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NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT



MONTHLY REPORT

MARCH 1984

UNITED STATES DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE

TABLE OF CONTENTS

Summary

| | |
|---|---|
| Key Activities | 1 |
| Funding Overview | 5 |
| Milestone Changes Since Last Report | 5 |
| NNWSI Cost vs. Plan | 6 |
| Budget Baseline Log | 7 |

Project Status

| | |
|--|----|
| 1.1 Systems | 8 |
| 1.2 Waste Package | 12 |
| 1.3 Site | 17 |
| 1.4 Repository | 22 |
| 1.5 Regulatory/Institutional | 27 |
| 1.6 Exploratory Shaft | 32 |
| 1.7 Test Facilities | 35 |
| 1.8 Land Acquisition | 41 |
| 1.9 Program Management | 42 |

| | |
|--|----|
| <u>NNWSI Participant Budget vs. Cost</u> | 46 |
|--|----|

| | |
|--------------------------------------|----|
| <u>NNWSI Milestone Log</u> | 55 |
|--------------------------------------|----|

| | |
|---|----|
| <u>NNWSI Project Staffing</u> | 56 |
|---|----|

SUMMARY

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT

MARCH, 1984

KEY ACTIVITIES

WBS 1.1, Systems

A paper entitled, "A Natural Language Solution to the Tuff Problems," was written for presentation at the spring meeting of the Association of System 2000 Users for Technical Exchange. The paper describes work on the current user-friendly interface for the Tuff Data Base.

As part of the NNWSI Project code verification (COVE) activity, various computer codes are used to solve a standard set of problems and the results are compared. A workshop will be held April 3-4 to reach a consensus on the conclusions.

WBS 1.2, Waste Package

Results were obtained from the chemical analyses of the solution taken from the one-year, room-temperature, gamma-irradiated, 304L stainless steel corrosion test in J-13 water plus tuff. Preliminary data indicate that many of the dissolved ionic species were concentrated by a factor of approximately two in the irradiated vessel as compared to the non-irradiated vessel.

A stress corrosion test on 304 and 304L stainless steels was begun in tuff-conditioned J-13 water at 100°C. The specimens being tested simulate several metallurgical conditions such as glass pouring, storage, and water/vapor exposure.

WBS 1.3, Site

Four USGS Open-File reports were published in March: "Aeromagnetic map of the western central Sierra Nevada, California;" "Vegetation of the last 45,000 years in the vicinity of the Nevada Test Site, South-Central Nevada;" "Geohydrologic data for test well UE-25b#1, Nevada Test Site, Nye County, Nevada," and "Geohydrologic data for test well USW G-4, Yucca Mountain Area, Nye County, Nevada."

The pumping test at well USW H-3 was completed. Results of geochemical analyses of the water imply that the water directly below Yucca Mountain in the Tram Member is not part of the aquifer found at the standing water level in wells drilled outside of Yucca Mountain.

Permission to core drill at Walker Lake has been received from the Nevada Department of Conservation and Natural Resources and is planned to begin in June. This drilling is part of the study of past climates of the region.

WBS 1.4, Repository

SNL personnel met with Bechtel to discuss seismic design considerations for waste handling facilities. It was concluded that ground-motion concerns would not eliminate any of the six candidate locations for surface facilities. However, faulted bedrock should be avoided, because displacement on pre-existing faults, regardless of the age of the last movement, would produce physical disruption of the buildings placed over them.

A contract to support the conceptual design of the repository underground workings has been awarded to Parsons, Brinckerhoff, Quade and Douglas, San Francisco.

WBS 1.5, Regulatory/Institutional

During March, a major technical staff effort was devoted to the preparation of the NNWSI Project position on the proposed NRC amendment to make 10CFR60 equally applicable to saturated and unsaturated zone repositories. The NNWSI

Project participants do not support the concept of flow time as an adequate performance measure. Other aspects of the NNWSI Project position are: groundwater travel time can be determined in the unsaturated zone with reasonable assurance; groundwater flow time is not an appropriate way to predict compliance with 40CFR191; moisture content is not a good indicator of either relative or potential dryness; the 300m depth favorable condition does not fully recognize the isolation potential of the unsaturated zone; and problems exist in requiring quantification of the extent of the capillary fringe.

The NNWSI Project position letter on "Generic Repository Licensing Issues" was finalized and sent to DOE/HQ. The Generic Issues included 10CFR60 performance objectives, procedural licensing issues and technical/operational licensing issues.

A revised schedule was given to the Projects at the DOE/HQ Environmental Assessment (EA) Steering Committee meeting on March 23. This schedule calls for the draft NNWSI Project EA to be provided to the State of Nevada in mid-May. The NNWSI Project staff continued revisions to the NNWSI Project EA as a priority activity.

WBS 1.6, Exploratory Shaft

An Exploratory Shaft Test Plan (ESTP) review retreat was held March 27-30. This meeting represented the first thorough NNWSI Project internal review of the ESTP.

WBS 1.7, Test Facilities

Ten of the thirteen planned in situ state-of-stress measurements at the Spent Fuel Test-Climax (SFT-C) Facility were completed during March. Stress measurements obtained last fiscal year indicated stress anomalies which may be explained by these additional measurements. A fourth deep borehole was drilled to accommodate additional measurements. The complete series of measurements will be obtained in the interval 60 to 90 ft.

At the E-MAD facility, fuel handling operations of fuel assembly D34 were initiated. The canister was cut open, inspected, and calorimetry was performed.

Fourteen tours were conducted of the E-MAD Facility for over 360 visitors, and eighteen tours were conducted at the SFT-C Facility.

WBS 1.9, Program Management

Presentations on the NNWSI Project were made at the AIF Fuel Cycle Conference '84 in Atlanta, the Waste Management '84 Symposium in Tuscon, and the Radio and TV News Directors Meeting in San Francisco.

A Public Information meeting will be held in Beatty, Nevada, on May 29. Technical presentations will be given by the NNWSI Project participants.

FUNDING OVERVIEW

The month-end programmatic estimated costs were \$29,452,000 against a planned \$30,297,000 which resulted in a cost underrun of \$845,000 through the month of March.

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

| | <u>Plan</u> | <u>Cost</u> | <u>Variance</u> |
|--------------------------------|--------------|--------------|-----------------|
| 1.1 Systems | \$ 1,692,000 | \$ 1,504,000 | \$188,000 |
| 1.2 Waste Package | 2,356,000 | 2,237,000 | 119,000 |
| 1.3 Site | 11,003,000 | 10,785,000 | 218,000 |
| 1.4 Repository | 4,765,000 | 4,763,000 | 2,000 |
| 1.5 Regulatory & Institutional | 1,440,000 | 1,383,000 | 57,000 |
| 1.6 Exploratory Shaft | 1,313,000 | 1,169,000 | 144,000 |
| 1.7 Test Facilities | 3,389,000 | 3,503,000 | <114,000> (1) |
| 1.9 Program Management | 3,751,000 | 3,495,000 | 256,000 |
| NTS Allocation | 463,000 | 463,000 | -0- |
| State Grant | 125,000 | 150,000 | <25,000> |
| | <hr/> | <hr/> | <hr/> |
| TOTAL | \$30,297,000 | \$29,452,000 | \$845,000 |

This report is based on a \$67M FY 1984 authorization. Overall, the project remains within budget.

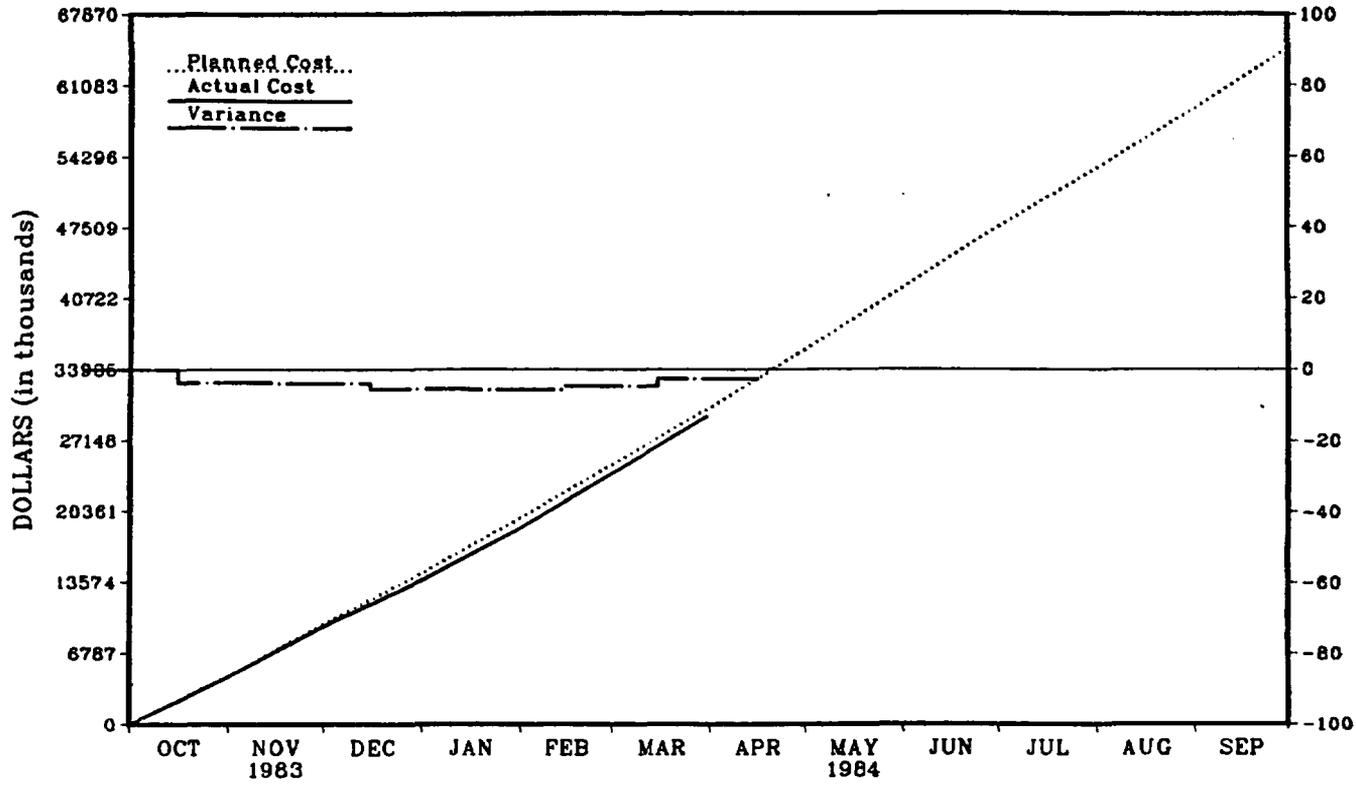
Note:

(1) Cost overrun is due to the carryover of \$226,000 of costs from the prior year.

MILESTONE CHANGES SINCE LAST REPORT

The Preliminary System Description Document, Milestone M151, has been rescheduled thirty days later due to earlier impacts caused by personnel being redirected to support the NNWSI Project Environmental Assessment. The description of milestone M353, Groundwater Level Data and Preliminary Potentiometric-Surface Maps, was changed to more clearly define the actual deliverable.

NNWSI Project GOVERNMENT FISCAL YEAR 1984



| | | | | | | | | | | | | |
|------------------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Plan (x1000) | 4559. | 9581. | 14393. | 19713. | 24850. | 30297. | 35857. | 41717. | 47545. | 53163. | 58836. | 64839. |
| Cost (x1000) | 4385. | 9207. | 13579. | 18556. | 23681. | 29452. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 174. | 374. | 814. | 1157. | 1169. | 845. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -4. | -4. | -6. | -6. | -5. | -3. | 0. | 0. | 0. | 0. | 0. | 0. |

NNWSI PLANNING & SCHEDULING
BUDGET BASELINE
MARCH 1984

| <u>CONTRACTORS</u> | <u>BEGINNING FUNDING</u> | <u>CHANGE</u> | <u>ENDING FUNDING</u> |
|--------------------|------------------------------|---------------|---------------------------|
| SNL | \$17,800 | - | \$17,800 |
| LLNL | 8,298 | - | 8,298 |
| LANL | 9,090 | - | 9,090 |
| USGS | 7,777 | - | 7,777 |
| SAI | 5,861 | - | 5,861 |
| REECO | 9,498 | - | 9,498 |
| H&N | 470 | - | 470 |
| F&S | 1,168 | - | 1,168 |
| WESTINGHOUSE | 2,746 | - | 2,746 |
| WSI | 200 | - | 200 |
| PAN AM | 30 | - | 30 |
| MISCELLANEOUS | 579 | - | 579 |
| NTS ALLOCATION | 847 | - | 847 |
| RESERVE | <u>46</u> | <u>-</u> | <u>46</u> |
| TOTAL (BA) | \$64,410 | - | \$64,410 |
| FORWARD FINANCING | (500) | - | (500) |
| CAPITAL EQUIPMENT | <u>3,090</u> | <u>-</u> | <u>3,090</u> |
| TOTAL (BA) | \$67,000 | - | \$67,000 |



PROJECT STATUS

1.1 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

The draft report, "Preliminary Parametric Studies with a Simplified Mathematical Model of a Proposed Nuclear Waste Disposal System, Yucca Mountain, Nevada," by M. S. Tierney and Y. T. Lin is in review. As submitted, the report addresses the contribution of the engineered barrier system to meeting radionuclide release requirements specified in 40CFR191. Direction has been received from DOE/HQ that will require an addition to the analysis that addresses the impact of variations in site parameters on meeting the EPA release limits; therefore, an expanded analysis was started and the report will be resubmitted for review in May.

A paper entitled, "A Natural Language Solution to the Tuff Problem," was written for presentation at the spring meeting of the Association of System 2000 Users for Technical Exchange (ASTUTE). The paper, written by B. S. Langkopf and L. Mallory, describes work on the current user-friendly interface for the Tuff Data Base.

The following data were entered or updated in the Tuff Data Base during March:

- geologic stratigraphy for holes USW G-2 and USW G-4,
- mineralogy data from USGS, Open-File Report 83-732,
- stratigraphic and thermomechanical data for USW H-5,
- newly surveyed elevation for USW G-3 provided by H&N, and
- coordinate data for UE-25a#3.

A reorganization was completed according to functional hydrologic units of the data from UE-25a#1, USW H-1, USW GU-3, USW G-4, and UE-25b#1. The data were previously organized according to formal geologic stratigraphy. Statistical analysis showed that the reorganization would decrease variability. TOSPAC will probably use the hydrologic stratigraphy. The analysis also showed that to eliminate the swamping effect of variability in the data, hydraulic conductivity should be expressed as the average of the log of the values rather than the average of the individual values.

As part of the ongoing effort to develop a system-oriented source term, a preliminary study was conducted to determine the significance of water infiltration rate on radionuclide release from spent fuel. Dissolution in both saturated (inundated) and partially saturated conditions was considered. Under partially saturated conditions, water flow over the fuel rods was shown to occur in droplets. An analysis was performed to calculate droplet travel times for the two emplacement modes being considered. Assuming congruent leaching, the release rate of uranium and other radionuclides will be a linear function of the water infiltration rate. If the waste package is exposed to inundated conditions, the dissolution rate will be constrained by uranium solubility. If partially saturated conditions are encountered, the uranium leach kinetics should constrain the spent fuel dissolution rate. The release rate of non-uranium radionuclides was predicted using the congruent leaching mechanism modified to account for the heterogeneity in the distribution of radionuclides across fuel fragments.

PLANNED WORK

Definitions, functional requirements, performance criteria, constraints, and interactions for each of the systems and subsystems that make up the Yucca Mountain Waste Disposal System are being developed.

A study is nearly complete of possible permeability changes in the host rock due to the heating and cooling of groundwater. This analysis is based on the assumption that the infiltrating groundwater will maintain saturation with

respect to amorphous silica. Efforts are being made to include a feldspar dissolution control mechanism and to limit aqueous phase temperatures to 100°C. A report on this subject is to be submitted for review by the end of April.

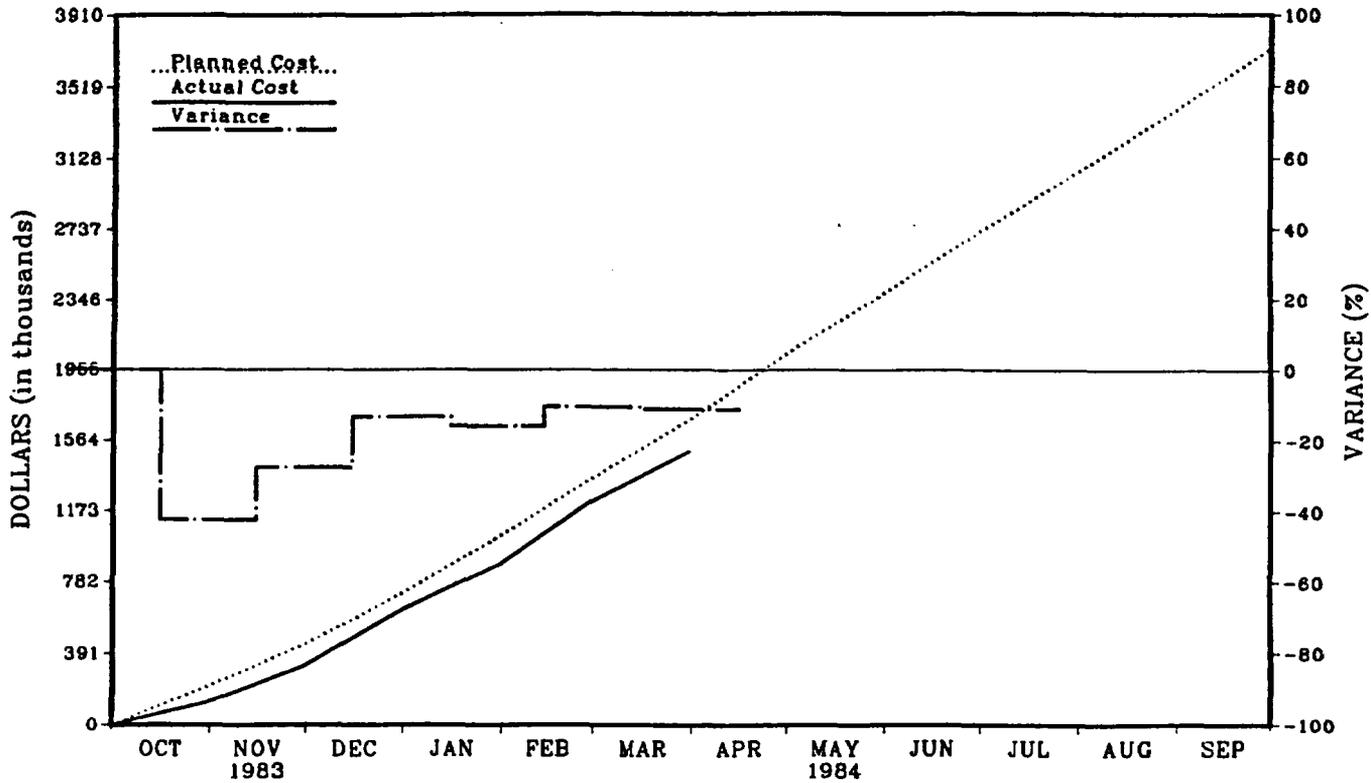
An ongoing task during the last year has been a code verification (COVE) program in which various NNWSI Project modelers used various computer codes to solve a standard set of problems including some with representative data from Yucca Mountain. At the end of the COVE activity, the results will be compared and conclusions will be drawn and documented relative to the strengths, limitations, and uses of the various computer codes that may be used for Performance Assessment. A workshop will be held April 3-4 to reach a consensus of the conclusions.

A simulation of a hydrothermal laboratory experiment that will be conducted is being developed. The simulation will aid in experimental design and will provide an opportunity to check the vapor transport portion of the NORIAH code on a Yucca Mountain related problem. This experimental code validation procedure will be discussed during the April 3-4 COVE workshop.

PROBLEM AREAS AND ACTIONS TAKEN

None.

WBS 1.1, Systems GOVERNMENT FISCAL YEAR 1984



| | | | | | | | | | | | | |
|------------------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Plan (x1000) | 220. | 442. | 724. | 1043. | 1362. | 1692. | 2046. | 2387. | 2726. | 3059. | 3398. | 3724. |
| Cost (x1000) | 127. | 320. | 628. | 877. | 1219. | 1504. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 93. | 122. | 96. | 166. | 143. | 188. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -42. | -28. | -13. | -16. | -10. | -11. | 0. | 0. | 0. | 0. | 0. | 0. |

NNWSI LEVEL 1 MILESTONES

| RESP. AGENCY | WBS | MILESTONE DESCRIPTION | O | N | D | J | F | M | A | M | J | J | A | S | |
|--------------|-----|--|--|---|---|---|---|---|---|---|---|---|---|---|--|
| SNL | 1.1 | PRELIMINARY PERFORMANCE ASSESSMENT FOR EA | ████████████████████ | | | | | △ | ◆ | | | | | | |
| SNL | 1.1 | PRELIMINARY SYSTEM DESCRIPTION DOCUMENT | ██ | | | | | | | | | | △ | ◆ | |
| SNL | 1.1 | USERS MANUAL FOR DATA BASE SYSTEM FOR PARTICIPANTS | ██ | | | | | | | | | | △ | ◆ | |

△ PLANNED MILESTONE COMPLETION DATE
 ▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
 ◆ COMPLETED AS REVISED

1.2 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

The first series of spent-fuel tests which were conducted in deionized water were terminated and restarted in fresh deionized water. The purpose of the restart is to determine whether either the same solution concentrations would be achieved in the case of all elements, or the readily soluble fraction of elements such as cesium had been exhausted.

It was determined that the uranium-doped glass which was supplied by the Materials Characterization Council (MCC) did not contain Pd, Rh, and Ru. Although the omission of noble metals from the glass formulation makes the glass less representative of the expected solidification product, the glass will be suitable for parametric testing. MCC was informed that future glass samples should be based upon the formulations provided to MCC by LLNL on November 1983.

Results were received from chemical analysis of the solution taken from the one-year, room-temperature, gamma-irradiated ($\sim 1 \times 10^5$ rads/hr), 304L stainless steel (solution annealed specimens and "sensitized" specimens) corrosion test. The test was made to determine the behavior of the material in partially aerated J-13 water in contact with crushed Topopah Spring tuff. As a control, an identical but non-irradiated test was conducted simultaneously. As compared to the non-irradiated vessel, preliminary analysis of the data indicates that many of the dissolved ionic species in the J-13 water were concentrated by a

factor of about two in the irradiated vessel. However, weight loss measurements on the specimens showed barely measurable corrosion on both the irradiated and non-irradiated sensitized or annealed material. More detailed analysis is underway of the observed chemical changes.

A stress corrosion test of 304 and 304L stainless steels performed in tuff-conditioned J-13 water at 100°C and in the saturated vapor above the water line was begun on March 13. The specimens are stressed to 90 percent of the test temperature yield strength. Some of the specimens are welded, and some are given a post-weld anneal, and others are given a sensitizing treatment to simulate glass pouring and storage conditions. A test matrix was constructed to allow at least 3 replicated specimens of each metallurgical condition to be exposed to the water and another 3 replicated specimens to be exposed to the vapor phase. The matrix was pulled from the test cell after 100 and 200 hours of exposure for examination of crack initiation. As expected, no cracks have been observed. In addition to the welding and heat treating operations, additional specimens are being prepared to encompass cold-work effects and to include alternative canister materials.

PLANNED ACTIVITIES

Samples of Topopah Spring Member tuff from drill hole USW G-1 are being characterized in order to determine if there are any significant differences between the Topopah Spring tuff at the repository horizon depth under Yucca Mountain and the Fran Ridge surface outcrop which is used to provide samples for the Waste Package materials testing program. These experiments will use J-13 water with crushed tuff (100 to 200 mesh size fraction) and polished core wafers, and are being conducted at 150 and 250°C. These tests are scheduled to be run for 64 days. The core wafer tests were at day 61 on March 31, 1984, and the crushed tuff tests were at day 54 on March 31, 1984. Immediately following the conclusion of these experiments, long-term testing for periods up to one year will begin.

Single-phase dissolution kinetics studies will begin using pure quartz crystal material. These studies will provide data needed for the geochemical modeling of experimental results obtained for the tuff. The tuff consists predominantly

of quartz, cristobalite, and alkali feldspar with some phenocrysts of plagioclase. Rates of dissolution for these four minerals will be needed to complete the data base for EQ3/6, the geochemical modeling code.

Work continues on the fabrication of the access tube for conducting elevated temperature, gamma-irradiation, corrosion experiments in the LLNL Gamma Irridation Facility. Most of the mechanical parts have been fabricated, and the remainder of the welding is scheduled during April. A test plan was developed which focuses on measurement of the corrosion potential and current as a function of the temperature, radiation dose, surface preparation of the specimens, and alloy composition and heat treatment. The first test will consider 304L and 316L stainless steels. Some specimens will be pre-pitted so that the role of the environment in passivating or propagating localized attack is assessed. In some experiments, the J-13 water will be concentrated. In addition, experiments will be conducted in simulated radiation environments to provide mechanistic interpretations of the irradiated environment.

Additional measurements will be made at the geotomography experimental site in G-Tunnel as the fracture system continues to drain. As results of the data analysis become available, the method will be assessed as a means by which changes in moisture content and saturation in fractured welded tuff can be monitored. This assessment will be used to plan the Waste Package Environment Test for the Yucca Mountain Exploratory Shaft.

Testing of irradiated Zircaloy cladding material will begin in April. These tests will be designed to help to determine the time during which credit for containment can be claimed for cladding around spent fuel.

PROBLEM AREAS AND ACTIONS TAKEN

The glass testing materials for glass composition II (doped with U, Pu, Np and Tc) have not been received from the MCC. The glass was requested in November 1983 for March 1, 1984 delivery. Delivery was promised no later than March 16, 1984. Delays in receipt of this material have caused delays in the start of

testing, and this will be reflected in the rescheuling of milestones which involve test results using that material. When the material is received, the milestone schedule will be reviewed and revised as necessary.

1.3 SITE

OBJECTIVE

The objective of this task is to determine whether or not Yucca Mountain is a suitable location for a repository for high-level waste. The effort is divided into two areas of study. The first is the development of the understanding of the characteristics of the rock mass that lies below the surface of Yucca Mountain. This encompasses the study of 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 the development of an understanding of the processes and events that could occur in the environs surrounding Yucca Mountain that could serve as a potential disruptive force to impact a repository. These efforts include the study of the tectonics, seismicity, volcanism, regional hydrology, paleohydrology, and paleoclimatology.

ACTIVITIES

The USGS finished the stratigraphic and lithologic description of boreholes UE-25WT#15 and UE-25WT#17 to complete the geologic characterization of the water table (WT) holes. A review of TV camera logs of the WT holes continued along with the development of computer-generated plots of the orientations of fractures identified on the TV logs of these boreholes. These automated plots display the true strike fractures by 5 degree increments and indicate the general dip direction by quadrants.

SNL personnel met with representatives of the USGS in Denver on March 1, 1984, to discuss future subsurface characterization for possible surface facility sites at Yucca Mountain. Differences between the results of recent drilling by Sandia and USGS predictions from detailed geophysical surveys indicate a surface-related low-velocity zone as much as 800 ft thick which appears to be independent of the well-characterized stratigraphy. Detailed seismic refraction profiles, gravity, ground magnetics, and electromagnetic surveys had previously been integrated to predict the top of the Tiva Canyon tuff in the

area of proposed surface facilities at about 700 ft. However, in January 1984, drilling on the east side of Yucca Mountain north of Fran Ridge intersected dry Tiva Canyon at about 150 ft.

Four USGS Open-File reports were published this month:

- "Aeromagnetic map of the western central Sierra Nevada, California," D. A. Ponce, USGS Open-File Report 84-216.
- "Vegetation and climates of the last 45,000 years in the vicinity of the Nevada Test Site, South-Central Nevada," W. G. Spaulding, USGS Open-File Report 83-535.
- "Geohydrologic data for test well UE-25b#1, Nevada Test Site, Nye County, Nevada," D. H. Lobmeyer, M. S. Whitfield, Jr., R. G. Lahoud, and Laura Bruckheimer, USGS Open-File Report 83-855.
- "Geohydrologic data for test well USW G-4, Yucca Mountain Area, Nye County, Nevada," C. B. Bentley, USGS Open-File Report 84-063.

The pumping test at well USW H-3 has been completed. Except for brief periods of shutdown due to mechanical failure, the well had been pumped continuously since early January. Throughout most of the test, the well was pumped at a rate of 1.5 gallons per minute with about 14 ft of drawdown in the well. Water level data during periods of pumping and recovery were obtained for hydrologic information, and geochemical testing of the water has been completed. Based on the quantities of the drilling fluids, Li^+ , Br^- , and detergent, it is felt that the water being pumped from the well is formation water. The water exhibits higher pH (higher alkalinity), and lower Eh than integral water samples from other wells in the Yucca Mountain vicinity. These results imply that the water directly below Yucca Mountain in the Tram Member is not part of the aquifer found at the standing water level in wells drilled outside of Yucca Mountain.

Preliminary drilling and testing criteria for USW UZ-6 (unsaturated-zone test hole) were completed and are under review. The site is approximately 2,900 ft

north of USW H-3 on Yucca Mountain and will be drilled to about 2,500 ft using the reverse vacuum air method. The criteria meeting for USW UZ-6 will be held early in April.

Recent observations of zeolite compositions taken from test holes UE-25b#1 and UE-25p#1 show that these zeolites do not exhibit the progression from calcium-rich to sodium-rich with increasing depth that has been observed in other drill holes. Reaction-path calculations done with EQ3/6 indicate that zeolite compositions are consistent with the higher calcium content of water from these wells.

Calculations were completed of potential effects of hydrovolcanic activity at Yucca Mountain. The only major hydrovolcanic event that could adversely change completed consequence analyses for volcanism is exhumation of a repository by hydrovolcanic explosions. This is unlikely for two reasons: the depth of burial of the repository is well below the deepest known hydrovolcanic crater, and experimental work has demonstrated that the energy yield of hydrovolcanic explosions decreases with depth (pressure).

WMPO, SNL, and SAI staff participated in an extensive tour of the Yucca Mountain area to select potential sites for the meteorological and air quality monitoring program for the NNWSI Project. Current estimates suggest that the system may be installed by November 1984. SNL has recommended that the two present meteorological towers at Yucca Mountain be kept in operation until the new system is working reliably.

PLANNED WORK

Work on the precipitation kinetics started during March will continue. This EQ6 code improvement includes the isolation of all dissolution and precipitation rate data so that they will be read from a new subroutine. The existing forms of the dissolution rate laws will be modified so that they can take precipitation into account with rate constants of similar form. A review of the current literature is continuing to determine whether or not additional precipitation rate laws should be included in the code.

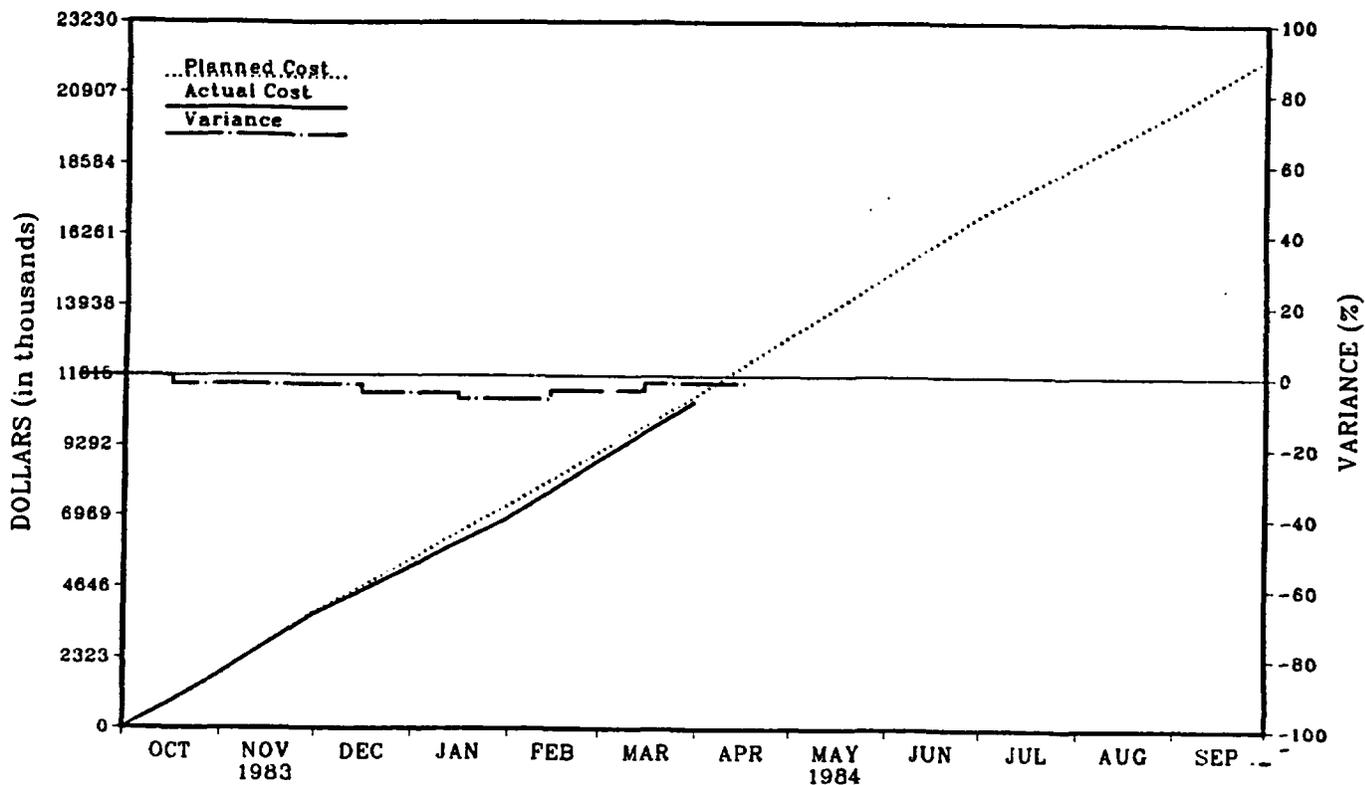
Permission to core drill at Walker Lake has been received from the Nevada Department of Conservation and Natural Resources. This drilling will be done to examine past regional climatology. Coring is planned for June and July. USGS personnel visited the Walker Lake area and made tentative arrangements for housing, core processing and cold storage facilities.

PROBLEM AREAS AND ACTIONS TAKEN

Thermal analyses conducted by LANL of clays and zeolites were halted during March because of power supply failure and line noise. A line conditioner was installed to correct this problem.

Direct transmission of Yucca Mountain meteorological data from the NTS has been of poor quality for the last few weeks coincident with the change of the NTS phone system. Data cassettes are being mailed to SNL until the problem can be resolved.

WBS 1.3, Site GOVERNMENT FISCAL YEAR 1984



| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|------------------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| Plan (x1000) | 1794. | 3809. | 5566. | 7356. | 9108. | 11003. | 12941. | 14956. | 16932. | 18642. | 20358. | 22126. |
| Cost (x1000) | 1748. | 3707. | 5285. | 6869. | 8726. | 10785. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 48. | 102. | 281. | 487. | 382. | 218. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -3. | -3. | -5. | -7. | -4. | -2. | 0. | 0. | 0. | 0. | 0. | 0. |

NNWSI LEVEL 1 MILESTONES

| RESP. AGENCY | WBS | MILESTONE DESCRIPTION | O | N | D | J | F | M | A | M | J | J | A | S | |
|--------------|-----|--|-----------------------|---|---|---|---|---|---|---|---|---|---|---|--|
| LANL | 1.3 | DRAFT RPT. ESTIMATING WATER FLOW & RN TRANS. ALONG FLOW PATH | ████████████████████▲ | | | | | | | | | | | | |
| USGS | 1.3 | GROUNDWATER LEVEL DATA & PRELIM. POTENTIOMETRIC SURFACE MAPS, YM | ████████████████████ | | | | | | | | | | △ | ◇ | |
| LANL | 1.3 | LETTER REPORT GROUNDWATER CHEMISTRY ALONG FLOW PATHS | ████████████████████ | | | | | | | | | | △ | ◇ | |
| LANL | 1.3 | COMPLETE REPORT ON VOLCANIC HAZARDS ANALYSIS | ████████████████████ | | | | | | | | | | △ | ◇ | |
| LANL | 1.3 | PROGRESS RPT. ON 3-D MINERALOGIC MODEL OF YM | ████████████████████ | | | | | | | | | | △ | ◇ | |

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

1.4 REPOSITORY

OBJECTIVE

The objective of this task is to develop the engineering capability to design, construct, operate, and decommission a repository in tuff. Five specific technical areas are involved which include (1) the determination of the physical and mechanical properties of the rock matrix and rock mass important to the design and construction of an underground structure, (2) the engineering analysis and evaluation of the various technical details important to the design and operation of a repository, (3) the development of the techniques of sealing a repository as part of decommissioning, (4) the preparation of a site specific design that will be accommodated within the surface and subsurface constraints of Yucca Mountain, and (5) the design and development of the equipment to construct the repository, handle the waste and the waste package, and transfer the waste and the waste package within the repository system.

ACTIVITIES

Experiments continued on time-dependent mechanical properties of Calico Hills tuff as a function of temperature and stress. The last planned test on this tuff type is into its third month with stress levels higher than all previous samples. The sample exhibits the time-dependent swelling phenomenon (previously noted in other samples) at stresses up to 55 MPa. This is believed to be due to swelling of zeolites within the sample. This phenomenon may be a previously unexpected source of stress in the repository environment if hydration states of zeolites change in situ. Analyses of the results continue with the objective of formulating an empirical constitutive relationship for incorporation into predictive calculational models that will be applied to borehole sealing, ES experiment design and interpretation, and repository design and performance assessment.

The following five papers were presented at Waste Management '84:

- "A Comparative Study of Radioactive Waste Emplacement Configurations,"
L. W. Scully, H. F. Gram, M. L. Wheeler and R. I. Brasier.

- "The Effect of Waste Age on the Design of a Geologic Repository," P. D. O'Brien and C. G. Shirley.
- "Preliminary Worst-Case Accident Analysis to Support the Conceptual Design of a Potential Repository in Tuff," J. L. Jackson, H. F. Gram, K. J. Hong, H. S. Ng, and A. M. Pendergrass.
- "Economic Impacts of Waste Emplacement Configuration for the Proposed Nuclear Waste Repository at the Nevada Test Site," L. W. Scully, R. I. Brasier, and H. F. Gram.
- "Operational Procedures for Receiving, Packaging, Emplacing, and Retrieving High Level and Transuranic Wastes in a Geologic Repository in Tuff," A. W. Dennis, P. D. O'Brien, R. Mulkin, and J. C. Frostenson.

SNL personnel met with Bechtel in San Francisco, California, on March 21 and 22 for a monthly design review meeting. Discussions regarding seismic design considerations for waste handling facilities concluded that ground-motion concerns would not eliminate any of the six candidate locations for surface facilities, although some shallow alluvium or faulted bedrock conditions should be avoided. Displacement on pre-existing faults, regardless of the age of the last movement, would produce physical disruption of buildings placed over them. For this reason, even though block movement along old faults is highly unlikely, faulted bedrock should be avoided. However, these concerns do not include the associated siting concerns for an underground portal near the waste handling facilities. This concern must be reconciled with Parsons, Brinckerhoff, Quade and Douglas, the architect-engineer (A-E) chosen for the subsurface conceptual design.

A study has been completed on saturation procedures for tuff samples to quantify the saturation differences resulting from vacuum and pressure saturation. The vacuum saturation procedure was applied to five densely welded Topopah Spring core samples of two different sizes and was followed by the application of high-pressure saturation to the samples. The five densely welded samples

showed an average increase of 7 percent. The non-welded sample showed no significant increase in saturation level with the application of high-pressure saturation.

To support the understanding of the performance of grout material used as a fault seal, grout curtain, settlement plug, station plug, or external fault seal, the stability of grout is being evaluated under conditions simulating the repository environment, i.e., within the Topopah Spring Member. The laboratory samples were exposed to the vapor phase at 200°C for several months and exhibited alteration and dissolution of the quartz sand in the grout/mortar. The dominant alteration products were observed to be calcite along with platelet crystals of calcium silicate hydrate. These initial observations, which are directly applicable to the performance of the fault seal, indicate that alteration of a grout can occur and that characterization of hydrologic properties of the altered grout may be necessary to understand its long-term performance.

Tours of the G-Tunnel Underground Facility were conducted for personnel from LLNL, USGS, Fenix & Scisson (F&S), and a group of health physics graduate students from San Diego State University.

PLANNED ACTIVITIES

A revised outline of the report, "Mechanical Compatibility Between Cementitious Materials and Topopah Spring Member Tuff," was prepared by SNL and submitted to the Pennsylvania State University. Compilation of data and writing consistent with the outline are in progress. Some testing to characterize the interface morphology between the grout and rock is continuing and will support this report. Several samples are being evaluated to determine the existence of mineralogic differences, texture, and porosity which might explain the contrast in bonding between the tuff and the grout. This work will support the performance of the components requiring an adequate bond.

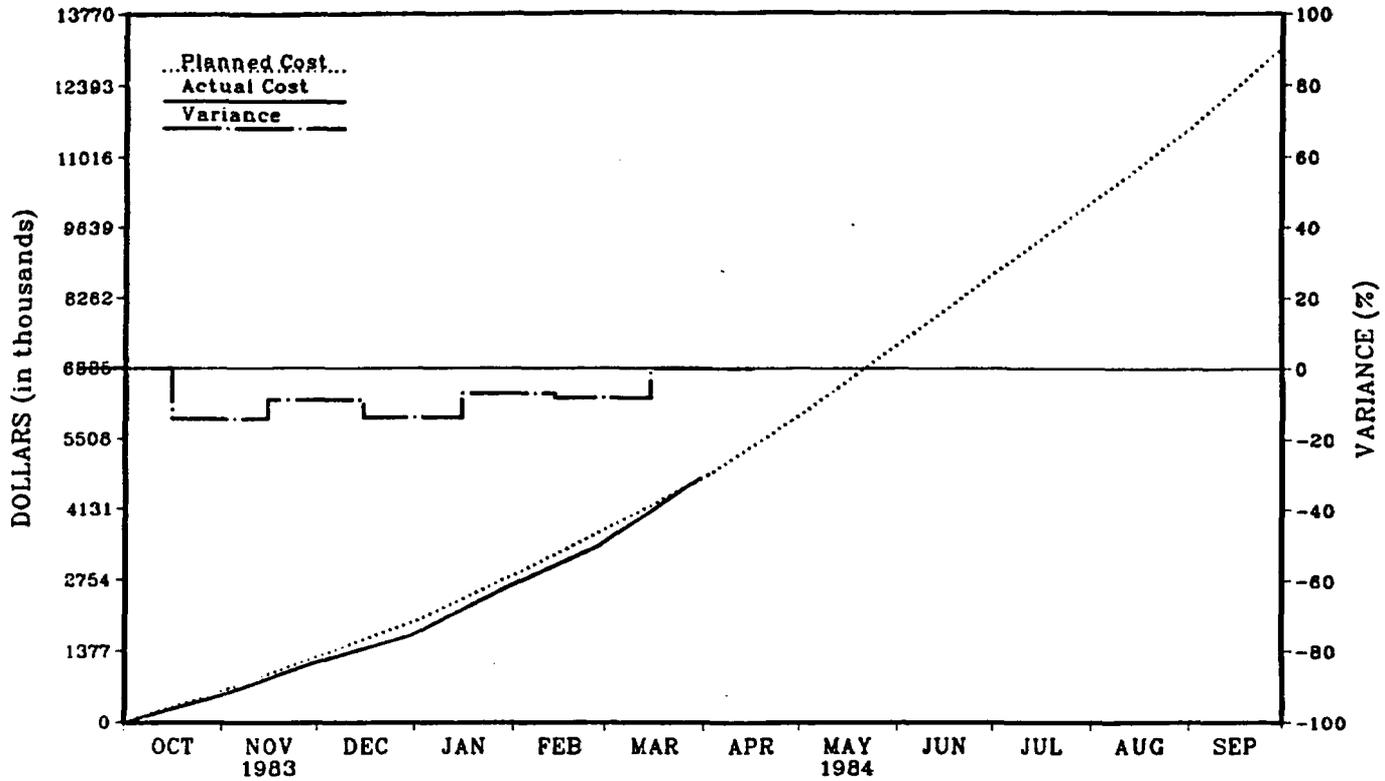
SNL personnel participated in a design meeting held at the NTS for the second phase of the small diameter heater experiments. The field crew is to concentrate on completing all emplacement hole preparations before starting to

install instrumentation. The highest priority is to cut the slots in the emplacement hole so thermocouple inserts can be installed on the surface of the hole. Efforts are also being directed toward completing the definition of the 100-channel data acquisition system.

PROBLEM AREAS AND ACTIONS TAKEN

Because testing took longer than anticipated, the draft report of Calico Hills tuff time-dependent mechanical properties is three months late.

WBS 1.4, Repository GOVERNMENT FISCAL YEAR 1984



| | | | | | | | | | | | | |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| Plan (x1000) | 613. | 1273. | 1951. | 2852. | 3749. | 4765. | 5982. | 7337. | 8718. | 10110. | 11547. | 13116. |
| Cost (x1000) | 525. | 1158. | 1680. | 2646. | 3436. | 4763. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 88. | 115. | 271. | 206. | 313. | 2. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -14. | -9. | -14. | -7. | -8. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |

NNWSI LEVEL 1 MILESTONES

| RESP. AGENCY | WBS | MILESTONE DESCRIPTION | Month | | | | | | | | | | | | | |
|--------------|-----|---|------------|---|---|---|---|---|---|---|---|---|---|---|--|--|
| | | | O | N | D | J | F | M | A | M | J | J | A | S | | |
| SNL | 1.4 | SUBMIT SUMMARY LOGIC NETWORK FOR REPOSITORY | ██████████ | | | ▲ | | | | | | | | | | |
| SNL | 1.4 | SEAL DEVELOPMENT PLAN FOR REPOSITORY | ██████████ | | | | | | | △ | ◇ | | | | | |

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

1.5 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 the 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 such include the Atomic Energy Act of 1954, the National Environment Policy Act (NEPA) of 1969, and the Nuclear Waste Policy Act (NWPA) of 1982, 10 CFR Part 60 and 40 CFR Part 191. For ease of understanding, regulatory and institutional activities may be further subdivided into five categories: (1) Site Recommendation Report, (2) Repository Licensing, (3) Site Characterization Report/Site Characterization Plan (SCR/SCP), (4) Environmental Assessment, and (5) State Interactions.

ACTIVITIES

A HQ-SCP Working Group meeting was held in Denver on March 20; the agenda concerned development of an SCP issues hierarchy. The licensing technology staff prepared a detailed presentation outlining the interrelationships of regulatory needs, and issues and information needs. The DOE/HQ position was that all projects should use the Mission Plan issues hierarchy to at least the second level (NNWSI "Issues"). The DOE/HQ proposed key issues also include an issue that would have required inclusion of Environmental, Socioeconomic, and Transportation discussions in the SCP. The NNWSI Project presentations were successful in that DOE/HQ accepted the rewording of three key issues to the point where they are indistinguishable from the NNWSI Project Key Issues. Also, DOE/HQ agreed that site-specific considerations required the second level issues to depart somewhat from those of the Mission Plan.

The meeting resulted in multiple deliverables that are to be furnished to DOE/HQ by early April:

- NNWSI Project position on inclusion of Environmental, Socioeconomic and Transportation discussions in the SCP.
- NNWSI Project position on development and inclusion in the SCP of site specific compliance measures.
- NNWSI Project position on definition of accessible environment, disturbed zone, travel time along fastest path of likely groundwater movement, and unsaturated zone performance objectives.
- Comments on the SCP working group charter.
- Comments on the Table of Contents for the SCP.
- Comments on Performance Assessment Definitions.
- Comments on Program guidance for SCP preparation.

A major technical staff effort during March was devoted to the preparation of the NNWSI Project position on the proposed NRC amendment to make 10CFR60 equally applicable to both saturated and unsaturated zone repositories. The proposed amendment clearly reflected input provided to the NRC at a previous meeting held at USGS in Denver. The NRC specifically requested comment on the question of whether or not the 1,000-year groundwater travel time performance objective should be applied to unsaturated zone repositories. Also, the NRC solicited comments on the applicability of flux as an unsaturated zone performance objective.

Briefly summarized, the major aspects of the NNWSI position are:

- Groundwater travel time can be determined in the unsaturated zone with reasonable assurance.

- The NNWSI Project participants do not support the concept of flow time as an adequate performance measure for either the unsaturated or the saturated zone.
- Groundwater flow time is not an appropriate way to predict compliance with 40CFR191.
- Moisture content is not a good indicator of either relative or potential dryness.
- The 300 m depth favorable condition does not fully recognize the isolation potential of the unsaturated zone.
- Problems exist in requiring quantification of the extent of the capillary fringe.

Significant time has been spent assisting Weston to prepare the DOE/HQ response to the amendment and this item will be tracked from interactions with Weston through final preparation of the DOE/HQ response and submittal to the NRC.

The NNWSI Project position letter on "Generic Repository Licensing Issues" was finalized and sent to DOE/HQ on March 14, 1984. This letter supplemented an interim letter sent to DOE/HQ on December 22, 1983. The Generic Issues included:

- 10CFR60 Performance Objectives
- Procedural Licensing Issues such as validation of computer codes, demonstration of waste package reliability, and definition of accessible environment.
- Technical/Operational Licensing Issues such as practical application of definition of disturbed zone, coupled behavior borehole sealing in the unsaturated zone, and use of radioactive tracers in field tests.

PLANNED WORK

The NNWSI Project staff will continue to prepare the NNWSI Project Environmental Assessment (EA) for June 1 transmittal to DOE/HQ. A draft, annotated schedule of EA development activities was prepared on March 28, 1984. This schedule will be finalized in early April 1984.

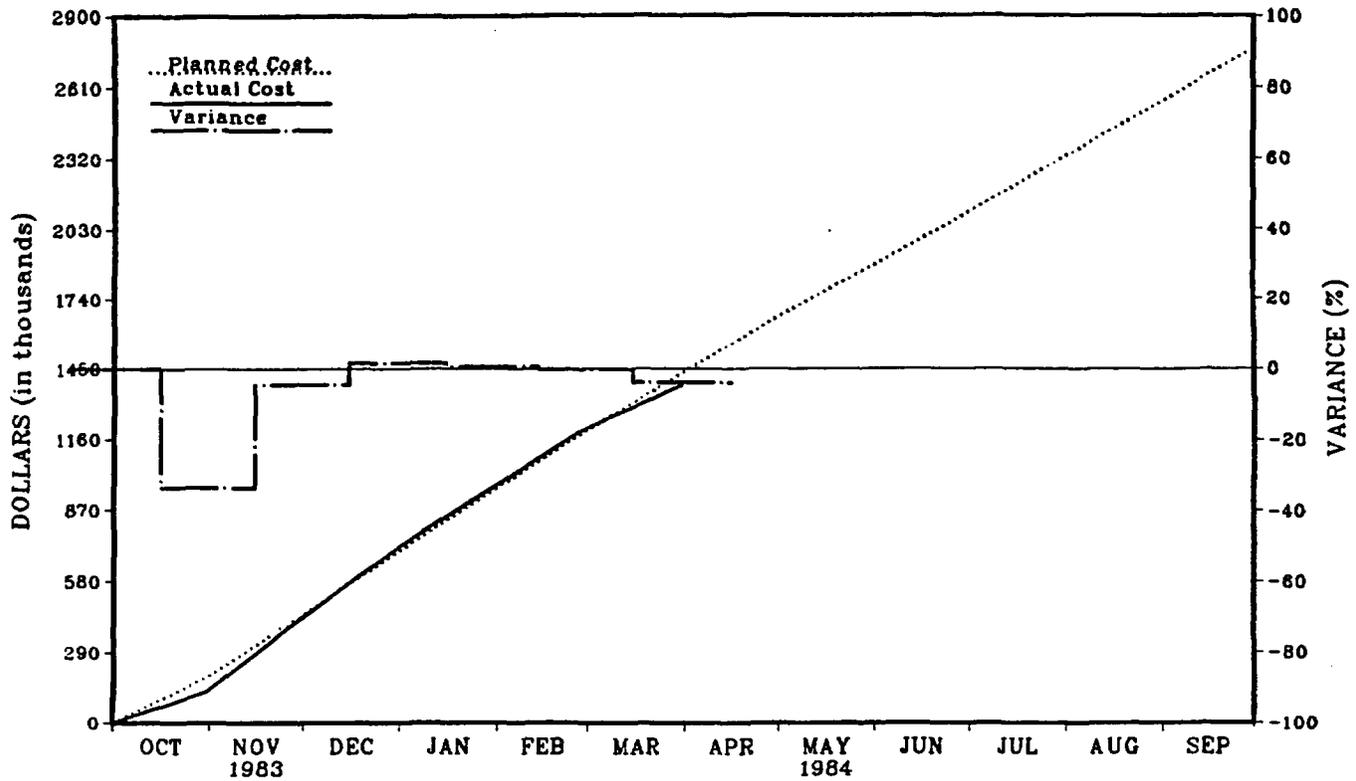
A list of county and city planners was prepared and a series of early-April 1984 meetings are planned to discuss community services data with the planning agencies' representatives.

PROBLEM AREAS AND ACTIONS TAKEN

The schedule provided by DOE/HQ at the March 23, 1984, DOE/HQ EA Steering Committee meeting now requires that a draft NNWSI Project EA be provided to the State of Nevada by about May 10, 1984. This draft document was neither previously required nor scheduled and will create a substantial workload impact on the technical and support staff to complete as directed by DOE/HQ. This schedule requires virtually full-time participation of the licensing technical staff. This will impact all regulatory activities. Especially significant activities that will be impacted are the SCP event sequence planning, the ESTP, and the EA Performance Assessment Review.

DOE/HQ SCP Key Issues contain one issue that addresses Environmental Quality, Socioeconomics, and Transportation. This issue must be deleted both in accordance with the NNWSI Project's interpretation of the meaning of site characterization and to maintain consistency with the EA division of issues that do and do not require site characterization.

WBS 1.5, Regulatory and Institutional GOVERNMENT FISCAL YEAR 1984



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|------------------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| Plan (x1000) | 196. | 447. | 708. | 964. | 1203. | 1440. | 1665. | 1883. | 2100. | 2330. | 2554. | 2788. |
| Cost (x1000) | 130. | 427. | 719. | 969. | 1199. | 1383. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 66. | 20. | -11. | -5. | 4. | 57. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -34. | -4. | 2. | 1. | 0. | -4. | 0. | 0. | 0. | 0. | 0. | 0. |

NNWSI LEVEL 1 MILESTONES

| RESP. AGENCY | WBS | MILESTONE DESCRIPTION | O | N | D | J | F | M | A | M | J | J | A | S | |
|--------------|-----|----------------------------------|--------|---|---|---|---|---|---|---|---|---|---|---|--|
| SAI | 1.5 | DRAFT EA | —————▲ | | | | | | | | | | | | |
| WMPO | 1.5 | NNWSI REFERENCES FOR EA COMPLETE | —————△ | | | | | | | | | | ◆ | | |
| SAI | 1.5 | DRAFT SCP TO HQ | ————— | | | | | | | | | | | △ | |

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◆ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

1.6 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 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, the effort will be conducted to define not only the nature of the unsaturated zone with regard to water content and water movement, but the nature of the natural barriers between the repository horizon and the static water level as well.

ACTIVITIES

An Exploratory Shaft Test Plan (ESTP) review retreat was held March 27-30, in La Jolla, California, for the WMPO, the TPOs, and the ESTP Committee members to discuss and improve the November 28, 1983, version of the ESTP. This meeting represented the first thorough NNWSI Project internal review of the ESTP and, as such, is of major significance to its development. Presentations were made on topics such as: performance assessment, shaft convergence tests, demonstration breakout room testing, drift and pillar monitoring, enhanced heated block test, canister scale heater test, geomechanical testing - intact rock, discrete fault seal/drain test, drilling machine tests, regulatory requirements, $C1_{36}$ dating tests, and waste package environment tests.

PLANNED WORK

A pre-criteria meeting to discuss Integrated Data System (IDS) interfaces with other surface and underground facilities is scheduled for April 10, 1984, with LANL, WMPO, and Holmes & Narver (H&N) personnel. Following this meeting, a design criteria letter will be prepared to describe the portion of the design to be done by H&N. April activities will include final preparations for receiving the IDS development system. The major portion of the development system is scheduled for shipment on May 4.

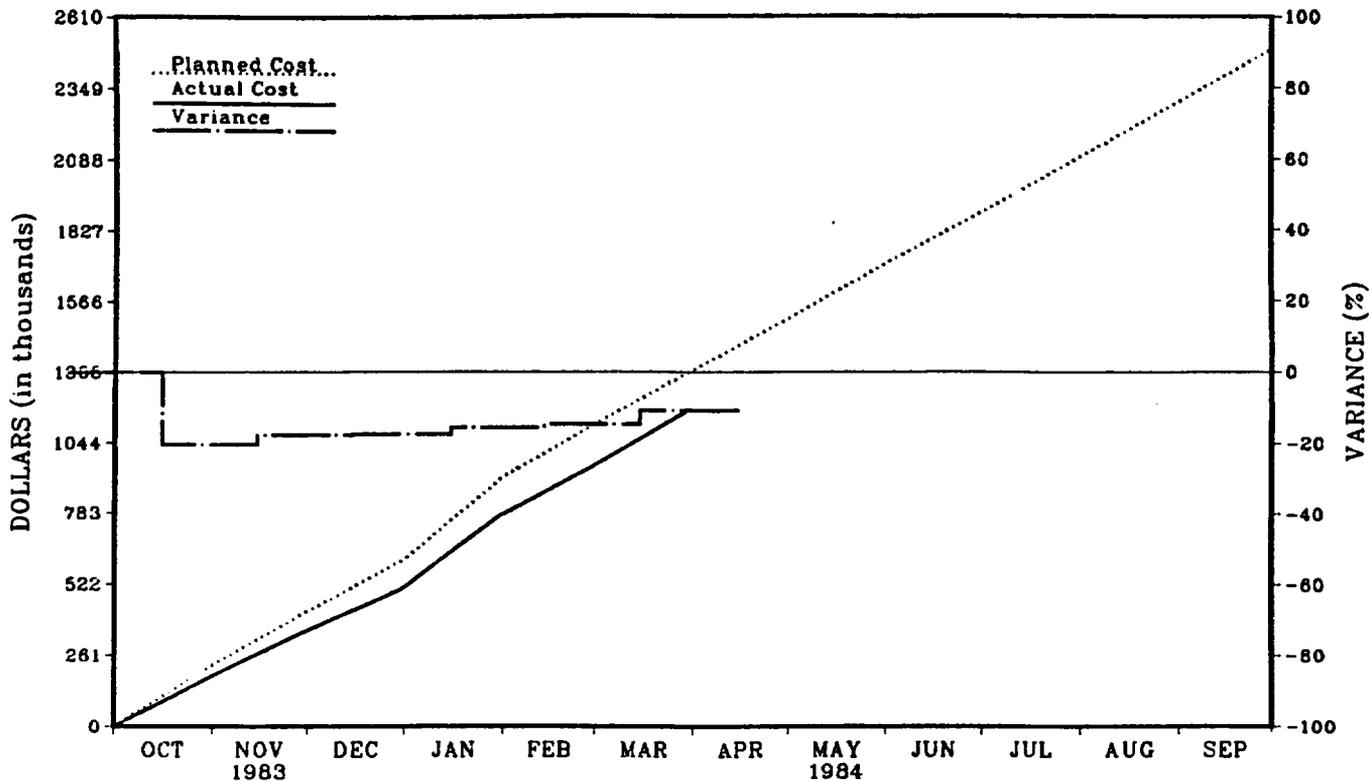
If necessary, work will be initiated to redesign the underground portion of the ES to accommodate changes suggested by the ESTP review.

PROBLEM AREAS AND ACTIONS TAKEN

The extent of modifications to the ESTP resulting from the review retreat is being defined; however, the impact is as yet uncertain.

Without a conceptual design for the repository there is a good chance that the ES diameter may be too small for either a ventilation shaft or a man and material shaft. This may mean ES redesign and scrapping of the present headframe. The contract for the subsurface A-E conceptual design is being accelerated to permit earliest analysis of the problem. A cost estimate of \$105,000 has been made for redesigning the ES to an inside diameter of twenty-five feet. The estimate covers only the mining-related portions of the design.

WBS 1.6, Exploratory Shaft GOVERNMENT FISCAL YEAR 1984



| | | | | | | | | | | | | |
|------------------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| Plan (x1000) | 224. | 421. | 612. | 917. | 1113. | 1313. | 1501. | 1703. | 1893. | 2098. | 2299. | 2490. |
| Cost (x1000) | 178. | 346. | 504. | 773. | 949. | 1169. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 46. | 75. | 108. | 144. | 164. | 144. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -21. | -18. | -18. | -16. | -15. | -11. | 0. | 0. | 0. | 0. | 0. | 0. |

NNWSI LEVEL 1 MILESTONES

| RESP. AGENCY | WBS | MILESTONE DESCRIPTION | O | N | D | J | F | M | A | M | J | J | A | S |
|--------------|-----|--|---|---|---|---|---|---|---|---|---|---|---|---|
| LANL | 1.6 | COMPLETE ESTP & SUBMIT TO HQ FOR FINAL REVIEW AND APPROVAL | | | | | | | | | | | △ | ◇ |

△ PLANNED MILESTONE COMPLETION DATE
▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE
◆ COMPLETED AS REVISED

1.7 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 NWS Projects. The two major facilities operated under this WBS Element include the Climax Spent Fuel Test Facility and the E-MAD Facility.

ACTIVITIES

Spent Fuel Test-Climax (SFT-C)

A fourth deep borehole was advanced to the 60-ft target depth to provide for additional measurements of the in situ state-of-stress near the SFT-C facility. Stress measurements obtained late last fiscal year indicated stress anomalies which may be explained by additional measurements. This fourth borehole is in the same vertical plane as two of the three previous boreholes and is inclined 45 degrees below horizontal. Ten of the thirteen planned in situ state-of-stress measurements were completed during March and the remaining three will be obtained during early April. The complete series of measurements will be obtained in the interval 60 to 96 ft. Preliminary analyses of the secondary principal stresses indicate that the average maximum secondary stress is 1800 psi with a standard deviation of 500 psi. The average minimum secondary stress is 1000 psi with a standard deviation of 350 psi. The orientations are near vertical and near horizontal, respectively. There is some indication that the measured stresses belong to two different populations with respect to orientation.

Full-scale testing of shock effects on IRAD sonic extensometers, funded by the Office of Crystalline Rock Development, was completed this month. These investigations are conducted as part of a joint United States-Canadian cooperative agreement. The study is aimed at determining the effect of nearby high explosive detonations on the accuracy of a type of borehole extensometers which will

be deployed during shaft sinking by the Canadian Underground Research Laboratory. To establish damage criteria for transverse shock loading, columns of high explosive 1-1/2 inch in diameter by 20 ft in length were detonated 8 ft, 4 ft, 2 ft, and 1 ft from a sonic extensometer. A test of axial shock loading effects was also conducted. Preliminary results indicate that the tests were successful.

Eighteen tours for 440 visitors were conducted of the SFT-C during the month of March.

E-MAD

Fourteen tours were conducted for over 360 visitors, who were affiliated with various federal, industry, military, educational, news media, and civic organizations. The tour groups are listed below:

| | |
|----------------|--|
| March 2, 1984 | California Radioactive Management Forum |
| March 2, 1984 | Employees of Reynolds Electrical & Engineering Co., Inc. |
| March 7, 1984 | DOE/HQ Budget Division |
| March 8, 1984 | San Jose Mercury-News Reporter |
| March 9, 1984 | The Director, Office of International Nuclear Policy and Multi-Lateral Cooperation, Federal Ministry of Research and Technology of Germany |
| March 12, 1984 | Nye County School District |
| March 13, 1984 | Southern Nevada Federal Executives Association |
| March 14, 1984 | Employees of the Lawrence Livermore National Laboratory |
| March 15, 1984 | University of Nevada, Las Vegas, Engineering and Geology faculty and class members |
| March 16, 1984 | Participants of the Waste Management '84 Conference |
| March 16, 1984 | Range 63 Branch, Nellis Air Force Base |
| March 22, 1984 | Town Council of Mesquite, Nevada |
| March 27, 1984 | Parsons Company representatives |
| March 27, 1984 | DOE/Albuquerque Office of Public Affairs and Contractors |

The Fuel Temperature Test month 12 operation of the air-filled metal storage cask simulation was completed and month 13 was initiated. Gas samples were

taken of the test canister, which contains fuel assembly B02, for analysis by two independent laboratories. The current maximum fuel temperature is 239°C.

Fuel handling operations to document the current condition of the fuel in fuel assembly D34 were initiated on March 26 when the canisterized fuel assembly was transferred from the E-MAD Hot Bay lag storage pit to the weld pit. Gas and full-volume filtration samples were taken from the storage canister and it was cut open for inspection, swipe sampling, and gamma emission measurements. Calorimetry was performed on March 29 to measure the heat decay rate of the fuel assembly. Results of the calorimeter operation were 20 percent below the predicted rate, so an investigation has been initiated.

Characterization to determine fuel integrity and to document the current condition of the fuel in fuel assembly B43 was completed. The canister containing this fuel assembly had been cut open in February 1984. The characterization included visual examination, photodocumentation, and surface contamination swipes from designated rod surfaces. Following characterization, the decay heat rate of the fuel assembly was measured at 0.442 kW using the E-MAD boiling water calorimeter. Water samples from the calorimeter, surface contamination swipe samples from the fuel assembly and canister interior, and the canister residue are being analyzed.

A cost estimate was prepared for retrieval of designated fuel rods from fuel assemblies D01, D04, and D06. The task is to include shipment of the rods to Battelle Columbus Laboratories for detailed characterization. If the task is approved, it is likely that the shipping container could accommodate additional rods from fuel assembly B02 after completion of the Fuel Temperature Test.

PLANNED WORK

Spent Fuel Test-Climax (SFT-C)

Disassembly of the data acquisition system will begin in April in preparation for shipment to LLNL. Demobilization and mothballing of test hardware will begin in April, and rod and anchorage integrity testing will be initiated.

E-MAD

The first two of the radiation shielding windows being refurbished for future installation in the East Process Cell are expected to be ready for shipment April 2; however, the windows will be held until the refurbishment contractor is notified that there are no fuel handling operations taking place at E-MAD which would prevent receiving them. The procedure for conducting window shielding integrity tests and instructions for window installation were received from the contractor.

In April, the temperature profile capsule assembly will be removed from fuel assembly D06. The Thermal Elongation Device (TED) and Material Interaction Test (MIT) capsules will be inspected, decontaminated, and packaged. The TED will be shipped to Hanford Engineering and Development Laboratory (HEDL), where maximum temperatures of the fuel assembly will be determined by measurement of the TED volume. The MIT capsules will also be shipped to HEDL for examination. The MITs and TED were placed in the fuel assembly at the Battelle Columbus Laboratories prior to shipment to E-MAD in November 1979.

PROBLEM AREAS AND ACTIONS TAKEN

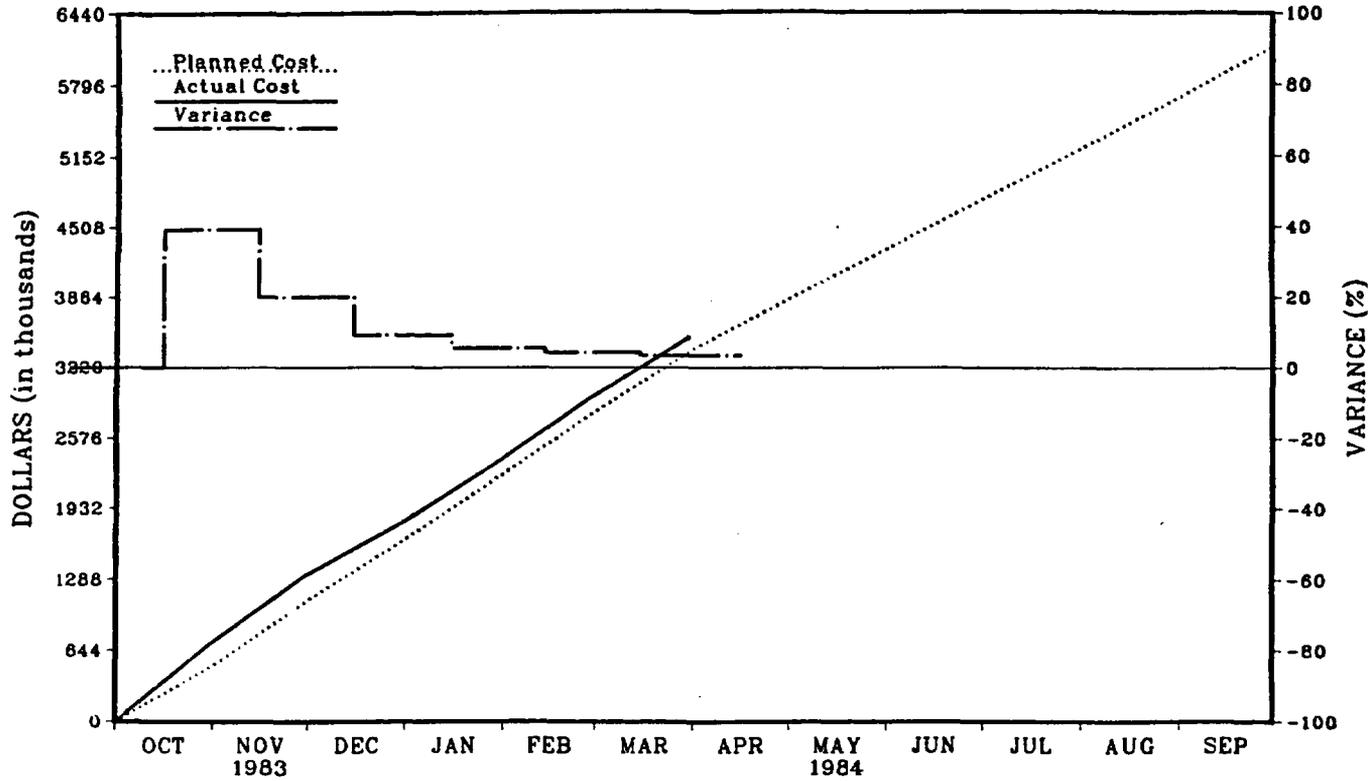
Spent Fuel Test-Climax (SFT-C)

Recent uncertainties in guidance with respect to the continuation of access to the SFT-C make decisions regarding partitioning of resources difficult. A formal written decision would be helpful. It appears that continued access through May 1984 will be needed to complete field technical work. A detailed survey of the shaft lagging and support structures indicates that considerable safety-related repairs need to be undertaken if access continues much longer. Discussions with NTS Support Contractors indicate that an approximate cost of \$60,000 is associated with these repairs.

E-MAD

An apparent electrical spike on the facility power system caused an intermittent data error to be transmitted by the Stack Air Monitor data processing module. A proposal is being prepared to modify the E-MAD electrical power system to provide filtered power to all critical solid state equipment such as this system, the closed circuit television system, digital Fuel Temperature Test controllers, etc.

**WBS 1.7, Test Facilities
GOVERNMENT FISCAL YEAR 1984**



| | | | | | | | | | | | | |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Plan (x1000) | 506. | 1100. | 1651. | 2249. | 2815. | 3389. | 3844. | 4301. | 4756. | 5212. | 5677. | 6134. |
| Cost (x1000) | 705. | 1323. | 1803. | 2373. | 2932. | 3503. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | -199. | -223. | -152. | -124. | -117. | -114. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | 39. | 20. | 9. | 6. | 4. | 3. | 0. | 0. | 0. | 0. | 0. | 0. |

NNWSI LEVEL 1 MILESTONES

| RESP. AGENCY | WBS | MILESTONE DESCRIPTION | O | N | D | J | F | M | A | M | J | J | A | S |
|--------------|-----|--|---|---|---|---|---|---|---|--------|---|---|---|---|
| LLNL | 1.7 | TERMINATION OF ROUTINE ACCESS AND LLNL TOUR SUPPORT TO SFT-C | | | | | | △ | | | | | | ◁ |
| LLNL | 1.7 | COMPLETE DECISION ANALYSIS ON USE OF CLIMAX FACILITY | | | | | | | | (OPEN) | | | | |

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

1.8 LAND ACQUISITION

OBJECTIVE

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

ACTIVITIES

None.

PROBLEM AREAS

None.

PLANNED WORK

To be included in future NNWSI Monthly Reports.

1.9 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: (1) Project Management, (2) Project Control, (3) Interface Activities, (4) Quality Assurance (QA), and (5) NWS Support.

ACTIVITIES

The status of the Planning and Scheduling (P&S) Baseline documents is as follows:

- Work Breakdown Structure (WBS) - Revised to incorporate changes through the February TPO/CCB meeting and distributed to the holders of the Baseline Document.
- WBS Dictionary - A draft is to be distributed to the participants in April 1984.
- Level 1 and 2 Milestones for FY 1984 - By the end of March, all FY 1984 Level 1 milestone completion criteria had been received. Expansion of the criteria for the USGS milestone is necessary. Level 2 milestone criteria are due from the participants by April 9, 1984.
- Budget Baseline - A recommended FY 1984 budget will be submitted at the TPO/CCB meeting scheduled for May.
- Cost Plans - The detailed time-phased budgets for FY 1984 should be baselined to support the Budget Baseline and will be recommended for baselining at the May TPO/CCB meeting.

The NNWSI Project Quarterly Technical Report for 4th Quarter FY 1983 is in review.

NVO-196-17 (Rev. 2), the NNWSI Project Quality Assurance Plan, is in review. The expected date of issue to Participating Organizations and NTS Support Contractors is April 20, 1984.

Two implementing procedures are in rough draft form and are targeted for issue as follows:

- NNWSI SOP-15-01 - NNWSI Nonconformance Control System, April 30, 1984.
- NNWSI SOP-02-01 - NNWSI QAPP Requirements, June 29, 1984.

NVO-196-18 (Rev. 2), the NNWSI Quality Assurance Program Plan, will be composed of the implementing procedures utilized by the QA Support Contractor (QASC) and WMPO. A list of required QA implementing procedures for NVO-196-18 (Rev. 2) is in review, as are procedures QMP-07-01, Surveillance, and QMP-18-01, Audits. The expected dates of issue for these procedures remain April 13, 1984, and April 9, 1984, respectively.

All NNWSI Project Audits for FY 1983 have been closed. The NNWSI Project Audit Schedule for FY 1984 is being revised because of schedule adjustments and LLNL's request to audit USGS, Menlo Park, California.

On March 11, a speech entitled "What Do Nearby Communities Want to Know About High-Level Waste Disposal," was presented by D. L. Vieth at the Waste Management '84 Symposium in Tucson. A condensed version of the same speech was presented by D. L. Vieth at the Radio and TV News Directors' Meeting in San Francisco on March 14. A. E. Stephenson presented "An Overview of NNWSI Project Activities" at the AIF Fuel Cycle Conference '84 in Atlanta on March 12.

As a consequence of the Waste Management '84 Conference, communications were established with Philis Reagel of the Office of Economic Development, City of North Las Vegas. The contact has led to a tour of the NTS by the North Las Vegas Chamber of Commerce, the North Las Vegas City Manager, and other key staff.

Presentations were made by NNWSI Project staff at the following meetings:

- o DOE/HQ EA Steering Committee Meeting in Denver, March 23, 1984.
- o ESTP Retreat in La Jolla, March 27-30, 1984.
- o DOE/HQ SCP Meeting in Denver, March 20, 1984.
- o Mid-Year Review in Washington, D.C., March 5-9, 1984.
- o Mid-Year Budget Review, in Las Vegas, March 22, 1984.

PLANNED WORK

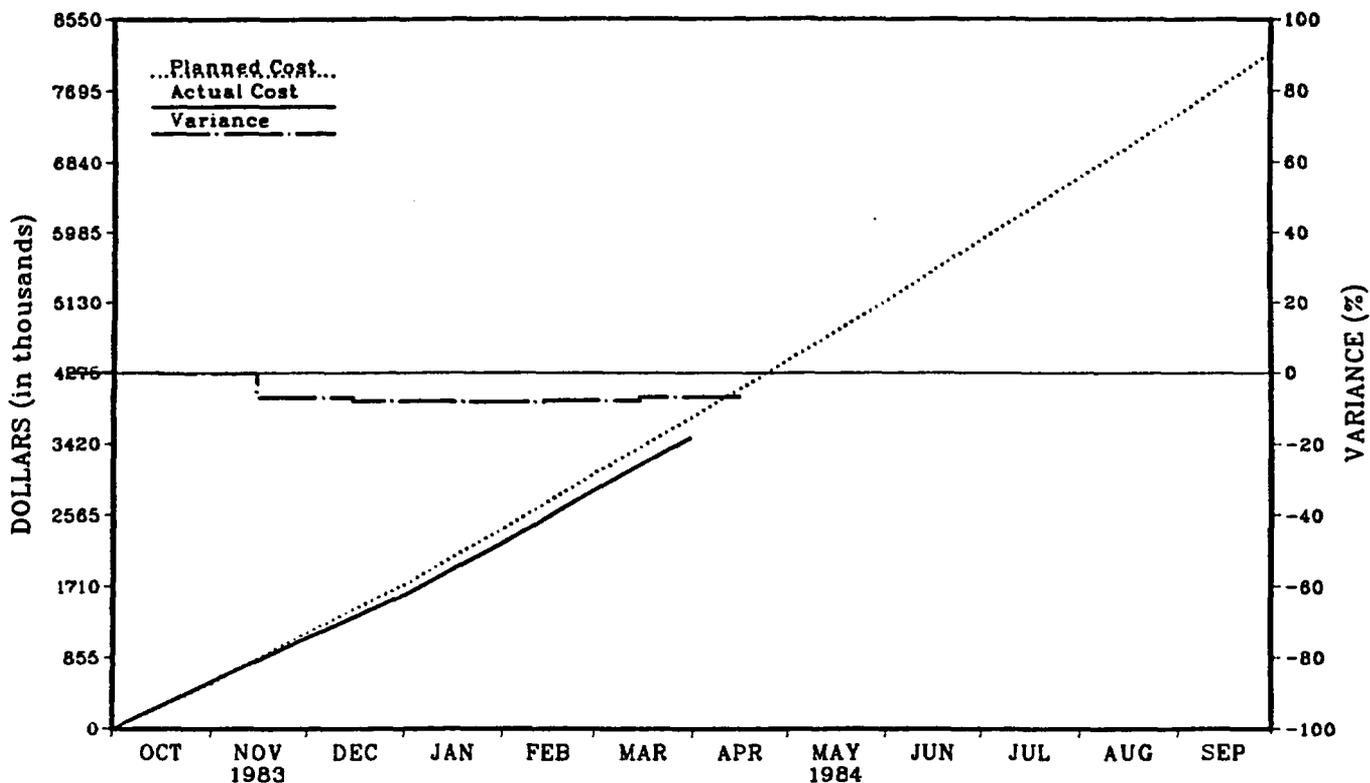
A report was submitted to the TPO conference in La Jolla, on March 26, 1984, on NNWSI Project Perceived QA Problem Areas. The QASC is to arrange a presentation to the TPOs of significant changes to the NNWSI Project Quality Assurance Plan and their impact to the Project. The presentation will be made at the first TPO meeting after the publication of the revised document.

Preparation continues for the May 29 Public Information Meeting in Beatty, Nevada. NNWSI Project participants will present technical information and the status of the NNWSI Project.

PROBLEMS AREAS AND ACTIONS TAKEN

None.

WBS 1.9, Program Management GOVERNMENT FISCAL YEAR 1984



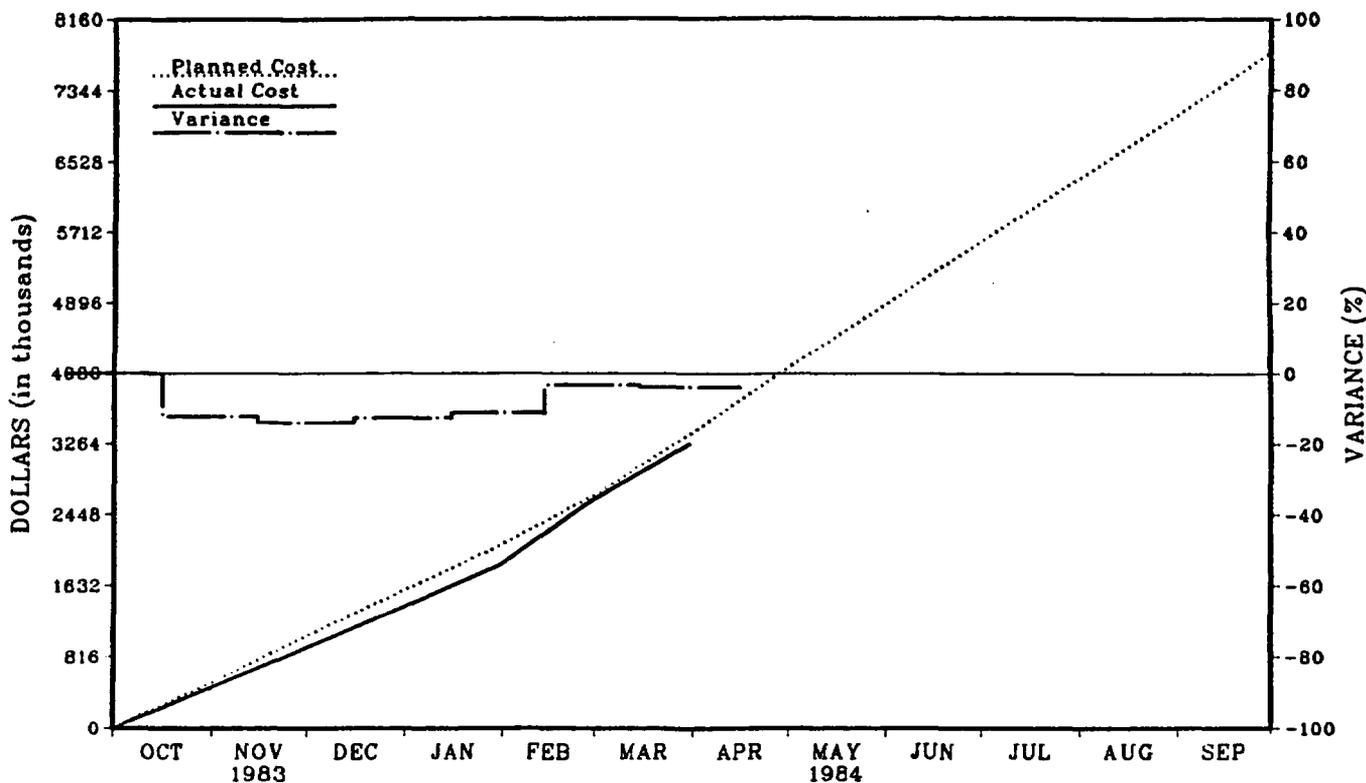
| | | | | | | | | | | | | |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Plan (x1000) | 552. | 1153. | 1738. | 2404. | 3067 | 3751. | 4428. | 5155. | 5896. | 6650. | 7405. | 8144. |
| Cost (x1000) | 551. | 1073. | 1599. | 2208. | 2828. | 3495. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 1. | 80. | 139. | 196. | 239. | 256. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | 0. | -7. | -8. | -8. | -8. | -7. | 0. | 0. | 0. | 0. | 0. | 0. |



PARTICIPANT

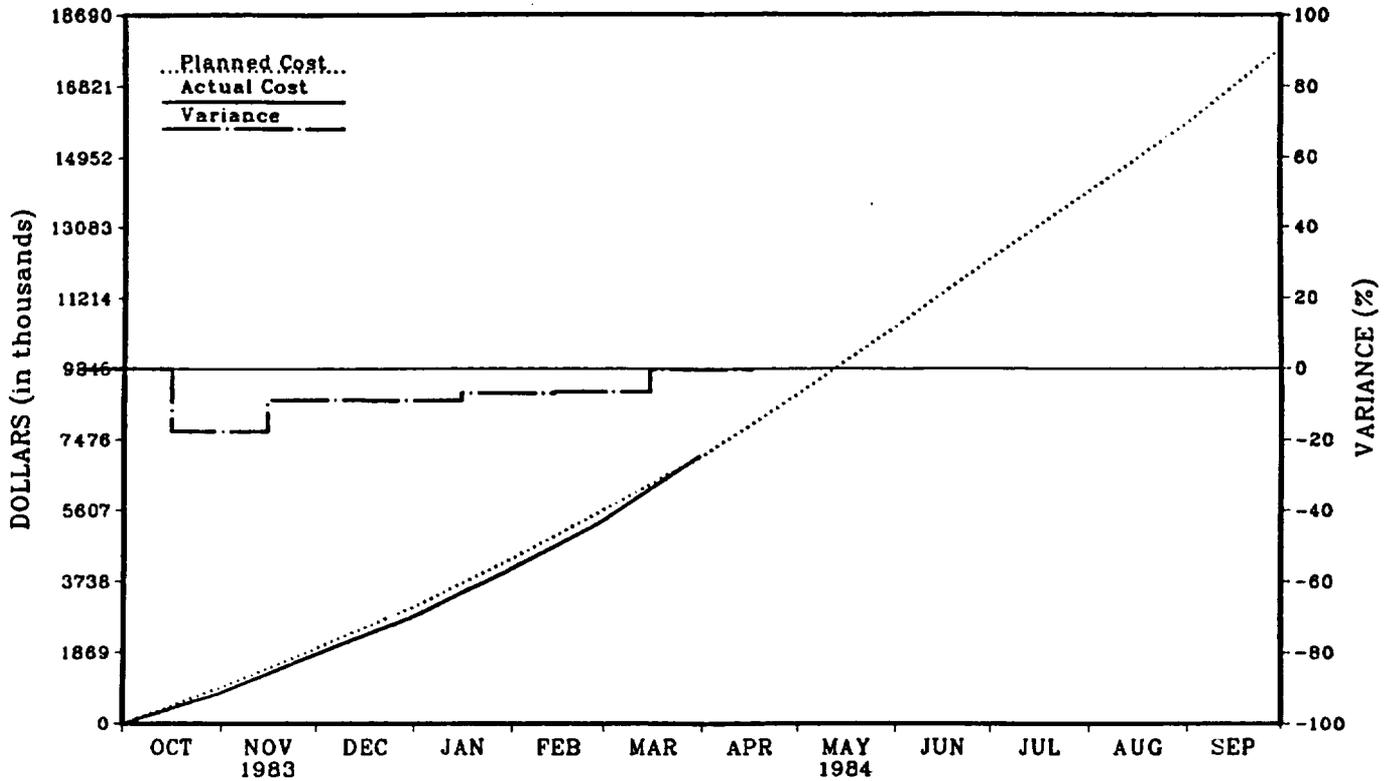
BUDGET vs COST

U. S. Geological Survey
GOVERNMENT FISCAL YEAR 1984



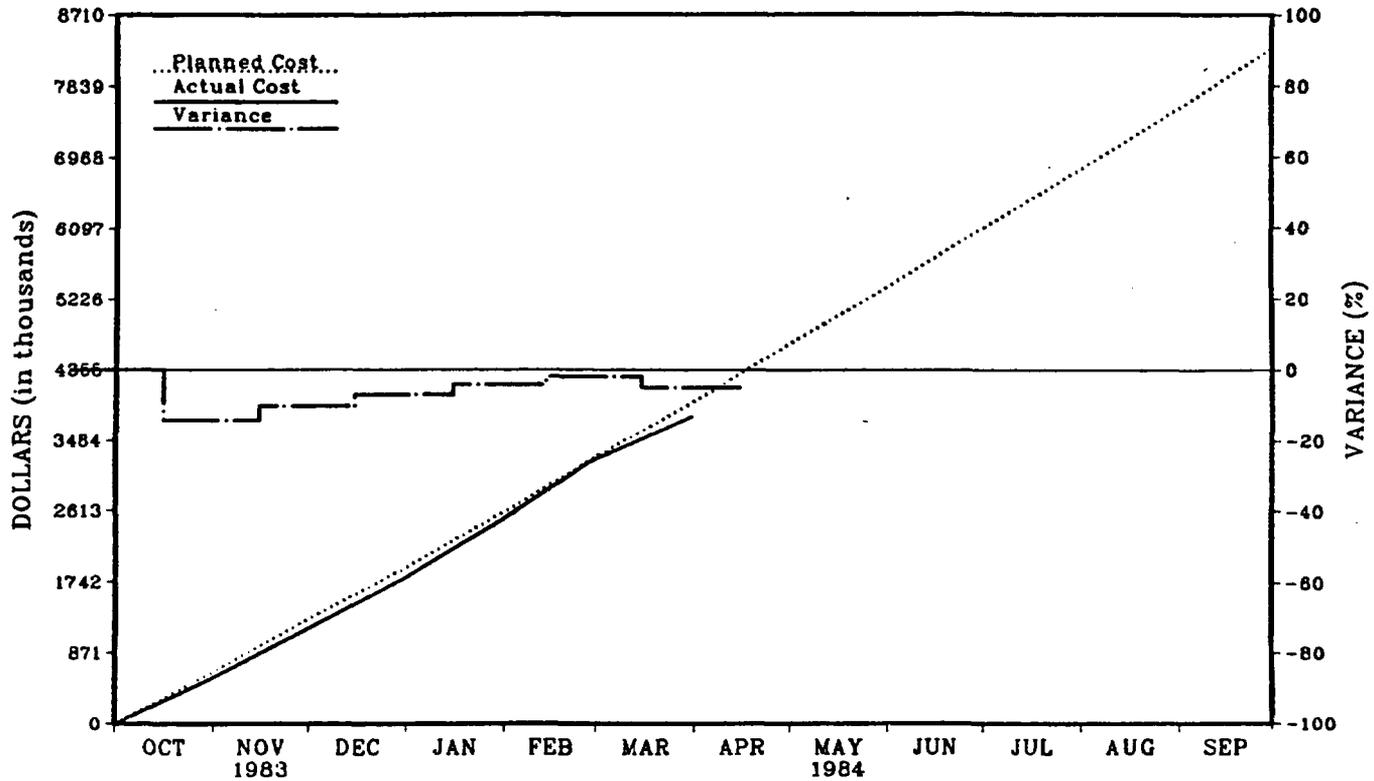
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|------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Plan (x1000) | 524. | 1060. | 1583. | 2108. | 2676. | 3402. | 4145. | 4883. | 5808. | 6334. | 7055. | 7777. |
| Cost (x1000) | 459. | 911. | 1383. | 1868. | 2585. | 3268. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 65. | 149. | 200. | 240. | 91. | 134. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -12. | -14. | -13. | -11. | -3. | -4. | 0. | 0. | 0. | 0. | 0. | 0. |

Sandia National Laboratories GOVERNMENT FISCAL YEAR 1984



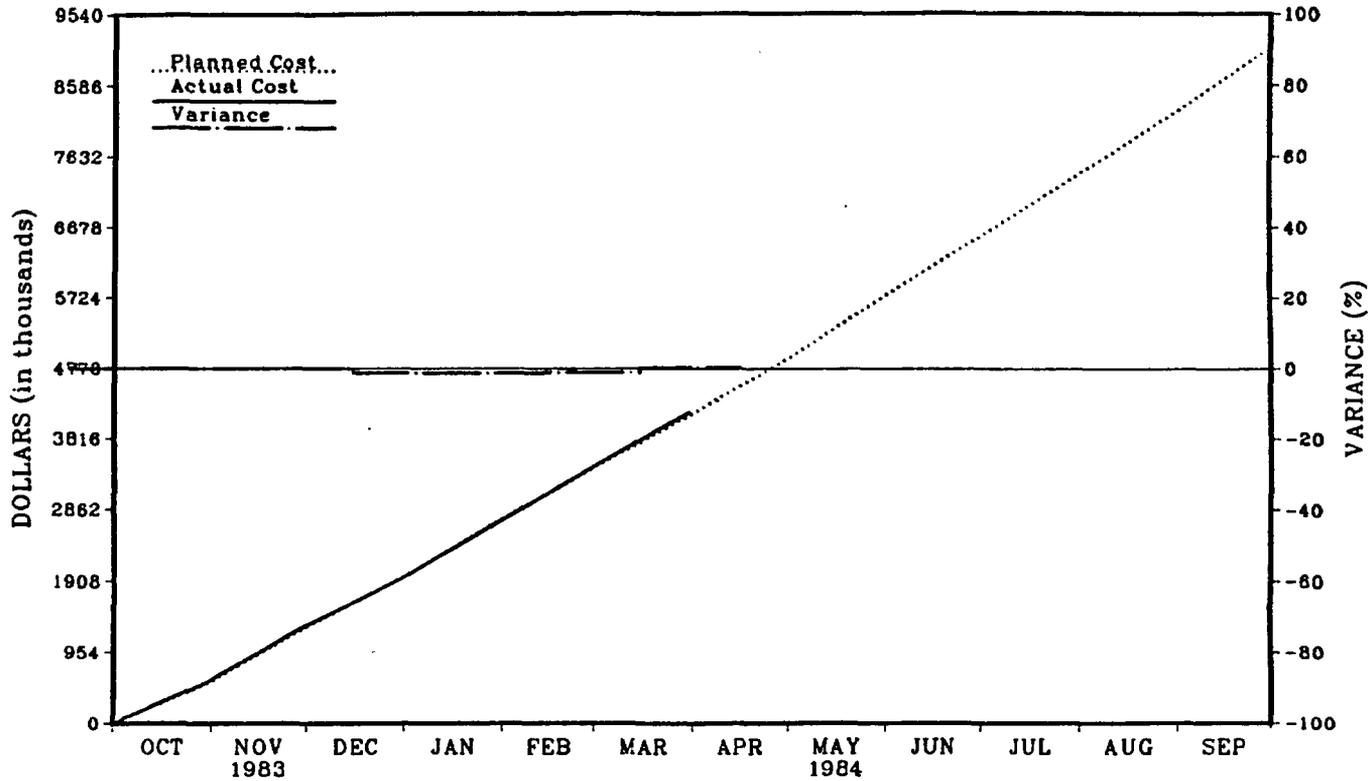
| | | | | | | | | | | | | |
|------------------|------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Plan (x1000) | 980. | 1971. | 3068. | 4330. | 5629. | 7060. | 8675. | 10454. | 12238. | 14037. | 15865. | 17800. |
| Cost (x1000) | 790. | 1796. | 2788. | 4025. | 5259. | 7043. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 170. | 175. | 280. | 305. | 370. | 17. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -18. | -9. | -9. | -7. | -7. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |

Lawrence Livermore National Laboratory GOVERNMENT FISCAL YEAR 1984



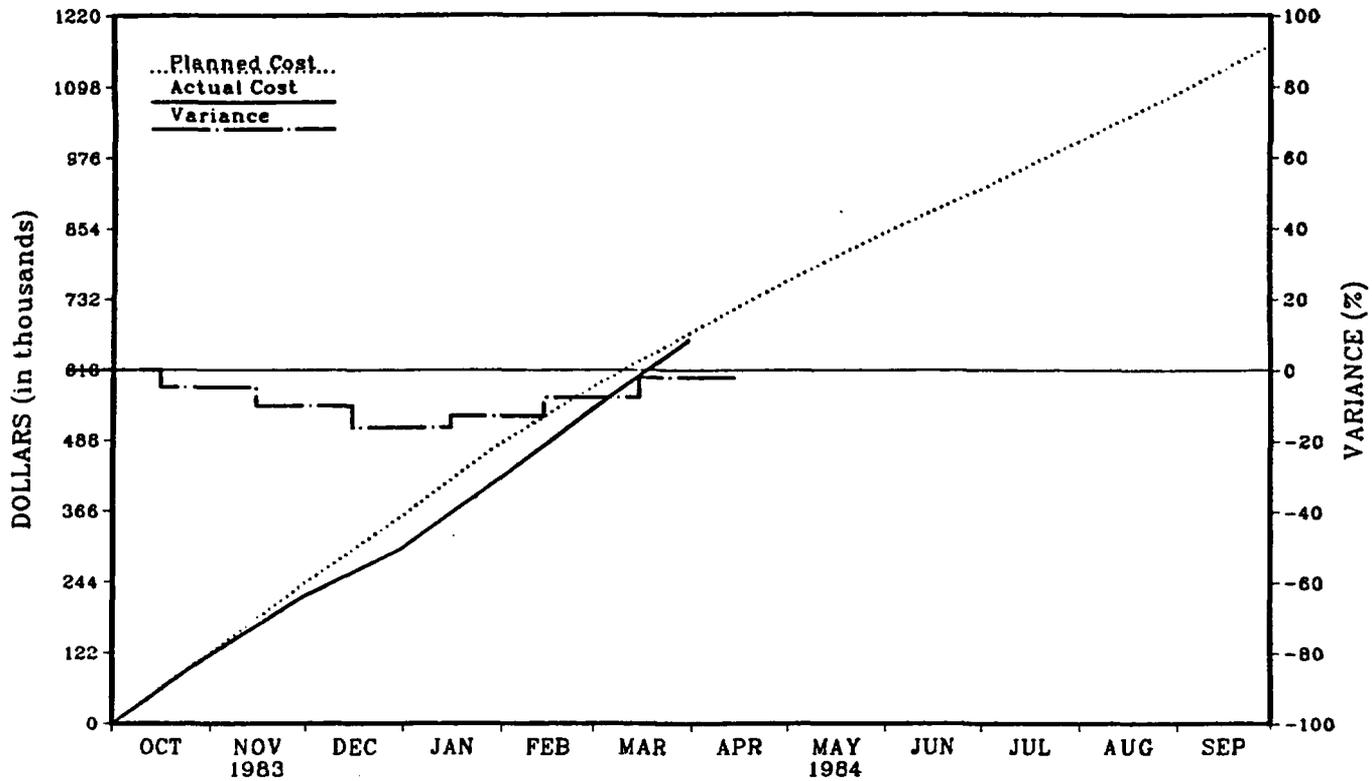
| | | | | | | | | | | | | |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Plan (x1000) | 641. | 1290. | 1920. | 2597. | 3284. | 3972. | 4678. | 5378. | 6096. | 6832. | 7570. | 8298. |
| Cost (x1000) | 549. | 1157. | 1785. | 2490. | 3224. | 3778. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 92. | 133. | 135. | 107. | 60. | 194. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -14. | -10. | -7. | -4. | -2. | -5. | 0. | 0. | 0. | 0. | 0. | 0. |

Los Alamos National Laboratory GOVERNMENT FISCAL YEAR 1984



| | | | | | | | | | | | | |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Plan (x1000) | 568. | 1298. | 1971. | 2738. | 3437. | 4183. | 4907. | 5757. | 6568. | 7400. | 8245. | 9090. |
| Cost (x1000) | 568. | 1298. | 1944. | 2703. | 3402. | 4179. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 0. | 0. | 27. | 35. | 35. | -16. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | 0. | 0. | -1. | -1. | -1. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |

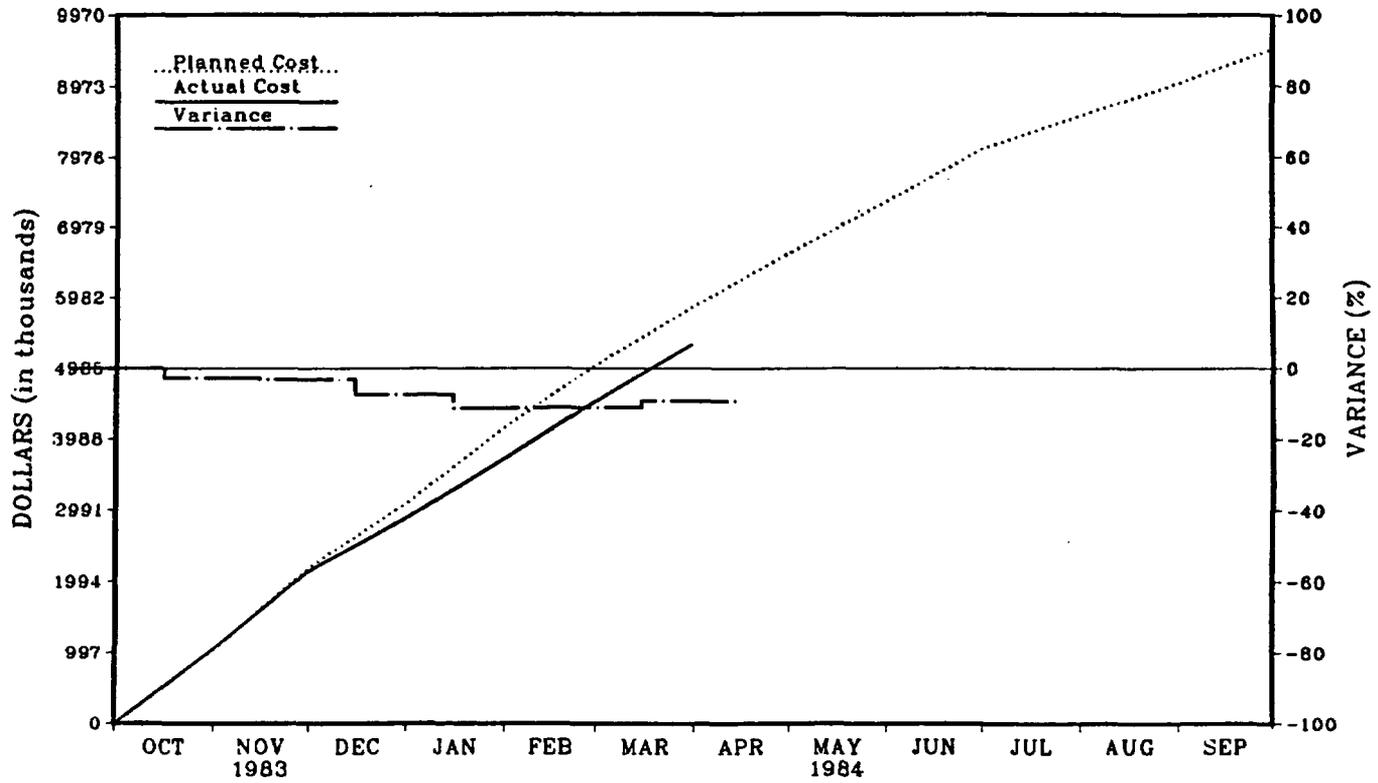
Fenix and Scisson, Inc.
GOVERNMENT FISCAL YEAR 1984



| | | | | | | | | | | | | |
|------------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| Plan (x1000) | 122. | 243. | 360. | 485. | 582. | 676. | 764. | 847. | 922. | 1004. | 1087. | 1168. |
| Cost (x1000) | 116. | 218. | 301. | 421. | 536. | 662. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 6. | 25. | 59. | 64. | 48. | 14. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -5. | -10. | -16. | -13. | -8. | -2. | 0. | 0. | 0. | 0. | 0. | 0. |

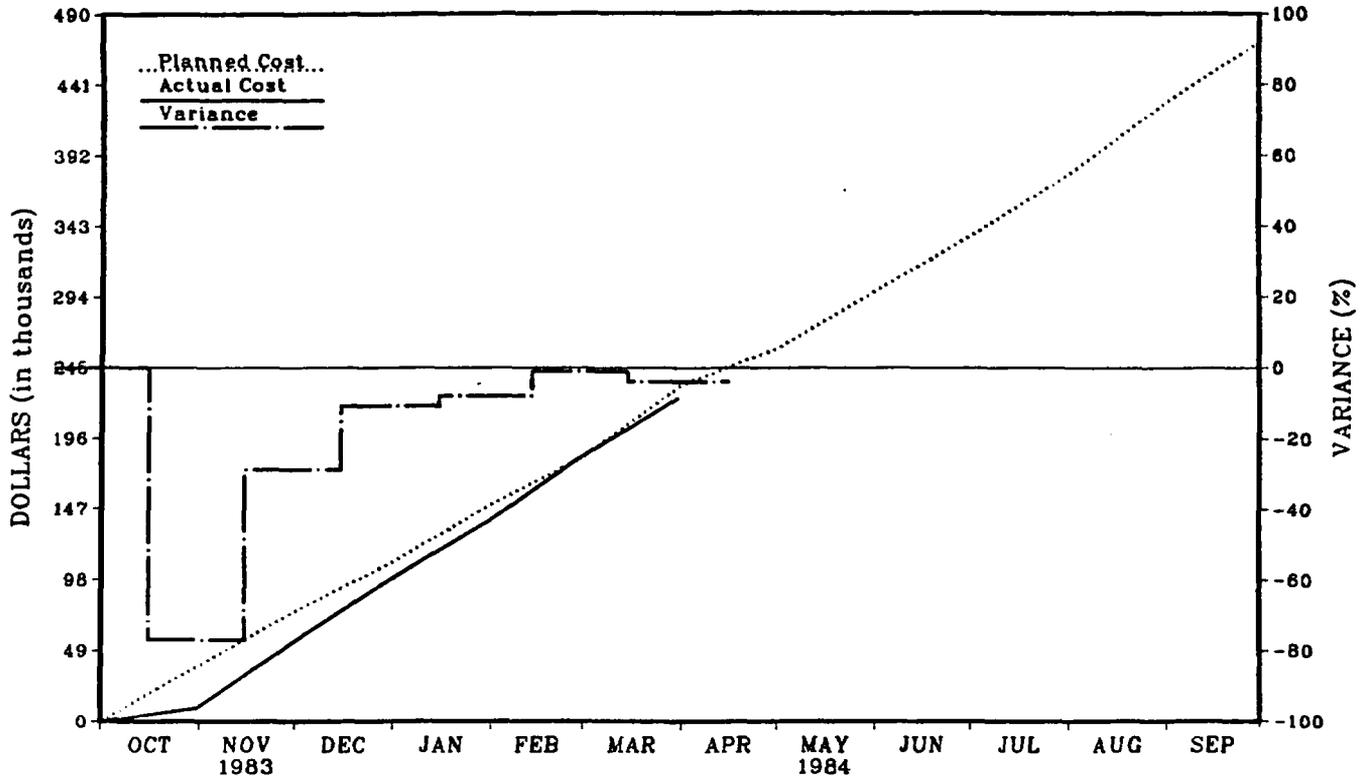
Reeco

GOVERNMENT FISCAL YEAR 1984



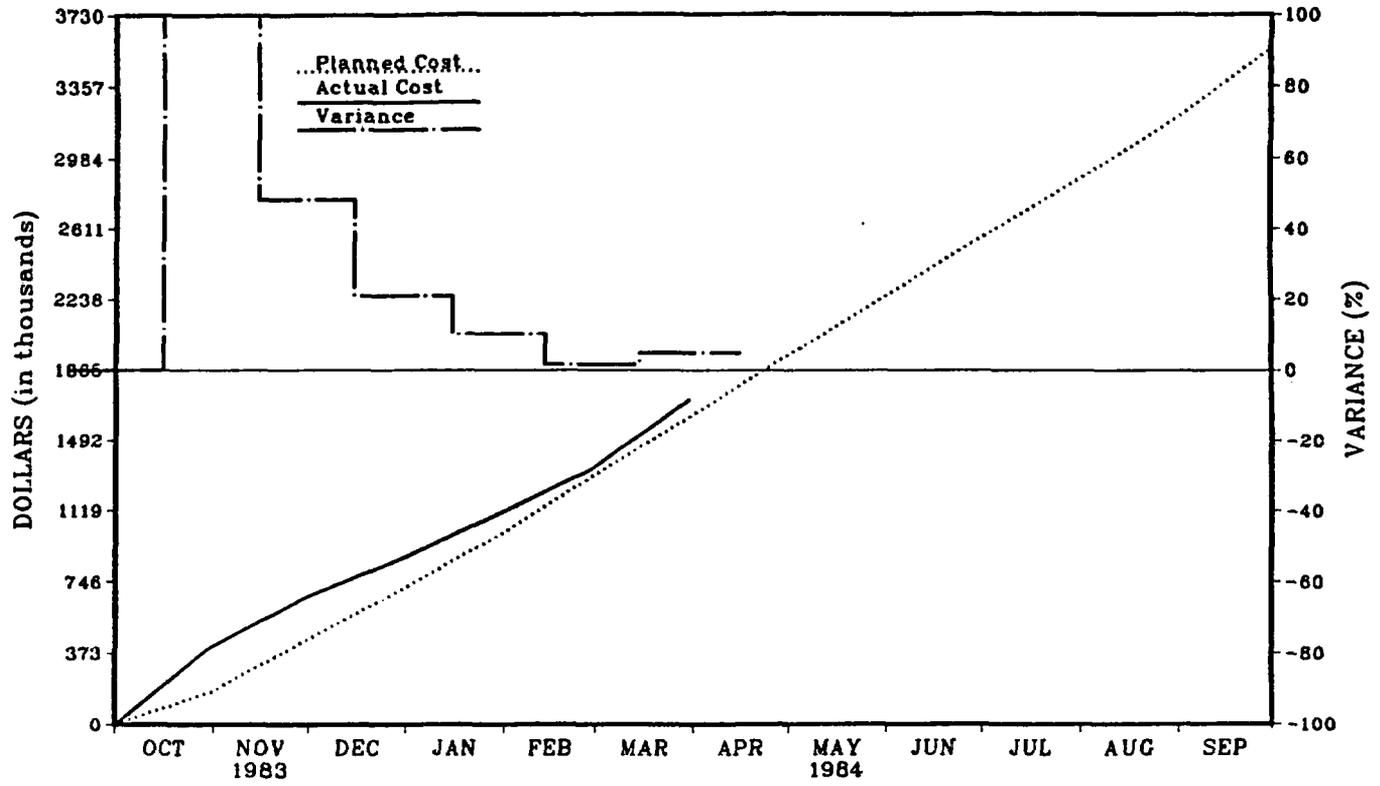
| | | | | | | | | | | | | |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Plan (x1000) | 1042. | 2182. | 3094. | 4156. | 5043. | 5871. | 6605. | 7346. | 8091. | 8557. | 9023. | 9498. |
| Cost (x1000) | 1014. | 2115. | 2864. | 3687. | 4485. | 5324. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 28. | 67. | 230. | 469. | 558. | 547. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -3. | -3. | -7. | -11. | -11. | -9. | 0. | 0. | 0. | 0. | 0. | 0. |

Holmes and Narver, Inc.
 GOVERNMENT FISCAL YEAR 1984



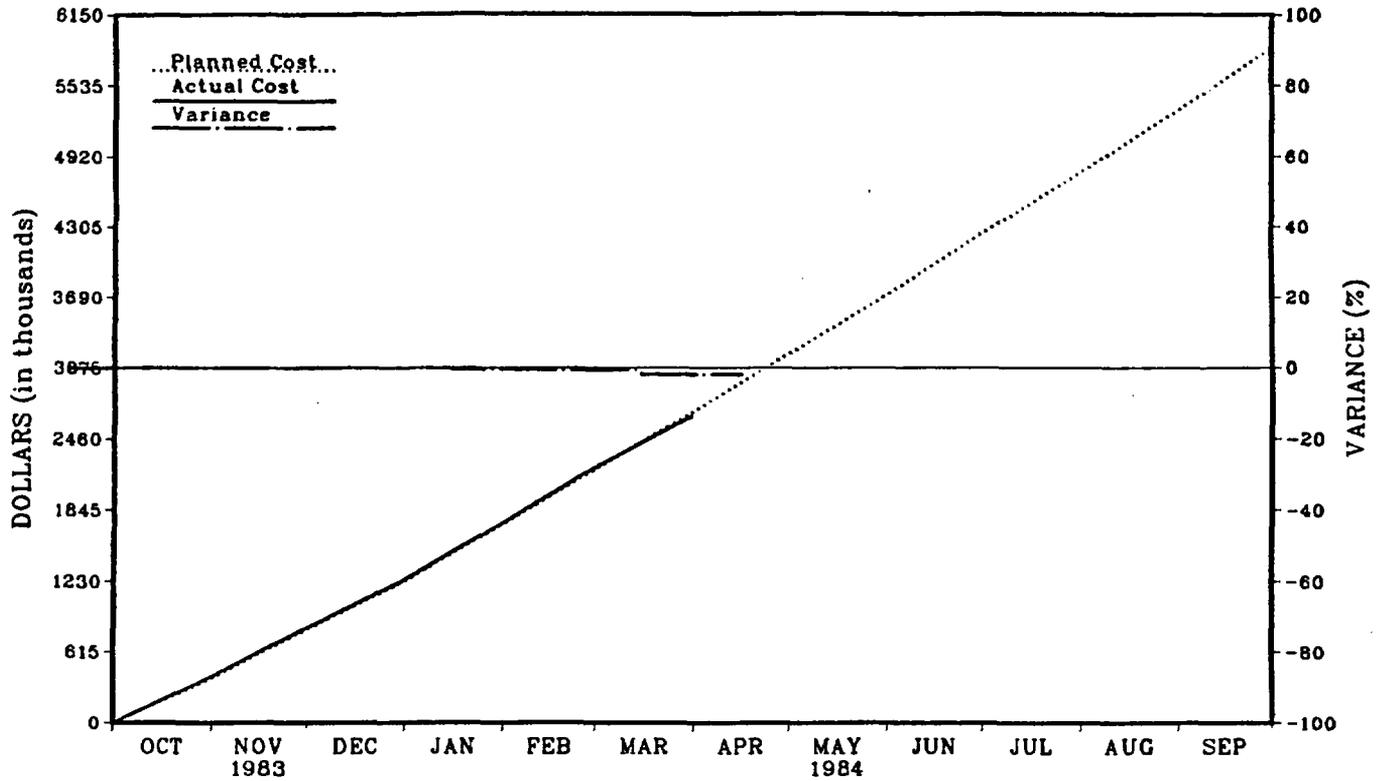
| | | | | | | | | | | | | |
|------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Plan (x1000) | 39. | 78. | 110. | 150. | 183. | 233. | 258. | 298. | 336. | 379. | 429. | 470. |
| Cost (x1000) | 9. | 54. | 98. | 138. | 181. | 224. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 30. | 22. | 12. | 12. | 2. | 9. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | -77. | -29. | -11. | -8. | -1. | -4. | 0. | 0. | 0. | 0. | 0. | 0. |

Miscellaneous Contractors GOVERNMENT FISCAL YEAR 1984



| | | | | | | | | | | | | |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Plan (x1000) | 175. | 448. | 717. | 1003. | 1311. | 1631. | 1942. | 2255. | 2565. | 2877. | 3197. | 3555. |
| Cost (x1000) | 402. | 665. | 868. | 1108. | 1332. | 1711. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | -227. | -217. | -151. | -103. | -21. | -80. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | 100. | 48. | 21. | 10. | 2. | 5. | 0. | 0. | 0. | 0. | 0. | 0. |

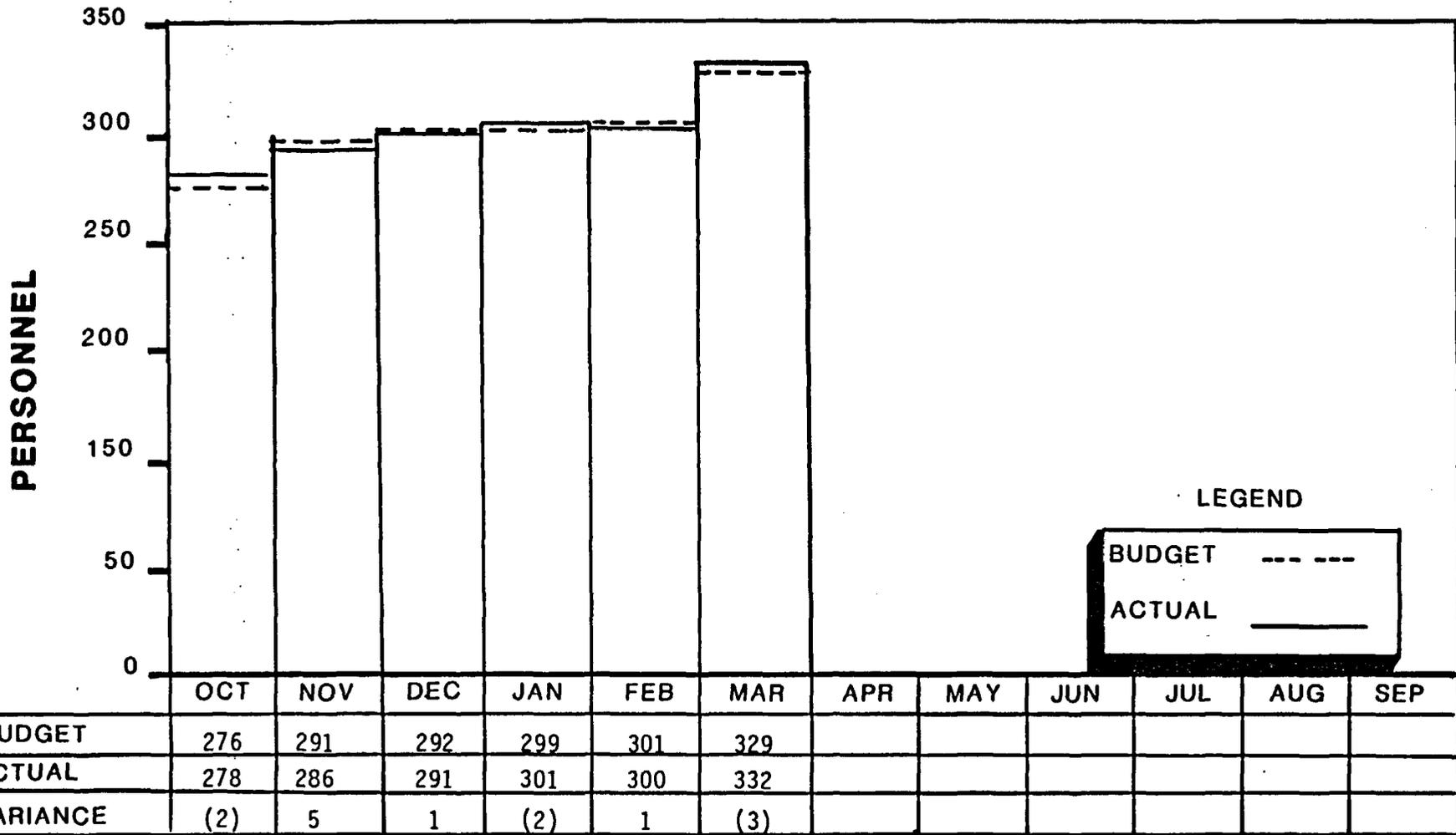
Science Applications, Inc.
GOVERNMENT FISCAL YEAR 1984



| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|------------------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1983 | | | | | | | 1984 | | | | |
| Plan (x1000) | 386. | 811. | 1234. | 1727. | 2204. | 2701. | 3198. | 3717. | 4254. | 4791. | 5328. | 5861. |
| Cost (x1000) | 386. | 811. | 1232. | 1719. | 2188. | 2650. | 0. | 0. | 0. | 0. | 0. | 0. |
| Variance (x1000) | 0. | 0. | 2. | 8. | 16. | 51. | 0. | 0. | 0. | 0. | 0. | 0. |
| % Variance | 0. | 0. | 0. | 0. | -1. | -2. | 0. | 0. | 0. | 0. | 0. | 0. |

NNWSI LEVEL I MILESTONES FY 1984

| NNWSI NUMBER | WBS | RESP. AGENCY | MILESTONE DESCRIPTION | PLANNED COMPLETION DATE | ACTUAL COMPLETION DATE | REMARKS |
|--------------|------|--------------|---|-------------------------|------------------------|---------|
| M150 | 1112 | SNL | PRELIMINARY PERFORMANCE ASSESSMENT FOR EA | 01/15/84 | 01/15/84 | |
| M151 | 1111 | SNL | PRELIMINARY SYSTEM DESCRIPTION DOCUMENT | 08/30/84 | | |
| M152 | 1111 | SNL | USERS MANUAL FOR DATA BASE SYSTEM FOR PARTICIPANTS | 08/30/84 | | |
| ---- | 12 | LLNL | SUMMARY LOGIC NETWORK FOR WP DESIGN AND DEVELOPMENT | 01/16/84 | 01/16/84 | |
| M250 | 1221 | LLNL | ESTABLISH INTERIM PRODUCT SPECIFICATIONS | 08/30/84 | | |
| M251 | 123 | LLNL | PRE-CLOSURE ANALYSIS OF SELECTED CONCEPTUAL DESIGNS | 09/28/84 | | |
| M352 | 1317 | LANL | DRAFT RPT. ESTIMATING WATER FLOW & RN TRANS. ALONG FLOW PATH | 02/02/84 | 02/02/84 | |
| M353 | 1352 | USGS | GROUNDWATER LEVEL DATA AND PRELIMINARY POTENTIOMETRIC-SURFACE MAPS, YUCCA MOUNTAIN AND VICINITY, NYE COUNTY, NV | 06/29/84 | 03/30/84 | |
| M354 | 1311 | LANL | LETTER REPORT GROUNDWATER CHEMISTRY ALONG FLOW PATHS | 08/30/84 | | |
| M356 | 1361 | LANL | COMPLETE REPORT ON VOLCANIC HAZARDS ANALYSIS | 09/28/84 | | |
| M355 | 132 | LANL | PROGRESS RPT. ON 3-D MINERALOGIC MODEL OF YM | 08/31/84 | | |
| M357 | 1364 | SNL | WEAPONS TEST SEISMIC REPORT | 10/30/84 | | |
| ---- | 14 | SNL | SUBMIT SUMMARY LOGIC NETWORK FOR REPOSITORY | 01/16/84 | 01/16/84 | |
| M447 | 1431 | SNL | SEAL DEVELOPMENT PLAN FOR REPOSITORY | 05/30/84 | | |
| M592 | 152 | SAI | DRAFT EA | 02/29/84 | 02/29/84 | |
| M523 | 15 | WMPO | NNWSI REFERENCES FOR EA COMPLETE | 08/01/84 | | |
| M521 | 154 | SAI | DRAFT SCP TO HQ | 08/15/84 | | |
| M660 | 1652 | LANL | COMPLETE ESTP & SUBMIT TO HQ FOR FINAL REVIEW AND APPROVAL | 08/31/84 | | |
| M701 | 171 | LLNL | TERMINATION OF ROUTINE ACCESS AND LLNL TOUR SUPPORT TO SFT-C | 09/30/84 | | |
| M706 | 171 | LLNL | COMPLETE DECISION ANALYSIS ON USE OF CLIMAX FACILITY | | OPEN (IN FY84) | |



NNWSI PROJECT STAFFING