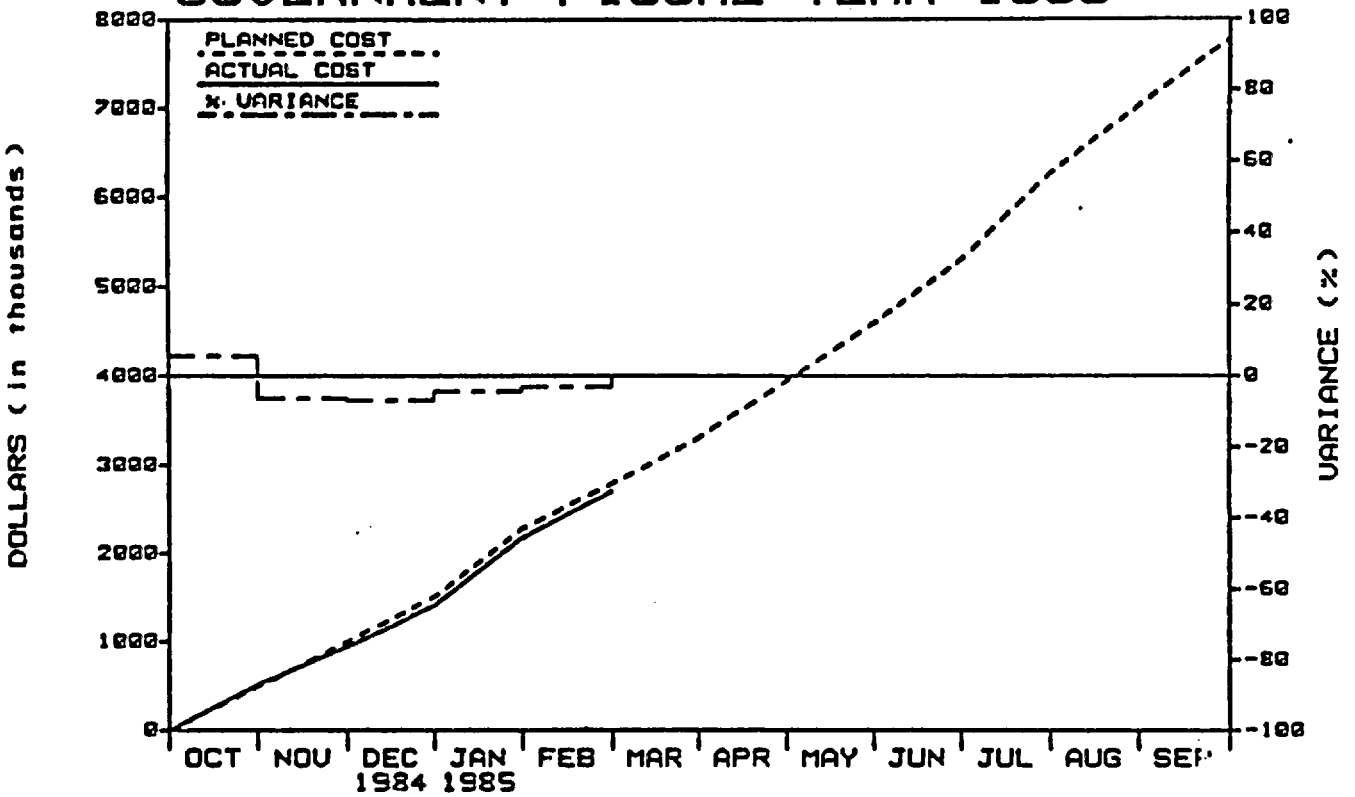
PLAN (X1000)	426	772	1222	1430	1802	2177	2548	2912	3294	3669	4043	4424
COST (X1000)	426	861	1148	1454	1812	0	0	0	0	0	0	0
VARIANCE (X1000)	0	-89	74	-24	-10	0	0	0	0	0	0	0
% VARIANCE	0	12	-6	2	1	0	0	0	0	0	0	0

SANDIA NATIONAL LABORATORIES
GOVERNMENT FISCAL YEAR 1985



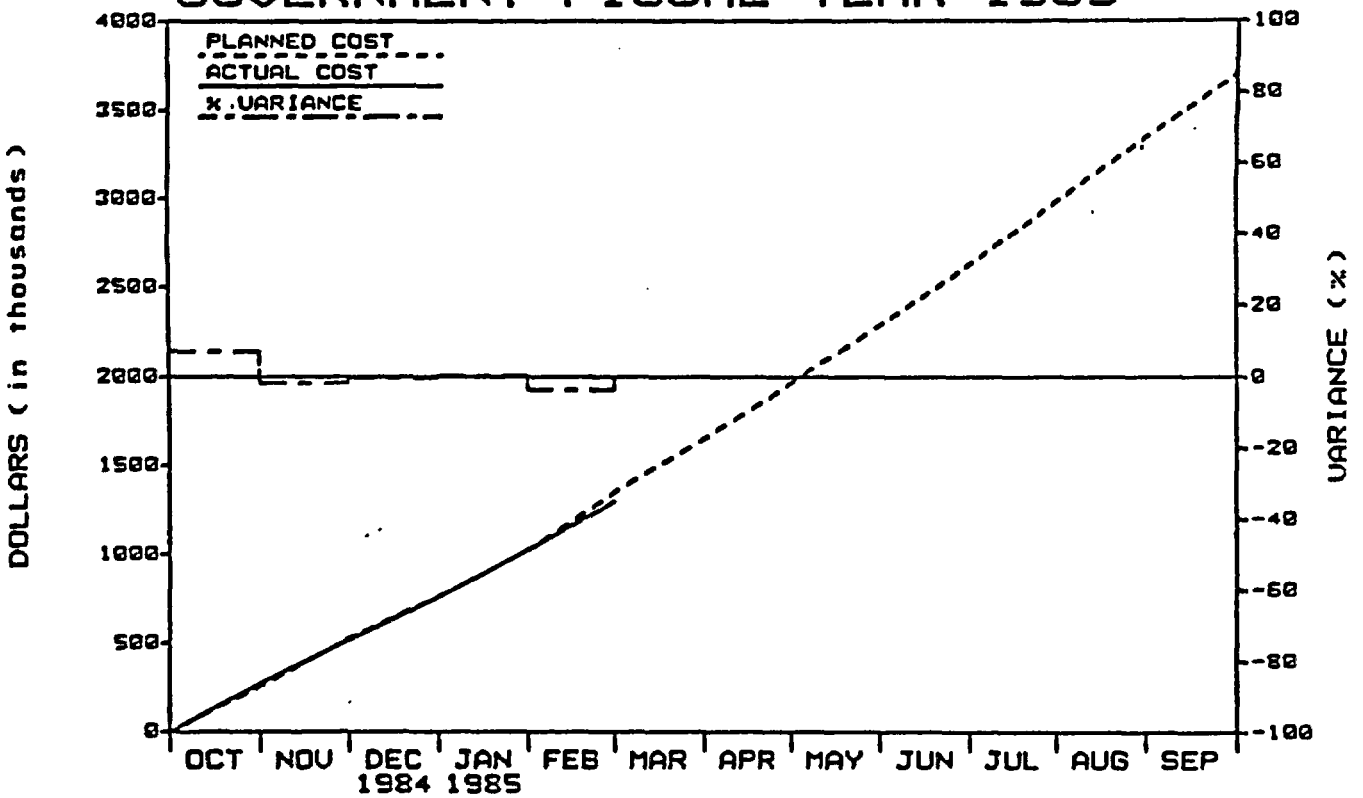
PLAN (X1000)	1240	2091	3527	5197	6736	8289	10115	11898	13722	15429	16976	18334
COST (X1000)	1230	2160	3511	5435	6546	0	0	0	0	0	0	0
VARIANCE (X1000)	10	-69	16	-238	190	0	0	0	0	0	0	0
% VARIANCE	-1	3	0	5	-3	0	0	0	0	0	0	0

SCIENCE APPLICATIONS INT'L CORP.
GOVERNMENT FISCAL YEAR 1985



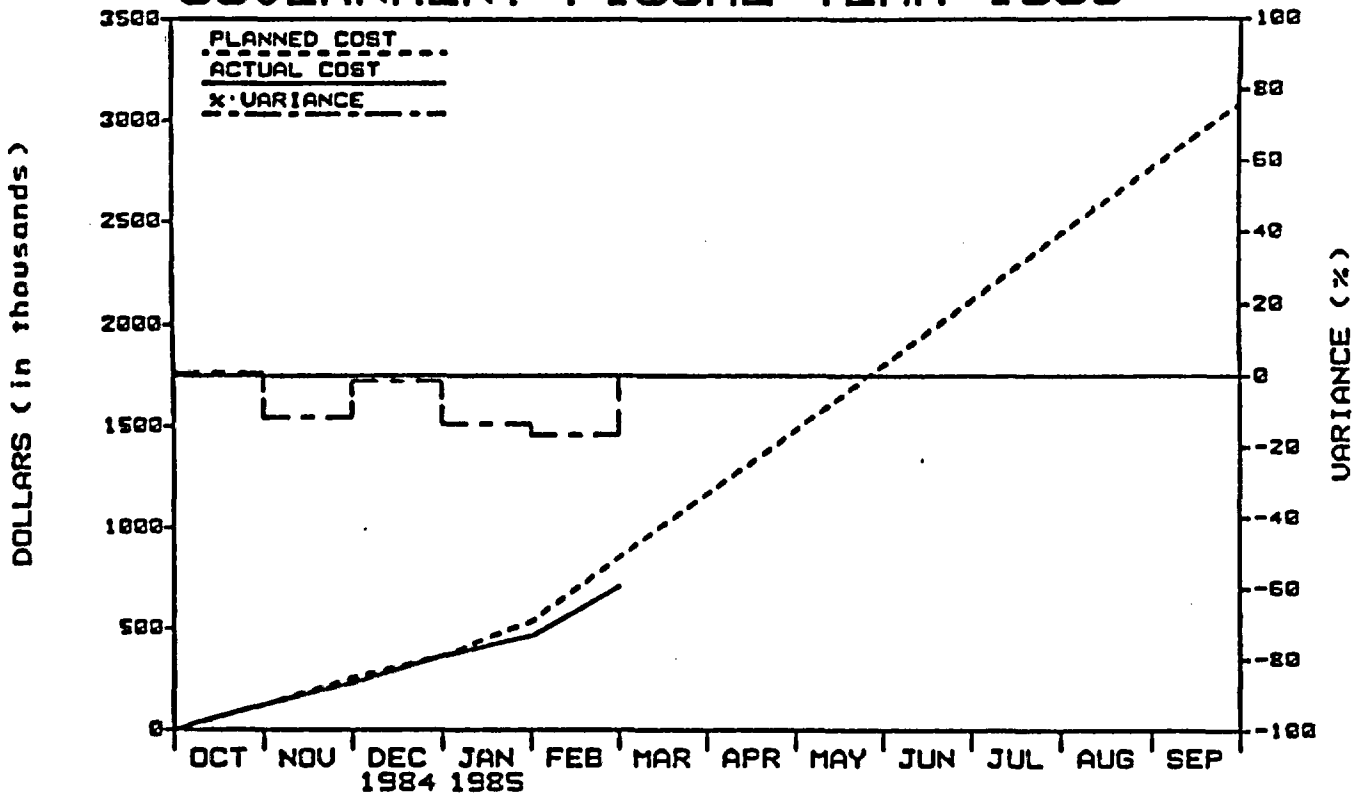
PLAN (X1000)	492	1005	1512	2276	2786	3298	3939	4588	5293	6253	7008	7775
COST (X1000)	519	942	1408	2177	2703	0	0	0	0	0	0	0
VARIANCE (X1000)	-27	63	104	99	83	0	0	0	0	0	0	0
% VARIANCE	5	-6	-7	-4	-3	0	0	0	0	0	0	0

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	0	0	0	0	0	0	0
VARIANCE (X1000)	-18	9	3	-4	50	0	0	0	0	0	0	0
% VARIANCE	7	-2	0	0	-4	0	0	0	0	0	0	0

MISCELLANEOUS CONTRACTORS
GOVERNMENT FISCAL YEAR 1985



PLAN (X1000)	122	258	366	536	851	11E	1483	1799	2114	2436	2756	3075
COST (X1000)	123	228	361	463	709	0	0	0	0	0	0	0
VARIANCE (X1000)	-1	30	5	73	142	0	0	0	0	0	0	0
% VARIANCE	1	-12	-1	-14	-17	0	0	0	0	3	3	0

FEBRUARY 1985

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
LEVEL 1 MILESTONES IN A TIME WINDOW OF 01 Oct 1984 TO 30 Sep 1985
Run Date: 29 March 1985

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL
System Engineering Management Plan	2.1.1.S	Witherill	1	SNL	M108	B	30 Aug 85
Performance Assessment Plan	2.1.1.S	Blanchard	1	SNL	N113	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
Preliminary System Description	2.1.2.1.S	Witherill	1	SNL	M151	B	21 Nov 84
Establish Interim Product Specifications	2.2.3.1.L	Valentine	1	WMPO	M250	B	30 Aug 84
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	LLNL	M231	B	29 Mar 85
Initiate Waste Package Advanced Conceptual Design	2.2.4.L	Valentine	1	LLNL	M233	B	30 Apr 85
Pre-Closure Analysis of Selected Conceptual Designs	2.2.4.L	Valentine	1	LLNL	M251	B	28 Sep 84 20 Dec 84
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
Weapons Test Seismic Report	2.3.2.2.4.S	Blanchard	1	WMPO	M357	B	15 Jan 85

FEBRUARY 1985

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
LEVEL 1 MILESTONES IN A TIME WINDOW OF 01 Oct 1984 TO 30 Sep 1985
Run Date: 29 March 1985

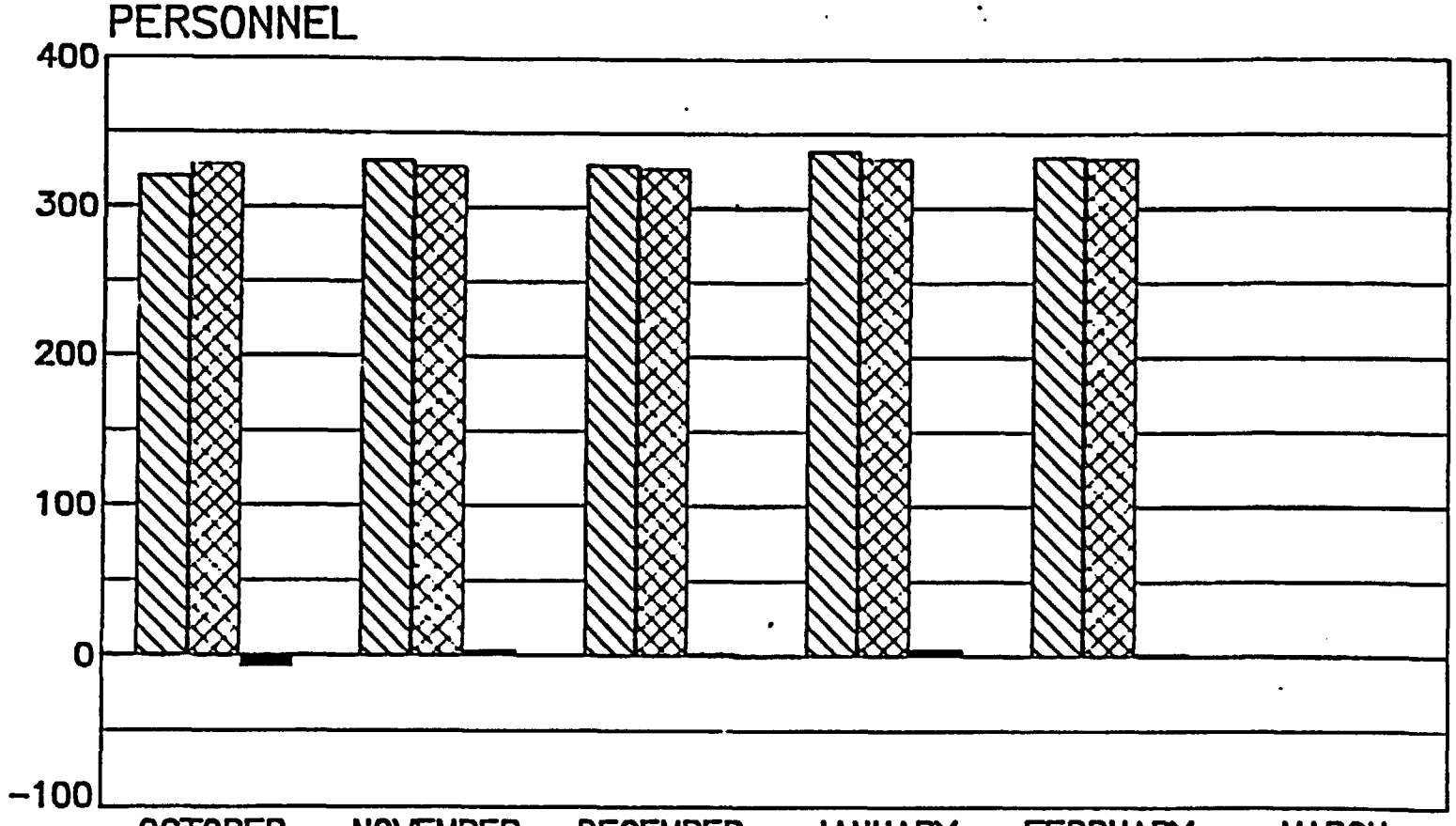
MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL
Complete Paleobotany Study of Yucca Mountain	2.3.3.5.1.G	Blanchard	1	USGS	M358	P	15 Oct 84
Letter Report on Groundwater Chemistry Along Flow Paths	2.3.4.1.1.A	Blanchard	1	LANL	M354	B	30 Aug 84 14 Feb 85
Complete 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
SCP Chapter 6 — Conceptual Design	2.5.2.2.S	Blanchard	1	SNL	M453	B	30 Aug 85
Draft Site Characterization Plan	2.5.2.2.T	Blanchard	1	SAIC	M521	B	30 Jul 85
Site Characterization Plan	2.5.2.2.T	Blanchard	1	SAIC	M522	B	20 Aug 85

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
LEVEL 1 MILESTONES IN A TIME WINDOW OF 01 Oct 1984 TO 30 Sep 1985
Run Date: 29 March 1985

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL
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) (NVO-244)	2.6.9.1.A	Witherill	1	LANL	M666	B	27 Sep 85
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
Draft Project Management Plan	2.9.1.T	Kunich	1	SAIC	M907	B	29 Mar 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
Submit NVO-196-18 (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: 32

- NNWSI PROJECT STAFFING -
FISCAL YEAR 1985



	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH
BUDGET	321	332	329	339	335	
ACTUAL	329	328	327	334	334	
VARIANCE	-8	4	2	5	1	

MR-3-85

Department of Energy
Nevada Operations Office
P. O. Box 14100
Las Vegas, NV 89114-4100

APR 12 1985

W. J. Purcell, Director, Office of Geologic Repositories, DOE/HQ (RW-20), FORSTL

NNWSI WEEKLY HIGHLIGHTS FOR WEEK ENDING APRIL 11, 1985

I. Issues Requiring Involvement of HQ or Other Projects

A. New Issues:

None to report.

B. Previously Reported Issues:

	Issue	Status	First Report Date
1.	Regarding March 18 letter to Purcell requesting support to resolve OCRWM position on transportation, a meeting or plan is required to clarify issues and document OCRWM policy positions.	Open	3/20/85
2.	Regarding February 6 letter to Purcell - NNWSI Project FY 85 Guidance--Clarification needed for tracking purposes on Level I milestones.	Open	2/27/85
3.	Regarding March 14 letter to E. S. Burton - EA Briefings and Hearings - requested copy of documents generated as a result of "Roles and Responsibilities at Briefings" memo.	Open	3/14/85
4.	Regarding April 1 letter to Frank - NNWSI Project Environmental Permitting - requested copy of Labot and Anderson Summary of Federal and Nevada Regulations.	Open	4/1/85

II. Major Internal Concerns

None to report.

III. Significant Accomplishments (SA)/Information Items (II)

SA

None to report.

II

Governor Richard Bryan toured the NTS on Monday, April 8. The tour went well but the Governor was non-committal regarding any changes in his attitude toward the repository. Tom Clark and Don Vieth accompanied the Governor, Congressman Harry Reid, James Cashman, and Major General Ralph Taylor on the tour of Climax, E-MAD, and aerial viewing of Yucca Mountain.

At HQ's request, efforts have been initiated to coordinate the NNWSI contribution to the Coupled Process Symposium scheduled for September 18-20.

Don Vieth participated in an open forum (debate format) at Clark County Community College on April 10. Other panel members included Bob Dickinson (Nevada Nulcear Waste Study Committee), and Fran Polk, Bill Vincent, and Judy Treichel (active environmentalists). About 50 people attended this forum.

IV. Upcoming Events

1. Coordination Group Meetings

- o Tuesday-Thursday, April 23-25: QACG Meeting, Chicago.

2. HQ Meetings

- o Tuesday-Thursday, April 16-18: EA Issues Resolution Group Meeting, D.C.
- o Wednesday-Thursday, April 17-18: OS & TS PRDA Review (Waste Canister), HQ.
- o Monday-Tuesday, April 29-30: SEMP Workshop, ABQ.
- o Tuesday-Thursday, April 30-May 2: EA Issues Steering Group Meeting, HQ.
- o Monday, May 13: Program Managers Meeting, Denver.
- o Thursday-Friday, May 16-17: FY 87 Budget Re ew, HQ.

3. Internal Project and DOE/NV Meetings

- Thursday, April 11: SCP Working Group.
- Monday-Friday, April 15-19: Brookings Course, Don Vieth.
- Tuesday, April 16: NV Program Managers Review, Las Vegas.
- Wednesday-Thursday, April 17-18: ESTP Committee Meeting, Las Vegas.
- Monday, April 22: St. George Community Leaders tour of NTS.
- Wednesday-Thursday, April 24-25: PM-TPO Meeting, Las Vegas.
- Tuesday-Wednesday, May 14-15: ESTPC Meeting, Las Vegas.

4. State and Public Interaction

- Tuesday-Friday, April 9-12: EA State Consultation Meeting.
- Friday, April 26: Don Vieth to address UNLV Chemists and Physicists and Mitch Kunich to address the NV State PTA in Tonopah.
- Monday, April 29: U.S. National Committee on Tunneling Technology Nominating Committee Meeting, Don Vieth (to nominate new officers and members).
- Thursday, May 2: Vern Witherill speaking at Lions Club, Las Vegas.
- Thursday, May 2: Don Vieth to address Institute of Environmental Scientists, Las Vegas.
- Thursday-Friday, May 2-3: First Repository States Meeting, Baltimore, MD.
- Monday-Tuesday, May 6-7: EEI Conference.
- Tuesday, May 14: Don Vieth to address H. Mudd College, Claremont, CA.

5. NRC Interaction

o Thursday, April 18: NRC/DOE Meeting to discuss repository design, Silver Springs, MD.

Donald L. Vieth, Director
Waste Management Project Office

WMPO:DLV-808

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