(10) See Packet 2 for encl

WM Record File 102

WM Project 11
Docket No.
PDR ✓
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Distribution:
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KStablein

November 21, 1984

MEMORANDUM FOR: Robert E. Browning, Director
Division of Waste Management

FROM: Paul T. Prestholt, Sr. OR-NNWSI PTP

Subject: NNWSI Site Report for Weeks of November 5 and 12, 1984

1. Jerry Szymanski, DOE-WMPO, has requested that I give a short talk to the NNWSI TPO's on the NRC position on tectonics and seismicity, pre and post-closure, as these subjects affect underground and surface facilities. The NNWSI would like to know the staff's position as to the applicability of 10CFR100, Appendix A, or modifications of this rule.

I spoke with King Stablein and asked him to query the staff and get their guidance. Stablein discussed the problem at length with John Greeves, who has given a great deal of thought to this problem. Greeves said that it would be a mistake to raise 10CFR100, Appendix A, as a possible approach. He feels that Appendix A is too prescriptive for the elements of a High Level Waste Repository.

Greeves suggests that DOE carefully assess the requirements as stated in 10CFR60 and prepare a position paper outlining DOE's approach to satisfying those requirements. DOE should then engage the NRC in informal meetings (less formal than workshops), with the goal of developing a strategy acceptable to both DOE and the NRC and satisfying 10CFR60. This meeting should include all three projects, as well as DOE Hq., as this problem is generic.

I would appreciate further guidance on this subject.

2. I have received a call from Gerry De Poorter, Los Alamos National Laboratories, concerning the NRC review of the LANL Geochemistry Program Plan. Our comments are needed ASAP. LANL will be presenting the plan to the NNWSI in January and wants to be sure that NRC concerns are taken into consideration.

3. I have been asked by King Stablein to request of WMPO

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that members of the NRC staff be allowed to read drafts of EA referenced documents that will not be available before the EA is released. For instance, those documents that the USGS will not have ready before the EA release would be read in Denver. This would be an informal review with very limited interaction between the DOE Participant and the NRC.

Jerry Szymanski will refer this matter to Don Vieth and get back to me.

4. The week of November 12 was spent in Silver Spring. This was the third trip to Silver Spring since this office opened on January 15. For the first time, I got the impression that the OLR position was accepted by the DWM staff, as a whole, as a help in conducting day-to-day business. I had a number of discussions with technical and RP staff during the week and found them very rewarding.

5. Mrs. Elise Sammarco has joined the NRC as the secretary in the Las Vegas office. She will be in the office between 9:30 AM and 2:45 PM (12:30 to 5:45 PM, D.C. time), Monday through Thursday.

See folder for MEMO to Browning AM. Presthoff 11-21-84 102

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

NOV 19 1984

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

NNWSI WEEKLY HIGHLIGHTS FOR WEEK ENDING NOVEMBER 15, 1984

I. Issues Requiring Involvement of HQ or Other Projects

A. New Issues:

None to report.

B. Previously Reported Issues:

Issue	Status	First Report Date
Does HQ have a policy regarding state conduct of site specific measurements at proposed repository sites? (Is this clarified by the recent grant guidelines?)	Open; Letter coming from WMPO.	July 26, 1984

II. Major Internal Concerns

None to report.

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

SA

None to report.

II

On November 8, the NRC gave a presentation to NNWSI Project participants in Las Vegas to describe legal and quality assurance aspects of the licensing process. Bill Olmstead, NRC ELD, gave an interesting summary of the litigation process and its implications. He discussed the Discovery process and the impact it could have on the way records are retained. Bill Altman gave a presentation on areas where QA, if inadequately performed, could adversely affect the ability to license a repository. The fact that a geologic HLW repository is a new venture for both the NRC and DOE was discussed. NRC considers it a learning experience for everyone involved and encouraged flexibility. Project participants from DOE/NV, WMPO/NV, SAIC, Westinghouse, LLNL, USGS, F&S, and H&N attended the

three-hour presentation. NRC will give this presentation in the near future to other Project participants in San Francisco, Albuquerque, and Denver. Bob Browning briefly addressed the group to encourage a cooperative working relationship between NRC and DOE/NV.

A draft of the NNWSI EA chapters 2-6 was given to Craig Toussaint of Weston on November 8 to deliver to DOE/HQ for concurrence review.

IV. Upcoming Events

1. Coordination Group Meetings

- o Friday, November 16: Repository Coordination Group Meeting, D.C.
- o Monday-Wednesday, December 3-5: Institutional/Socioeconomics Coordination Group Meeting, D.C.

2. HQ Meetings

- o Thursday, November 15: OCRWM QA Seminar, Los Alamos.
- o Thursday-Friday, November 15-16: EA Review, D.C.
- o Friday, November 16: Program Review Briefing, D.C.
- o Monday-Wednesday, December 3-4: EA Interaction Training Meeting, D.C.
- o Wednesday-Thursday, December 5-6: Office Automation Meeting, D.C.

3. Internal Project and DOE/NV Meetings

- o Tuesday, November 20: DOE/NV Program Review Meeting.
- o Monday-Friday, November 26-30: ESI Visit to LLNL (Records Center).
- o Tuesday, November 27: SAIC Monthly Status Review, Las Vegas.
- o Wednesday-Thursday, November 28-29: PM-TPO Meeting, Las Vegas.
- o Wednesday, December 5: ESF Status Meeting, NTS.
- o Thursday-Friday, December 6-7: ESTP Committee Meeting, Las Vegas (tentative).
- o Monday, December 10: SCP Working Group (Issues) Meeting, Las Vegas (tentative).
- o Monday-Friday, December 10-14: ESI Visit to SNL (Records).

- o Monday-Wednesay, December 10-12: ESTP PIs meeting with DLV, Las Vegas (tentative).
- o Monday-Friday, December 17-21: ESI Visits to USGS and LANL (Records).
- o Monday-Friday, January 7-11 and 14-18: ESI Visits to NTS Contractors.
- o Wednesday-Thursday, January 23-24: PM-TPO Meeting, Las Vegas.

4. State and Public Interaction

- o Monday-Friday, November 26-30: Materials Research Society Annual Meeting, Boston.
- o Thursday, December 6: National Conference of State Legislatures Tour of NTS.
- o Friday, December 7: Nye County Commissioners/Advisory Board tour of NTS.
- o Tuesday, January 8: EA Briefing to State Officials in Carson City.
- o Tuesday, January 22: EA Public Briefing, Las Vegas.
- o Thursday, January 24: EA Public Briefing, Reno.

5. NRC Interaction

- o Thursday-Friday, December 13-14: NRC NNWSI QA Review Meeting, Las Vegas.

Donald L. Vieth, Director
Waste Management Project Office

WMPO:DLV-326

cc:
J. W. Bennett, DOE/HQ (RW-20), GTN
R. J. Blaney, DOE/HQ (RW-20), GTN
T. P. Longo, DOE/HQ (RW-22), GTN
C. R. Cooley, DOE/HQ (RW-24), GTN
M. W. Frei, DOE/HQ (RW-23), GTN
V. J. Cassella, DOE/HQ (RW-12), GTN
Ralph Stein, DOE/HQ (RW-23), FORSTL
E. S. Burton, DOE/HQ (RW-25), FORSTL
J. O. Neff, DOE/SRPO, Columbus, OH
S. A. Mann, DOE/CRPO, Argonne, IL
O. L. Olson, DOE/RL, Richland, WA
R. W. Taft, AMES
L. E. Perrin, RMBD
A. J. Roberts, RMBD
T. O. Hunter, SNL, 6310, Albuquerque, NM
R. W. Lynch, SNL, 6300, Albuquerque, NM
W. W. Dudley, Jr., USGS, Denver, CO
L. D. Ramspott, LLNL, Livermore, CA
D. T. Oakley, LANL, Los Alamos, NM
J. B. Wright, W/WTSD, Mercury, NTS
M. E. Spaeth, SAIC, Las Vegas, NV
J. R. LaRiviere, SAIC, Las Vegas, NV
W. S. Twenhofel, SAIC, Lakewood, CO
J. H. Fiore, SAIC, Las Vegas, NV
R. R. Loux, NWPO
C. H. Johnson, NWPO
P. T. Prestholt, NRC/Las Vegas, NV

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J. W. Bennett, DOE/HQ (RW-20), GTN
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R. R. Loux, NWPO
C. H. Johnson, NWPO
P. T. Prestholt, NRC/Las Vegas, NV

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

NOV 14 1984

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

NNWSI WEEKLY HIGHLIGHTS FOR WEEK ENDING NOVEMBER 8, 1984

I. Issues Requiring Involvement of HQ or Other Projects

A. New Issues:

None to report.

B. Previously Reported Issues:

Issue	Status	First Report Date
Does HQ have a policy regarding state conduct of site specific measurements at proposed repository sites? (Is this clarified by the recent grant guidelines?)	Open; Letter coming from WMPO.	July 26, 1984

II. Major Internal Concerns

None to report.

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

SA

None to report.

II

On November 6, NNWSI and BWIP Project representatives conducted a conference call to discuss collaboration on the copper development plans that had been submitted to DOE/HQ. The Projects have agreed to a division of work and will adjust the plans accordingly. The decisions reached will be summarized at the November 14-15 Program Managers' Meeting in D.C.

Revision 3 of the NNWSI QAP, NVO-196-17, has been distributed to the Project participants for implementation effective November 1, 1984.

On November 1, Cornelius Williams, the GAO Auditor, held an informal exit briefing with the NV Deputy Manager, Ray Duncan. He informed NV that

DOE/NV implementation of the vulnerability, assessment, and internal control reviews have been properly and adequately performed.

IV. Upcoming Events

1. Coordination Group Meetings

- o Wednesday and Friday, November 14 and 16: Repository Coordination Group Meeting, D.C.
- o Tuesday-Thursday, December 11-13: Waste Package Coordination Meeting and Tour of NTS, Las Vegas.

2. HQ Meetings

- o Thursday, November 8: EBS Teleconference call.
- o Wednesday-Thursday, November 14-15: FY 85 Program Review, D.C.
- o Wednesday-Thursday, November 14-15: Program Manager's Meeting.
- o Thursday, November 15: OCRWM QA Seminar, Los Alamos.
- o Thursday-Friday, November 15-16: EA Review, D.C.
- o Friday, November 16: Program Review Briefing, D.C.
- o Monday-Wednesday, December 3-4: EA Interaction Training Meeting, D.C.
- o Wednesday-Thursday, December 5-6: Office Automation Meeting, D.C.

3. Internal Project and DOE/NV Meetings

- o Thursday-Friday, November 8-9: Director of USGS and Staff NTS Tour and Meeting, Las Vegas.
- o Tuesday, November 13: OECD Source Term Workshop, ABQ.
- o Wednesday, November 14: ESF Status Meeting, NTS.
- o Tuesday, November 20: DOE/NV Program Review Meeting.
- o Monday-Friday, November 26-30: ESI Visit to LLNL (Records Center).
- o Tuesday, November 27: SAIC Monthly Status Review, Las Vegas.
- o Wednesday-Thursday, November 28-29: PM-TPO Meeting, Las Vegas.
- o Thursday-Friday, December 6-7: ESTP Committee Meeting, Las Vegas (tentative).

- o Monday, December 10: SCP Working Group (Issues) Meeting, Las Vegas.
- o Monday-Wednesay, December 10-12: ESTP PIs meeting with DLV, Las Vegas (tentative).
- o Monday-Friday, December 17-21: ESI Visits to USGS and LANL.
- o Monday-Friday, January 7-11 and 14-18: ESI Visits to NTS Contractors.

4. State and Public Interaction

- o Thursday, November 8: Don Vieth to address LV Chapter of Professional Engineers, Las Vegas.
- o Monday-Friday, November 26-30: Materials Research Society Annual Meeting, Boston.
- o Thursday, December 6: National Conference of State Legislatures Tour of NTS.

5. NRC Interaction

- o Thursday, November 8: Bill Olmstead of NRC-ELD to give legal presentation to NV/SAIC/W, Las Vegas.
- o Thursday-Friday, December 13-14: NRC NNWSI QA Review Meeting, Las Vegas.

For
Donald L. Vieth, Director
Waste Management Project Office

WMPO:DLV-296

cc w/encl:
T. R. Clark, MGR
R. D. Duncan, DMGR
R. W. Taft, AMES
J. B. Cotter, EEM
D. H. Irby, EEM
J. W. Bennett, DOE/HQ (RW-20), GTN
D. L. Vieth, WMPO, DOE/NV
M. B. Blanchard, WMPO, DOE/NV
M. P. Kunich, WMPO, DOE/NV
J. S. Szymanski, WMPO, DOE/NV
V. F. Witherill, WMPO, DOE/NV
R. H. Richards, WMPO, DOE/NV
James Blaylock, QAD, DOE/NV
R. R. Loux, NWPO
C. H. Johnson, NWPO
L. E. Perrin, RMB
A. J. Roberts, RMB
J. R. Rinaldi, QAD
D. L. Anderson, DOE/HQ (RW-22), GTN
T. P. Longo, DOE/HQ (RW-22), GTN
Cy Klingsberg, DOE/HQ, (RW-24) GTN
J. J. Fiore, DOE/HQ, (RW-22) GTN
J. O. Neff, Prog. Mgr., NPO, DOE/RLC
Stan Goldsmith, ONWI, Columbus, OH
W. W. Dudley, Jr. USGS, Denver, CO
R. W. Lynch, SNL, 6300, Albuquerque, NM
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P. T. Prestholt, NRC
M. E. Spaeth, SAIC, Las Vegas, NV
J. R. LaRiviere, SAIC, Las Vegas, NV
L. V. Hoffman, SAIC, Las Vegas, NV
L. L. Andrist, SAIC, Las Vegas, NV
J. H. Fiore, SAIC, Las Vegas, NV

Department of Energy
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NOV 14 1984

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

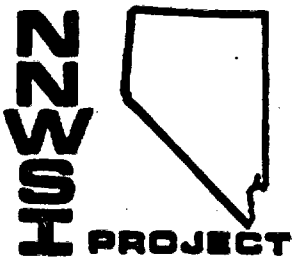
NNWSI PROJECT MONTHLY REPORT FOR AUGUST 1984

Enclosed is the NNWSI Monthly Report for August 1984 covering the technical activities and status of the NNWSI Project.

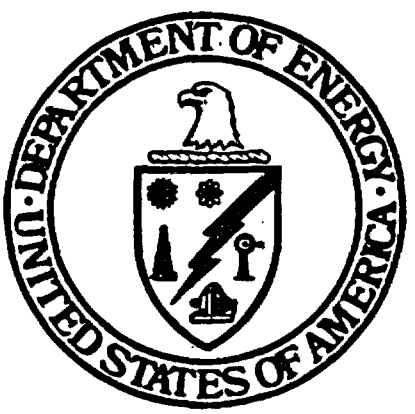
FOR
Donald L. Vieth, Director
Waste Management Project Office

WMPO:DLV-300

Enclosure:
As stated



NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT



MONTHLY REPORT

AUGUST 1984

UNITED STATES DEPARTMENT OF ENERGY

NEVADA OPERATIONS OFFICE

TABLE OF CONTENTS

SUMMARY

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT

AUGUST 1984

KEY ACTIVITIES

WBS 2.1, SYSTEMS

Draft descriptions of several systems from the Yucca Mountain Mined Geologic Disposal System Requirements (MGDSR) (System Description) document were sent to WMPO for use in evaluating possible approaches to Chapter 9 of the NNWSI Site Characterization Plan. Work on the Yucca Mountain MGDSR document was a top SNL NNWSI Project Department priority in August. A draft document is due at WMPO on September 21. The portion of the Tuff Data Base that includes sorption/desorption information from individual tests was restructured to include pH information. Information on pH was input for the sorption/desorption results already in the data base.

WBS 2.2, WASTE PACKAGE

Initial results from the spent fuel cladding containment tests indicate that uranium is significantly more soluble in J-13 water than in deionized water (possibly due to the formation of carbonate complexes). The electrochemical Zircaloy corrosion scoping experiment involving spent fuel cladding wrapped with a strip of stainless steel and partially immersed in J-13 water in contact with crushed Topopah Springs tuff (Tpt) is continuing according to schedule.

The single mineral dissolution kinetics experiments using quartz was terminated at the end of the month. Solutions are being analyzed for Si only by a calorimetry and inductively-coupled plasma spectrometer (ICP).

Initial results with the Hanford Engineering Development Laboratory (HEDL) Thermal-gravimetric Analysis (TGA) system to determine its usefulness in low temperature oxidation studies of spent LWR fuel look promising. The TGA system was relatively stable for a test period of over 20 days. Preliminary results indicate that oxidation rate is not simply directly proportional to sample area.

WBS 2.3, SITE

During pumping of well USW H-6, good isolation was obtained between packed-off permeable zones in the Bullfrog and Tram Members. The compositions of the Bullfrog and Tram groundwaters are extremely similar. The main differences are slightly higher concentrations of calcium and bicarbonate ions in the Tram than in the Bullfrog groundwater. Both pumped zones exhibited groundwaters essentially saturated with air. These results are quite different than expected because groundwaters were thought to be reducing, based on earlier data from another well and different interval.

Samples of shallow groundwater were collected from a location near the Exploratory Shaft (ES) site at Yucca Mountain to determine the infiltration of rainfall into fractured tuff during the past 25 years using the ^{36}Cl "bomb pulse" technique. The tuff samples that were collected will be analyzed to determine whether any of the ^{36}Cl bomb pulse has remained at this shallow depth.

Several successful runs of the unsaturated zone (UZ) Conceptual Model were made using synthesized data as a program check. Permeabilities and rain/dry period intensities were varied to test the ranges. The results are satisfactory to date on a relative basis. Five computer runs were completed which involve changing the evapo-transpiration rates and equilibrium pressures in a continuing effort to validate the model.

WBS 2.4, REPOSITORY

Sandia has been requested by DOE/HQ through DOE/NV/WMPO to participate with Weston and the Independent Cost Estimate (ICE) Group of DOE to develop a reconciled cost estimate for a geologic repository for radioactive waste. This cost estimate will be based upon the work developed for the NNWSI Two-Staged Repository Development Report. This work is expected to continue through October 1984.

A three-day workshop was held at SNL on August 7-9 to establish a framework for the Conceptual Design Report (CDR) outline and to establish guidelines for text preparation. A story-board format will be used for the CDR outline. This format was chosen to allow early review and comment on the proposed contents of the CDR.

The map of the subsurface area available for underground facility development was revised on the basis of USGS recommendations. The new map delineates areas similar to the old map but is consistent with USGS geologic mapping of Yucca Mountain.

The life-cycle cost estimate for the reference repository has been developed in the format requested by Weston for their Repository Cost Reconciliation Workbook. These data were reviewed in Washington on August 20-22 with representatives from DOE, Weston, and the three repository project teams.

Comments were prepared for WMPO for transmittal to DOE/HQ on NRC's proposed 10CFR60 revision. This revision is intended to make the procedural portion of the standard consistent with the NWPA.

Studies at LANL during August addressed the reactivity of sealing materials at elevated temperatures up to the maximum credible temperature expected around wast package emplacement drifts or boreholes in the Topopah Spring (Tpt) member. The stability of concrete sealing materials is being tested at elevated temperatures to simulate probable exposure conditions of certain fracture seals in Tpt tuffs.

The seal design/testing data-base transfer was completed at SNL during August including transfer of reports needed for the sealing conceptual design activity, a review of the information contained within the report, and synthesis into a data package that can be used for reference supporting the numerical calculations.

WBS 2.5, REGULATORY/INSTITUTIONAL

A project workshop on ground motion at Yucca Mountain induced by earthquakes and weapons testing was held August 6-7 in La Jolla at the request of WMPO. SNL, USGS, and SAIC staff discussed perceived discrepancies and inconsistencies in data and interpretations presented in the EA. The review panel included N. F. Brace, R. Smith, R. Raleigh, and B. Wernike, all of whom are experts on seismicity and tectonics. The outcome of the meeting will be a summary report prepared by SAIC that is expected not only to resolve EA questions but to further refine site characterization activities.

A meeting was held in Las Vegas on August 31 on the NNWSI Information Management Systems. The NRC requested this meeting in order to inform DOE of their charter to begin a requirements analysis for an NRC issue-tracking and information-management system. A presentation on the NNWSI Project Issue Management System approach was given to NRC.

Comments were prepared for WMPO for transmittal to DOE/HQ on NRC's proposed 10CFR60 revision. This revision is intended to make the procedural portion of the standard consistent with the NWPA. Several points were of concern including the NRC's proposed process for SCP review and publication, and NRC's apparent expectation relative to the scope of the conceptual design to be included in the SCP.

Minutes for the July 10-12 DOE/NRC Geochemistry Workshop held at Los Alamos, NM, were finalized and transmitted to NRC for signature. Interactions between workshop participants were effective and professionally conducted. Future workshops should concentrate on well-defined and bounded technical issues and

concerns. Furthermore, representatives of all major project organizations should be present at future workshops to assure continuity and to respond to questions in their area of expertise.

WBS 2.6, EXPLORATORY SHAFT

The Exploratory Shaft Test Plan (ESTP) Committee recommended that the second shaft (6 ft finished inside diameter) be located near USWG-4, southwest of the 12 ft shaft location. A revised underground layout was also approved by the committee.

WBS 2.7, TEST FACILITIES

Post-test laboratory calibrations of transducers deployed on the Spent Fuel Test-Climax (SFT-C) were completed. Data analyses continue to be the dominant activity following completion of field activities. Three draft reports were completed which document the results of borehole jack and petite sismique rock mass modulus measurements. A report comparing measured and calculated radiation doses in the vicinity of canister emplacement boreholes was also completed.

WBS 2.9, PROGRAM MANAGEMENT

DOE/HQ provided a program-wide Work Breakdown Structure (WBS) that will require extensive re-work of the NNWSI Project baseline document. A preliminary WBS was prepared for review and comment by the Project participants.

All planned audits have been completed by QASC with the exception of the WMPO internal audit. This audit may be cancelled due to other priority activities.

Based on comments submitted to SAIC by the NNWSI Project participating organizations and a re-evaluation by the QASC, a number of changes were made to clarify the QAP. The rationale for quality level definitions was expanded, and the section on test control was revised to clarify differences between experiments and tests.

FUNDING OVERVIEW

The month-end programmatic estimated costs were $58,203,000 against a plan of $59,186,000 resulting in a cost underrun of $983,000 through the month of August. The plan is based on a $67M FY-1984 funding authorization.

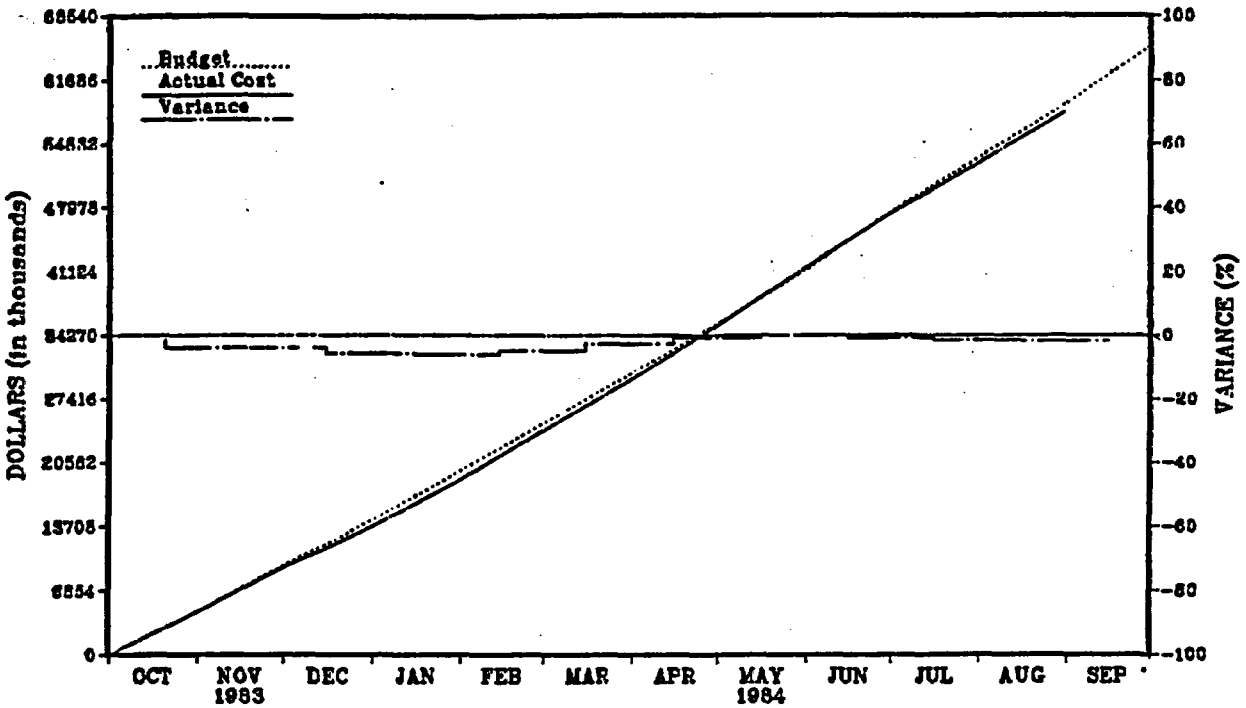
The following are the year-to-date plans, costs, and variances:

		Plan	Cost	Variance
2.1	Systems	$3,398,000	$2,981,000	$417,000
2.2	Waste Package	4,450,000	4,175,000	275,000
2.3	Site	20,480,000	21,490,000	<1,010,000>
2.4	Repository	11,544,000	10,717,000	827,000
2.5	Regulatroy and Institutional	2,483,000	2,889,000	<406,000>
2.6	Exploratory Shaft	2,332,000	2,100,000	232,000
2.7	Test Facilities	5,728,000	5,464,000	264,000
2.9	Program Management	7,231,000	6,985,000	246,000
	NTS Allocation	790,000	841,000	<51,000>
	State Grant	750,000	561,000	189,000
	Total	$59,186,000	$58,203,000	$983,000

The plan is based on a $67M on FY 1984 funding authorization.

NNWSI Project

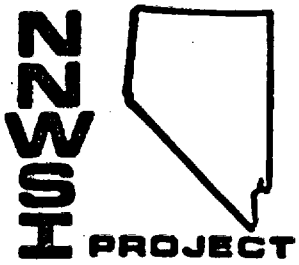
GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	4559.	9501.	14393.	19713.	24850.	30297.	35570.	41467.	47535.	53332.	59186.	65285.
Cost (x1000)	4385.	9207.	13579.	18556.	23681.	29452.	35221.	41435.	47166.	52546.	58203.	0.
Variance (x1000)	174.	374.	814.	1157.	1169.	845.	349.	32.	369.	786.	983.	0.
% Variance	-4.	-4.	-6	-6.	-5.	-3.	-1.	0.	-1.	-1.	-2.	0.

NNWSI PLANNING & SCHEDULING
BUDGET BASELINE
AUGUST, 1984

CONTRACTORS	BEGINNING FUNDING	CHANGE	ENDING FUNDING
SNL	$ 17,757	-	$ 17,757
LLNL	8,298	-	8,298
LANL	9,090	-	9,090
USGS	7,777	-	7,777
SAIC	5,861	-	5,861
REECo	9,538	-	9,538
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	850	-	850
RESERVE	46	-	46
TOTAL	$ 64,410	-	$ 64,410
FORWARD FINANCING	(500)	-	(500)
CAPITAL EQUIPMENT	3,090	-	3,090
TOTAL (BA)	$ 67,000	-	$ 67,000



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

COMPLETED ACTIVITIES

Draft descriptions of several systems from the Yucca Mountain Mined Geologic Disposal System Requirements (MGDSR) (System Description) document were sent to WMPO for use in evaluating possible approaches to Chapter 9 of the NNWSI Site Characterization Plan.

Work on the Yucca Mountain MGDSR document was a top NNWSI Project Department priority in August. Staff were assigned to assist in identification of requirements for the operational repository, and logistics for document production and review were implemented. Draft descriptions of approximately 80 percent of the systems were complete by the end of August and were given preliminary review. A draft document is due at WMPO on September 21.

SNL has developed a self-consistent boundary-condition algorithm for the TOSPAC transport module that includes consideration of convective, dispersive, decaying-efflux, and infiltration boundaries.

The documentation of the physical, mathematical, and numerical basis of TOSPAC was begun in August (new FY85 MILESTONE).

Analytical studies were started on parameter sensitivity in support of the NNWSI Data Priority Studies (new FY85 milestone) in August. The sensitivity of the release-rate and water-travel-time performance measures have been studied.

Water travel time in the unsaturated zone was found to be equally sensitive to porosity and rock-unit thickness, and slightly less sensitive to levels of percolation flux; in fracture flow, the water-travel time is equally sensitive to all three of these variables. The study is endeavoring to determine the sensitivity of the EPA performance measure which defines cumulative curies released to the accessible environment. Sensitivity to approximately ten first-order parameters involved will be done numerically and will be completed within the next three months.

Discussions were held with Lawrence Berkeley Laboratory (LBL) to determine the status of a study of the transport of water, vapor, air, and heat in the vicinity of a radioactive-waste package emplaced in unsaturated rock, and to outline the activities required in this area during FY 1985. The contract with LBL will supply a portion of the information needed to assess the performance of the postclosure near-field environment.

A draft report, "Users Manual for the Tuff Data Base, Interface" (SAND 84-1643) by Brenda Langkopf, Barbara Satter, and Eileen Welch was completed and submitted to WMPO on August 23, 1984.

The portion of the Tuff Data Base that includes sorption/desorption information from individual tests was restructured to include pH information. Information on pH was input for the sorption/desorption results already in the data base. Present activities include input of remaining sorption/desorption published data, input of recently published mineralogy data from LA-9706-MS and LA-9707-MS, and debugging of a preliminary program for plotting Tuff Data Base information.

A copy of "FEMTRAN - A Finite Element Computer Program for Simulating Radionuclide Transport through Porous Media" (SAND84-047) by M. J. Martinex was delivered to WMPO in August. The report provides a user's manual for the FEMTRAN code which has been developed for two-dimensional, transient radionuclide-transport calculations for Performance Assessment.

A representative hydrologic problem for Yucca Mountain was defined by SNL in a memo dated March 1, 1984. The codes TOSPAC, TRACR3D, SAGUARO, and NORIA were used to run the problem. An informal meeting to discuss the results to date was held on August 20. It was concluded that 1) the stability of all solutions needs to be enhanced, 2) the convergence of dynamic solutions using SAGUARO and NORIA needs to be compared using a variety of initial conditions, and 3) cases 3 and 4 should be run with SAGUARO, NORIA, and TRACR3D using the steady-state solution of TOSPAC as the initial condition. The representative problem has proved to be excellent for comparing dynamic versus steady-state solutions and for highlighting the different stability and convergence problems of the one-dimensional steady-state code versus those of multi-dimensional, dynamic codes.

Modeling of near-field thermohydrologic conditions is being coordinated between Lawrence Livermore National Laboratory (LLNL) and SNL to satisfy several WBS elements. A memorandum summarizing the proposed strategy was written and distributed during August. One of the purposes of the coordinated modeling is to provide benchmarking of the codes WAFE, TOUGH, and NORIA.

PLANNED WORK

The report, "Effect of Water Flux on Spent-Fuel Dissolution in a Potential Nuclear Waste Repository in Tuff," (SAND84-1007) by J. W. Braithwaite was revised following peer review and will be submitted to WMPO for policy review by September 28, 1984.

The report on the COVE benchmarking activity is nearing completion and should be delivered on time (September 30, 1984) to NV. The question of the need for coupled-effects modeling and testing is to be coordinated by LANL in a position paper. Approaches that have been taken for performance-assessment work to date on modeling coupled effects were discussed in a meeting between Data Base, Performance Assessment and LANL staff members.

A sensitivity study that identifies the important parameters affecting the time-dependent radionuclide release rates from the waste package will be completed and reported in "Source Term Considerations for a Potential

Nuclear-Waste Repository Located in Unsaturated Tuff." If accepted, this paper will be presented at the Organization for Economic Cooperation and Development's (OECD) Nuclear Energy Agency workshop on the "Source Term for Radionuclide Migration from High Level Waste or Spent Nuclear Fuel". The workshop will be held in Albuquerque on November 13-15, 1984 and is co-sponsored by DOE.

During October and November, efforts will focus on restructuring the approach to modeling the movement of fluids and transport of wastes through the Yucca Mountain site. The issue that needs resolution concerns the practicality of using two- and three-dimensional codes for simulating the behavior of the site in light of the paucity of data generally available to support the multi-dimensional computer codes.

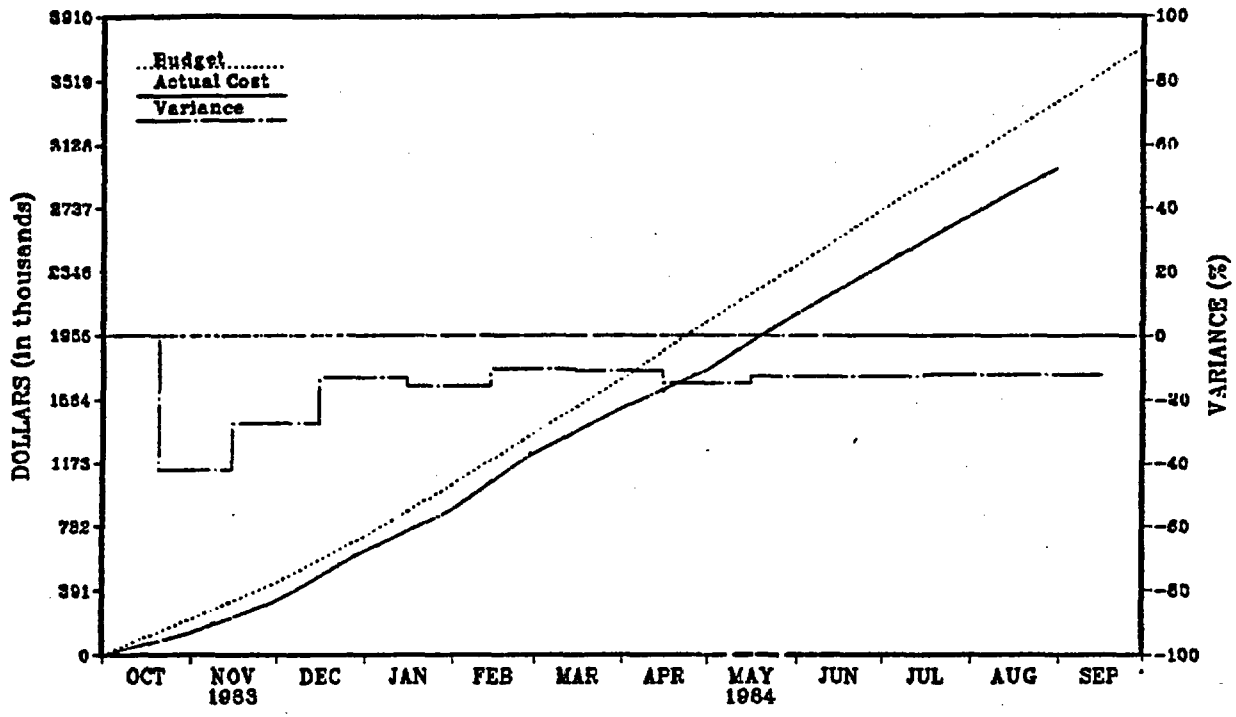
The first phase of the Tuff Data Base User Interface will be completed in December and the second phase will be started. The second phase will include plotting capabilities.

PROBLEM AREAS

An examination of the numerical stability of the TOSPAC hydrodynamics module has begun. It appears that every numerical scheme so far proposed for the solution of the equation of unsaturated flow (Richards' Equation) suffers from numerical instabilities when used with the composite matrix/fracture characteristic curves. Different numerical schemes or perhaps different problem formulations may be needed to overcome this problem.

WBS 2.1, Systems

GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	220.	442.	724.	1043.	1362.	1682.	2046.	2367.	2726.	3059.	3398.	3724.
Cost (x1000)	127.	320.	628.	877.	1219.	1504.	1741.	2083.	2378.	2682.	2981.	0.
Variance (x1000)	93.	122.	96.	166.	143.	166.	305.	304.	348.	377.	417.	0.
% Variance	-42.	-28.	-13.	-16.	-10.	-11.	-16.	-13.	-13.	-12.	-12.	0.

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

Initial results from the spent fuel cladding containment tests indicate that uranium is significantly more soluble in J-13 water than in deionized water (possibly due to the formation of carbonate complexes). The electrochemical Zircaloy corrosion scoping experiment involving spent fuel cladding wrapped with a strip of stainless steel and partially immersed in J-13 water in contact with crushed Topopah Springs tuff (Tpt) is continuing according to schedule.

The single mineral dissolution kinetics experiments using quartz was terminated at the end of the month. Solutions are being analyzed for Si only by a calorimetry and inductively-coupled plasma spectrometer (ICP). Solid phase observations by Scanning Electron Microscopy (SEM) will commence shortly. The experiments spanned the range pH 1 through 13 and were run at 70°C for 60 days. Several of the experiments will have to be repeated due to leaking flow-through cells caused by cell plugging.

The report entitled "Report on static hydrothermal alteration studies of Tpt core wafers in J-13 water at 150°C" by Knauss and Beiriger was completed, passed QA peer review, and was forwarded to WMPO for review.

The paper entitled "Hydrothermal interaction of Topopah Spring Tuff with J-13 Water as a Function of Temperature" by Knauss, Delany, Beiriger and Peifer was accepted for presentation at the Symposium on the Scientific Basis for Nuclear

Waste Management in the 1984 Materials Research Society (MRS) National meeting in Boston this fall. This report focuses on the results of drill core samples run in the gold-cell rocking autoclaves.

Initial results with the Hanford Engineering Development Laboratory (HEDL) Thermal-gravimetric Analysis (TGA) system to determine its usefulness in low temperature oxidation studies of spent LWR fuel look promising. Two TGA runs were conducted at 225°C in air with a 14°C dew point on one sample of crushed fuel and one fuel fragment. The TGA system was relatively stable for a test period of over 20 days. Preliminary results indicate that oxidation rate is not simply directly proportional to sample area.

The manuscript entitled "Parametric Testing of a DWPF Glass" by F. Bazan and J. Rego was completed and distributed for technical review.

Electrochemical Corrosion Potential

During August, the electrochemical corrosion potential was measured for different candidate stainless steels in J-13 water in a high-intensity gamma irradiation field. This was done to determine the corrosion potential shifts due to the production of a more oxidizing environment under gamma irradiation, and to determine whether such potential shifts could induce localized pitting attack because of the relative placements of the corrosion potentials and the pitting potentials of the different stainless steels.

Results similar to those previously reported for 304L were obtained for 316L stainless steel. A positive shift in the corrosion potential was also observed for the 316L sample in room temperature J-13 water. After about 390 minutes, the experiment was terminated. The 316L electrode was removed and re-immersed in fresh, unirradiated J-13 water; E_{corr} was found to drop immediately. This experiment shows that the shift in E_{corr} found under irradiation is due to the formation of relatively stable radiolysis products which remain in solution. After about 50 minutes at E_{corr} in the unirradiated J-13 water, one drop of concentrated 30 percent hydrogen peroxide (H_2O_2) was added and the potential was observed to shift in the oxidizing direction. A concentration of

1.4×10^{-4} M H_2O_2 caused the potential shift. The similarity between this shift and that observed under gamma irradiation suggests that radiolytic formation of H_2O_2 from water may account for the shift in corrosion potential.

Potentiostatic anodic polarization potentials in the gamma field were also obtained, to determine the effects of gamma radiolysis on pitting potentials. Polarization potentials for 316L were measured in 650 ppm chloride solution both under gamma irradiation and out of the gamma field. Under gamma irradiation, the E_{corr} and E_{pit} values are 50 mV and 390 mV, respectively. This represents a separation of 340 mV. In the polarization curve determined outside the gamma field, the corresponding values yield a separation of 330 mV. The similarity in the magnitude of the shift is interpreted to mean that the stainless steel is no more susceptible to pitting attack with gamma irradiation than without.

In order to investigate the corrosion behavior in the more concentrated electrolyte solutions than presently occur at the Site, J-13 water was boiled down to approximately 10 times (10x) and 100 times (100x) its initial ionic concentration. Initial analyses were compared with the concentrated J-13 results.

It is observed that the 10x solution results in anion concentrations that are roughly 10x more concentrated. The 100x solution yields high results for every anion except fluoride which is generally less soluble than other salts. These results are being repeated by analytical chemistry personnel. Copious precipitation is observed when J-13 is boiled down to 100x concentration. Analysis revealed this precipitate to consist mostly of calcium silicates. The pH of the 100x boil-down solution rises to about 9.8 compared to normal J-13 water which is nearly neutral (7.0). This pH change may actually be beneficial to the localized corrosion performance of the stainless steel as the more alkaline environment may counter the effect of an increase in chloride ion content.

Design

In order to obtain commercial cost estimates for spent fuel canister space frames, detailed drawings were prepared for BWR and PWR space frames. The PWR drawing was sent to fabricators for detailed cost estimates for quantities of 200 per year each of three lengths (total 600/yr).

Discussions continued with INTERA to develop an FY85 statement of work for the analysis of non-porous flow within the waste package. LLNL met with INTERA in Houston on August 29, 1984 to define several generic falling fluid problems which could impact the performance of a waste package in the unsaturated zone. It was agreed that the first phase of this proposed subcontract should focus on calculation of flow path, volume, and residence time along a non-porous cylinder.

High Frequency Electromagnetic Geotomography

Borescope surveys of the G-Tunnel post-experiment boreholes were performed this month to detect fractures in the plane of the high frequency electromagnetic (HFEM) geotomography measurements. The borescope logs and the geophysical results were used to infer paths of tracer flow during the HFEM experiments. Anomalies seen in the geotomographs appear to closely match the fractures present in the plane of the HFEM measurements. A model of the inferred flow paths was also developed and used to generate synthetic tomographs. This procedure confirmed that the inferred flow paths can produce the image anomalies observed in the actual tomographs.

PLANNED WORK

Work has been initiated to model the matrix diffusion of radionuclides through the Tpt tuff reaction vessels used in the Savanah River Laboratory (SRL)-NNWSI saturated release tests of the DHLW waste form. Both the simulated and fully active waste release tests will be modeled and the results compared to the nuclide distributions measured in the rock and solution analyses. Details of

the work will be presented at the ORNL-sponsored Workshop on the Application of Geochemical Models to High-Level Nuclear Waste Repositories scheduled for October 2-5, 1984.

Evaluation and verification of WAPPA submodels will continue through this fiscal year. In FY85, these models will be organized into a waste package system model with a flow/transport submodel and data bases for metal corrosion and waste form release rates to predict the long-term performance of the NNWSI waste package subsystem.

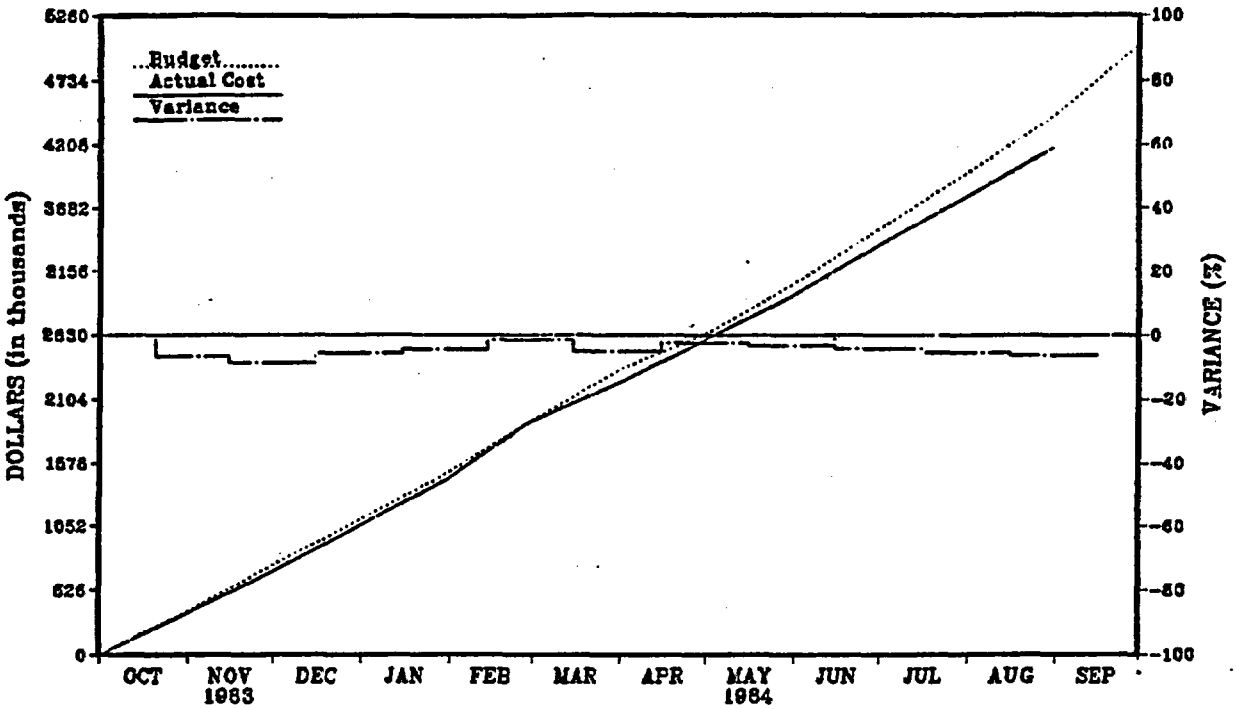
The report describing the suitability of HFEM techniques for monitoring saturation changes in fractured, welded tuff will be completed in September. In addition, review of other types of instrumentation, measurement, and sampling techniques will continue. These fall into the general areas of subsurface hydrology and geomechanics, in keeping with the broad scope of the Waste Package Environment Tests. Scoping calculations for experiment design will commence within the next months; this work is closely related to the numerical modeling being planned in the Waste Package Performance Analysis sub-task.

PROBLEM AREAS

None.

WBS 2.2, Waste Package

GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	352.	734.	1107.	1509.	1932.	2350.	2642:	3068.	3509.	3976.	4450.	5015.
Cost (x1000)	329.	671.	1045.	1442.	1903.	2237.	2561.	2954.	3359.	3764.	4175.	0.
Variance (x1000)	23.	63.	62.	67.	29.	113.	81.	104.	150.	212.	275.	0.
% Variance	-7.	-9.	-6.	-4.	-2.	-5.	-2.	-3.	-4.	-5.	-6.	0.

2.3 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

Geochemistry

During pumping of well USW H-6, good isolation was obtained between packed-off permeable zones in the Bullfrog and Tram Members. This was indicated by more than 45 m of drawdown in the Tram when pumped at over 13 liter/s. If there had been connection between the permeable zones, less drawdown would have been observed. The compositions of the groundwaters are extremely similar. The main differences are slightly higher concentrations (approximately 0.1 meq/liter) of calcium and bicarbonate ions in the Tram than in the Bullfrog groundwater. Both pumped zones exhibited groundwaters essentially saturated with air. These results are quite different than expected because groundwaters were thought to be reducing, based on earlier data from another well and different interval.

Samples of shallow groundwater were collected from a location near the Exploratory Shaft (ES) site at Yucca Mountain to determine the infiltration of rainfall into fractured tuff during the past 25 years using the ^{36}Cl "bomb pulse" technique. Materials were obtained from depths to 2.5 ft below the surface when heavy rain forced the termination of sampling; the excavation contained standing water after the rain that would have compromised the interpretation of further data. The tuff samples that were collected will be analyzed to determine whether any of the ^{36}Cl bomb pulse has remained at this shallow depth.

Derivation of the necessary parameters has been completed for the thermodynamic model of analcime. The model indicates that the analcimes present in Yucca Mountain crystallized under conditions where the silica activity was only slightly below that in equilibrium with cristobalite. The fact that they presently coexist suggests that the analcimes did not crystallize at temperatures above about 150°C but does not indicate a specific temperature at which crystallization did take place. The model predicts that analcime will crystallize at higher silica activities when the pressure on the crystal is close to the fluid pressure. This implies that, as silica activities more closely approach equilibrium with quartz, albite may be converted to analcime which will crystallize in void space where the pressure on the analcime would be equal to the fluid pressure. Such an occurrence would decrease permeability.

An assessment has started to determine the importance of various radionuclides that may be present in HLW. This assessment will emphasize radionuclides occurring in large quantities that may be released from the solid waste at high rates and not be highly sorbed along flow paths. This work is being done to assure that all radionuclides that might be released to the environment in significant quantities are being considered.

Radiation Sensitivity Analysis:

Performance comparisons of different hydrodynamic codes for predicting transport within geologic media were completed. Four scenarios were devised for the layered Yucca Mountain, and these scenarios are the basis for

calculations by different codes and for comparison of results. During August, case 1 was run to steady state using the TRACR3D code, and the results compared with those from steady-state calculations using Sandia's TOSPAC (one-dimensional) and SAGUARO (two-dimensional) codes. The agreement among all three codes was excellent. TRACR3D reached the steady state for case 1 in only seven minutes of computer time. At present, it is the only operational code capable of dynamic two- and three-dimensional Yucca Mountain calculations for both flow and transport.

The case 2 layered Yucca Mountain scenario was run using TRACR3D for a significant period, but the results have not yet reached steady state. Nevertheless, comparison of these results with the case 2 steady-state results from TOSPAC and SAGUARO indicated that the results thus far are very reasonable.

To increase the speed of TRACR3D calculations for involved scenarios, modifications were made to use both explicit and implicit formulas where each is most efficient. These changes were incorporated in the code during August, and the modified code now is being used for cases 2, 3, and 4 of the layered Yucca Mountain calculations. Before layered Yucca Mountain scenario calculations were started, six test cases were used to compare results from different computer systems. By the beginning of August, both the Sandia and Los Alamos computer systems gave identical results for all six cases.

During August, modeling of proposed experiments began for the ESF tests. Modeling both of the diffusion experiment and the proposed pressure-driven fracture flow experiments are being conducted to specify experimental conditions and to identify parameter sensitivities and probable results of these experiments.

Applied Diffusion:

Work is continuing to determine the efficacy of bromide as a water tracer in Topopah Spring Member tuff. A newly purchased ion chromatograph has been modified to accept samples with small volumes. The column of crushed and

sieved Topopah Spring tuff used for this work appears to be packing so densely with use that the flow rate of J-13 water through the column is less than half its original value.

Geochemical Modeling EQ3/6:

Development of an economy mode and super-economy mode was completed and these options are up and running on the development version of EQ6. All computational anomalies involved with finite-difference step sizes have been corrected.

New MCRT data files were completed for selenium, thorium, and tin. Updates were made to all data files to coincide with the SUPCRT database update from UC Berkeley collaborators. Output changes were made in the pre-random access MCRT code to increase user productivity. The conversion of all data files to the new random-access format is continuing.

Mineralogy/Petrology

A first draft is complete of "Petrochemical Variation of Topopah Spring Tuff Matrix with Depth (Stratigraphic Level), Drill Hole USW G-4, Yucca Mountain, Nevada." This report describes a set of criteria by which stratigraphic depth can be determined within the upper and lower lithophysal and middle and lower nonlithophysal T_{pt} intervals. The report on "Iron and Manganese in Oxide Minerals and in Glasses: Preliminary Consideration of Eh Buffering Potential at Yucca Mountain, Nevada" was completed. This report emphasizes the occurrence of Fe^{2+} in T_{pt} glasses and the need to investigate the possibility that fracture-lining Mn oxides may act as oxidizing agents.

Geology

A detailed proposal was prepared for clearing and washing of additional rock pavements to support fracture studies at Yucca Mountain. The proposal contains a statement of the environmental impact to the repository site. In addition,

mapping was done for the 1:6,000 scale detailed geologic map of the area around drill hole USW G-4 and fractures exposed on washed rock pavements on Yucca Mountain.

Fall field operations were planned which involve measuring gravity changes with time at and near the repository site on Yucca Mountain.

Hydrology

Heavy rains that fell in the Yucca Mountain area during the week of August 13-19 were sampled for regional hydrochemistry studies. Surface water samples were taken at 40-Mile Wash, Busted Butte Wash, and Drill Hole Wash. More than 40 precipitation samples were taken during the period of rain activity.

The daylight crew moved the Ideco 37 rig to test well UE-25c#1 on August 9-10. A dual element straddle packer system with surface readout pressure and temperature recorders was then installed in UE-25c#1. A similar packer system will be set in UE-25c#2. Transducers will then be set in UE-25c#3 and UE-25p#1. A pumping test will then be run in UE-25c#3 in support of groundwater flow investigations.

Several successful runs of the unsaturated zone (UZ) Conceptual Model were made by SAIC/Golden using synthesized data as a program check. Permeabilities and rain/dry period intensities were varied to test the ranges. The results are satisfactory to date on a relative basis. The results of the preliminary UZ model runs are being studied and further runs are being made. Because of the unpredictable nonlinearity of the system this task is time-consuming. Five computer runs were completed which involve changing the evapo-transpiration rates and equilibrium pressures in a continuing effort to validate the model.

New field data are being reviewed and prepared by SAIC/Golden for the various rock textures of tuffs from Tiva Canyon, Pah Canyon, Topopah Spring, Calico Hills units and a representative fault zone. These data will be input to the

UZ finite difference model using the simplified version to determine bounds on the input data. Runs have been made to determine bounds on the constants used in the Corey-Brooks Equation, namely and residual saturation.

Site Stability

Field sampling and mapping were completed for the basalts of the Saline Range west of Death Valley, California. These basalts comprise a type I volcanic field and are localized between east-tilted range blocks. Vents for the field are aligned along N-NE trends, similar to the structural setting of young basalts throughout the south Great Basin.

The paper "Volcanic Hazard Assessment for Disposal of High-Level Radioactive Waste" has been sent to WMPO/NV for programmatic review.

Teleseismic data gathered in 1982 were processed to define a better picture of the crust beneath Yucca Mountain. The results will provide better resolution of crustal structure down to and including the Mohorovicic discontinuity.

During the week of August 6, NNWSI participants met with a panel of tectonics and seismicity experts at the request of WMPO. The workshop addressed ground motion at Yucca Mountain induced by earthquakes and weapons testing. The purpose of the workshop was to resolve inconsistencies in data interpretation related to site stability. See Environmental Assessment portion of 2.5, Regulatory/Institutional section for details.

Unsaturated Zone Hydrology

A TV camera scan of test well USW UZ-6 was made on August 7 from 20-inch casing in the interval 324 to 775 feet. Other dry hole logs made on August 7 included caliper, neutron and gamma, density, and induction electric surveys. Deviation surveys were made every 60 ft because only a near-bit reamer without additional stabilizers was used. Deviation has remained constant at 0.5° due to reduced weight on the bit. The well had been drilled to a depth of 1195 ft as of

August 30. Because of recurring problems with the vacuum system, the drill string was pulled and the seals on the inner string of each joint were inspected. A thorough review of the dual string drill pipe which was redesigned for UZ-6 will be made. Although no major changes can be made at this time, suspected flaws in design should be corrected prior to drilling future holes in the unsaturated zone.

Drilling of 26 neutron holes for the UZ investigation has been completed as of August 30.

Nuclear Hydrology Program (NHP) staff and contractors participated in a workshop on unsaturated-zone hydrologic modeling at the USGS in Denver on August 30.

Future Hydrologic Conditions

The following activities relating to the future hydrologic conditions were completed or continued:

Walker Lake coring has been completed; 500 ft of sediment was penetrated. Sampling of core material was completed in mid-August Core samples were sent to Denver and placed in the Core Library in Mercury. Sampling of the core was done for C^{14} and gastropods. USGS paleomagnetic samples were taken and are being processed.

Numerous packrat middens of Holocene and pre-Holocene age have been located within a 100 km radius to Walker Lake.

PLANNED WORK

Experiments are being planned by LANL for the field determination of natural particulates in Well J-13 groundwater.

The samples collected in June and July for ^{36}Cl determinations are scheduled to be analyzed at the University of Rochester tandem accelerator next month. The ^{36}Cl data and the depth of each sample below the surface will be used to determine the rainfall infiltration since the deposition of bomb-pulse ^{36}Cl about 25 years ago.

During the next month, the following TRACR3D calculations will be run:

1. The layered Yucca Mountain calculations will continue. Case 2 should be completed shortly, and cases 3 and 4 will start.

2. Modeling of the diffusion experiment will continue.

3. Modeling of the pressure-driven fracture flow experiment will continue.

During September, the milestone report summarizing the x-ray diffraction data for Yucca Mountain will be complete. Also, a milestone report "Alteration Products and Processes in the Lower Topopah Spring Member of the Paintbrush Tuff, Yucca Mountain, Nevada" will be prepared in first-draft form.

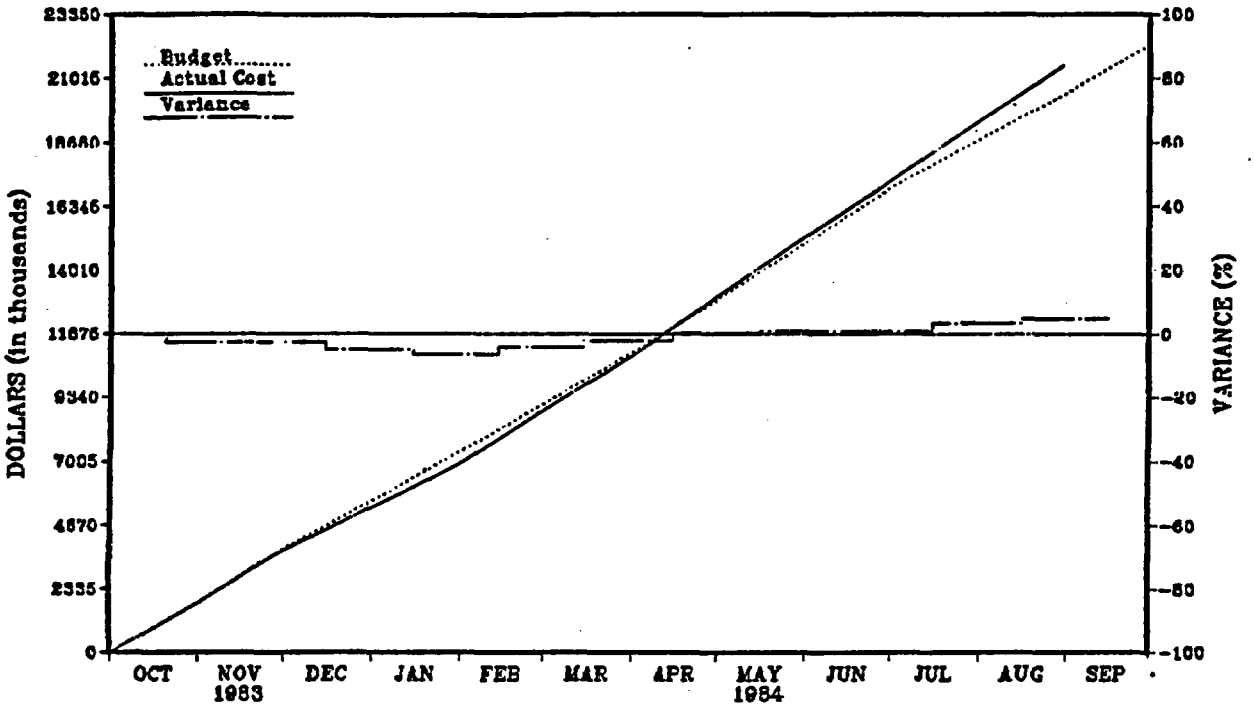
An MCRT User's Manual is being drafted to contain full explanation of the random access package. The recent changes in the MCRT data files to the random access format will also be included in the manual, although they were not originally planned to be made until FY85.

Planning has been started for the drilling of test wells USW UZ-4 and UZ-5. Criteria for UZ-4 were drafted. Drilling at UZ-4 is planned to start on September 6.

The analysis of gas samples from USW UZ-1 is near completion.

WBS 2.3, Site

GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	1794.	3609.	5506.	7350.	9106.	11003.	12907.	15016.	17026.	18766.	20480.	22244.
Cost (x1000)	1748.	3707.	5265.	6869.	8726.	10785.	12997.	15167.	17184.	19376.	21490.	0.
Variance (x1000)	46.	102.	261.	457.	382.	218.	-30.	-149.	-158.	-606.	-1010.	0.
% Variance	-3.	-3.	-6.	-7.	-4.	-2.	0.	1.	1.	3.	5.	0.

PROBLEM AREAS

The duPont corporation has replaced the controller and thermogravimetric analysis modules at LANL to rectify equipment problems in the mineral stability experiments.

The computational anomalies observed in the finite-differences routines affected all runs on EQ6, and thus slowed progress this month until they could be corrected. Testing on the precipitation kinetics test cases was delayed by approximately three weeks.

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. Five specific technical areas are involved that include (1) the 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) the engineering analysis and evaluation of the various technical details that are important to the design and operation of a repository; (3) the development of the techniques of sealing a repository as part of decommissioning; and (4) the preparation of a site-specific design that will be accommodated within the 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

A meeting was held with Bechtel National, Inc. (BNI) on August 13, with Parsons-Brinckerhoff (PB) on August 14, and jointly with BNI and PB on August 15 to review the proposed program plan coordinating design activities. Both contractors requested minor modifications to the program plan. These modifications were approved by the project engineers in charge of the contracts and were incorporated in the program plan.

A recommendation of reference location for surface facilities for conceptual design was sent to DOE/NV/WMPO on August 6. A letter or SAND report describing the evaluation technique in detail will follow.

The regularly scheduled design-review meetings with BNI were held during the month. These meetings pertained to the development of the surface facilities in general. More specifically, they addressed the development of the waste-handling facilities and the identification of interface activities common to the surface and underground facilities.

Sandia has been requested by DOE/HQ through DOE/NV/WMPO to participate with Weston and the Independent Cost Estimate (ICE) Group of DOE to develop a reconciled cost estimate for a geologic repository for radioactive waste. This cost estimate will be based upon the work developed for the NNWSI Two-Staged Repository Development Report. This work is expected to continue through October 1984.

Sandia has directed BNI to present a detailed design review at SNL on December 6-7, 1984. This design review will present the design concepts for the repository surface facilities with emphasis on the waste-handling facilities considering vertical emplacement.

A draft of the mining-system section of the Systems Description Document was completed.

Revisions based on peer review at Sandia National Laboratories (SNL) were completed for a draft report "Preliminary Bounds of the Expected Postclosure Performance of the Yucca Mountain Repository Site" by S. Sinnock, Y. T. Lin, and J. P. Brannen. It summarizes the available information on hydrology, geochemistry, and rock characteristics, as pertinent for a bounding-performance assessment, and presents the results of calculations by a simple computer code, SPARTAN.

Peer review at SNL was completed for a contractor report from Lawrence Berkeley Laboratory (LBL) by J. S. Y. Wang and T. N. Narasimhan entitled "Hydrologic Mechanisms Governing Fluid Flow in Partially Saturated, Fractured, Porous Tuff at Yucca Mountain." It presents a conceptual approach to modeling the effects of discrete fractures on water movement through the unsaturated zone at Yucca Mountain.

A three-day workshop was held at SNL on August 7-9 to establish a framework for the Conceptual Design Report (CDR) outline and to establish guidelines for text preparation. It has been decided to use a story-board format for the CDR outline which requires that the contents of each section and subsection of the report be identified (defined) by a statement using complete sentences. This format was chosen to allow early review and comment on the proposed contents of the CDR.

The revised program plan that coordinates design activities was submitted for review on August 24, 1984. If adopted, the plan will require modifications to the PB and BNI contracts to extend the period of performance through FY 1985. The critical dates identified in the current draft plan are:

Underground-Facilities Design Complete	08/20/85
Surface-Facilities Design Complete	09/03/85
Schedule 44 Available	12/20/85
Draft CDR Submitted to DOE/NV-WMPO	03/31/86

The Exploratory Shaft Test Plan Committee requested that SNL identify site parameters required for repository design and parameters that will be utilized in the preclosure safety-assessment studies, i.e., used to address the issues identified in Subpart D of 10CFR960. This request will be addressed as part of the SNL work on Chapters 8 and 9 of the Site Characterization Plan.

As indicated in last month's report, the draft copy of the "Two-Stage Repository Development at Yucca Mountain: An Engineering Feasibility Study" (SAND84-1351) was delivered to DOE/HQ. The draft is presently undergoing editorial review to meet final-report completion as a reference to support publication of the environmental-assessment document.

J. Holland completed preliminary calculations of the gravity loading component of in situ stress at Yucca Mountain. These calculations, once fully analyzed, will provide a reasonable lower-bound estimate to the in situ stress state for exploratory shaft and repository design purposes. Furthermore, they will enhance the understanding fo the spatial variability of in situ stress, when used in conjunction with actual field measurements, and will provide input guidance to section 4.6 (Stress Field) of the SCP.

During August requests for quotations were issued for both far-field and near-field design-analysis contracts. The far-field contractor will determine the appropriate far-field thermal load for the underground facility; the determination will be based upon current geologic data and performance constraints. The near-field contractor will analyze the stability of the underground excavations designed during the conceptual design.

The map of the subsurface area available for underground facility development was revised on the basis of USGS recommendations. The new map delineates areas similar to the old map but is consistent with USGS geologic mapping of Yucca Mountain. The ADINA code has been successfully implemented at Agbabian Associrtes so that calculations can be made there to compare with SNL analyses.

The life-cycle cost estimate for the reference repository has been developed in the format requested by Weston for their Repository Cost Reconciliation Workbook. These data were reviewed in Washington on August 20-22 with representatives from DOE, Weston, and the three repository project teams.

Hydrologic calculations for Yucca Mountain were performed using Total Systems Performance Assessment Code (TOSPAC) with "maximum" relative permeability curves. The water fluxes, pressure-head profiles, and water travel times were compared with results documented from relative permeability curves representative of each stratigraphic unit. As expected, at high percolation rates where fracture flow dominated, the matrix hydrologic properties were not sensitive, and results for the two sets of curves were essentially the same.

When matrix water movement dominated, the travel times using the "maximum" relative permeability curves were shorter but still long compared to 10,000 years.

A fractured core sample taken from a depth of 2261 ft. in USW-G-1 was tested for fracture permeability at different confining pressures as a check of the system. Fracture-permeability values on the order of 1×10^{-4} m/s were obtained, which are reasonable for the sample tested. Additional samples are being prepared to obtain full-pressure loading and unloading cycle permeability curves.

The gamma-beam densitometry apparatus to be used for hydrological characterization of a 10.5-in long core sample of Topopah Spring Tuff has been assembled and is being checked for operation problems. The core will be tested for saturated conductivity, saturation versus pressure head, relative permeability versus pressure head, and water movement response to an induced thermal gradient.

A presentation of the NNWSI Repository Sealing Program was made to personnel from PB, BNI, and SNL on August 3 in San Francisco. It was the most comprehensive presentation given on the sealing program and included discussions of past, present, and future activities in the sealing program.

Studies at LANL during August addressed the reactivity of sealing materials at elevated temperatures up to the maximum credible temperature expected around waste package emplacement drifts or boreholes in the Topopah Spring member. The stability of concrete sealing materials is being tested at elevated temperatures to simulate probable exposure conditions of certain fracture seals in the Topopah Spring Member. Both saturated and under-saturated conditions are being investigated at 150° and 90°C, following earlier tests at 200°C. A new chemically modified grout is also being tested at 200°C.

Additional work continued at SNL to characterize the tuff concrete. Specific work included steady-state permeability testing fo the tuff concrete, setting up the transient-pulse technique for permeability testing, evaluating the

abrasion susceptability of crushed-tuff aggregate, and investigating the soundness of aggregates using sodium sulfate or magnesium sulphate. The tests were performed at the request of PB at the August 2, 1984 Interface Meeting.

The majority of the work associated with the geochemical evaluation of grouts and mortars has been completed. Much of the time during this month was spent digesting the data that have been collected to date as an initial step in the preparation of a forthcoming topical report.

The seal design/testing data-base transfer was completed during August including transfer of reports needed for the sealing conceptual-design activity, a review of the information contained within the report, and synthesis into a data package that can be used for reference supporting the numerical calculations.

PLANNED WORK

The numerical analyses portion of the Pacific Northwest Laboratories (PNL) contract is nearing completion. Two additional calculations will be performed during October 1984 to evaluate:

Case 1 - Vertical emplacement of waste packages using sand as the drift backfill and the properties of sample G4-6 for the surrounding rock.

Case 2 - Vertical emplacement of waste packages using clay as the drift backfill and the properties of sample G4-6 for the surrounding rock.

The influx to the modeled area is assumed to be 0.1 mm/year. These calculations, using the more current data on the welded-tuff portion of the Tpt, will provide additional confirmation to the conclusion reached in the sealing concepts report, i.e., in unsaturated tuff. Backfill does little to influence flow past waste packages. Beyond these calculations PNL will perform laboratory analyses to determine the hydrologic properties of tuff, grout, and concrete.

Detailed microscopic (SEM and optical) studies and x-ray diffraction phase determinations are being made of reaction products of long-term experiments at 150° and 90°C with the grout formulation 82-22 and Tpt tuff. Analyses of these results are in progress and will be reported in an upcoming topical report. In addition to the solution analyses of cations and anions that have been completed, separate chemical analyses of carbon and carbonate from some of the solutions have been obtained. The pH values that have been determined are from different sampling periods for some of the solutions reacted at 200°C with the new grout, 84-12, and Tpt tuff. These appear to be approaching a steady-state pH value of approximately 9, similar to that found previously using grout 82-22.

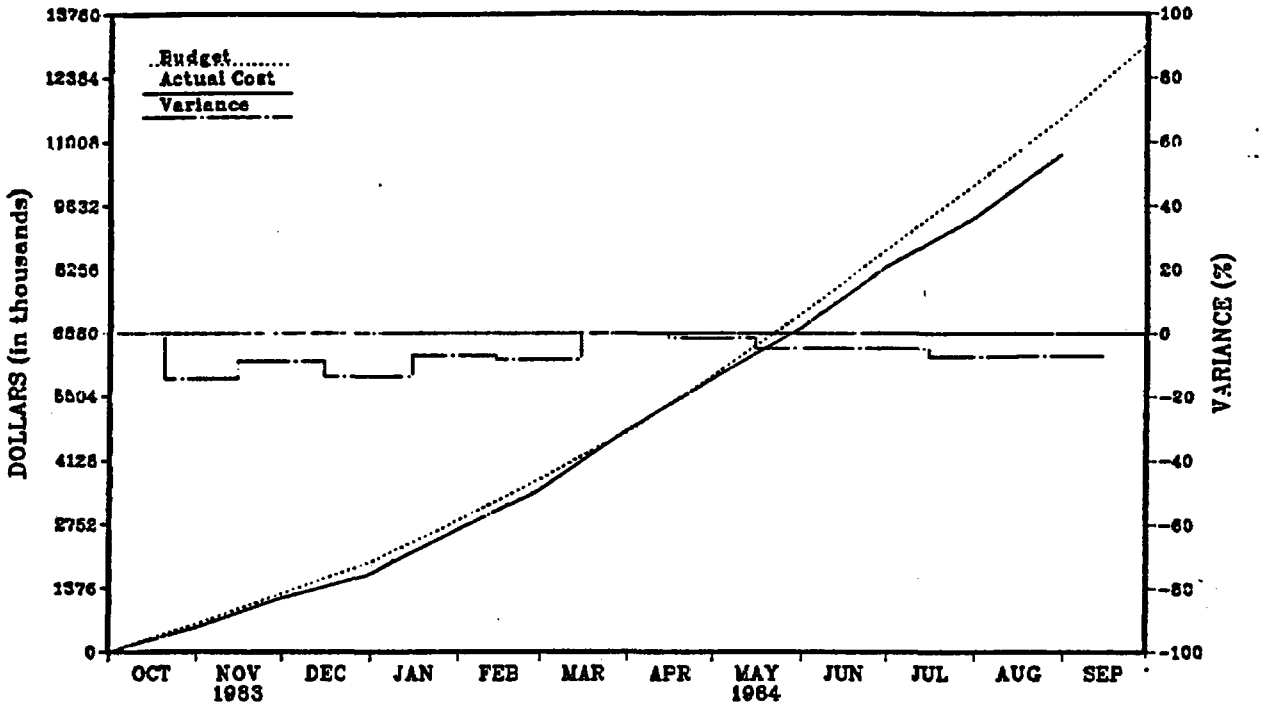
PROBLEM AREAS

Studies done by SNL at the request of DOE/HQ are making significant impact on budgets and schedules (such as the "Two-Stage Repository Development at Yucca Mountain" report and the reconciled cost estimate exercise with Weston and the ICE Group). These costly and time-consuming exercises have not been previously included in budget estimates. If this trend continues, the effect on the eventual conceptual design will be to dilute the technical content and completeness of the design and subsequent report.

Moving of equipment at LANL caused a delay in experiments on time-dependent mechanical properties. This delay and the longer-than-anticipated tests on Calico Hills tuff will result in insufficient time to complete work on Tpt tuff before the termination date. Thus, evaluation of only one test will yield too little information on which to base conclusions regarding the importance of time-dependent degradation of strength.

WBS 2.4, Repository

GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	613.	1273.	1951.	2652.	3749.	4765.	5962.	7337.	8713.	10107.	11544.	13113.
Cost (x1000)	525.	1158.	1680.	2646.	3436.	4763.	5867.	6993.	8307.	9361.	10717.	0.
Variance (x1000)	88.	115.	271.	206.	313.	2.	95.	344.	406.	746.	827.	0.
% Variance	-14.	-9.	-14.	-7.	-8.	0.	-2.	-5.	-5.	-7.	-7.	0.

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 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 these 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. To facilitate understanding, regulatory and institutional activities may be further subdivided into five categories: (1) Site Recommendation Report, (2) Repository Licensing, (3) Site Characterization Plan (SCP), (4) Environmental Assessment, and (5) State Interactions.

ACTIVITIES

Environmental Assessment (EA)

Section 6.3.2 of the EA, "Postclosure System Guideline," was revised to make it compatible with Section 6.4.2, "Postclosure Preliminary Performance Assessment."

Two new networks were created to reflect EA status through the end of CY 1984. The first network described the steps necessary to prepare a camera-ready copy of the EA to DOE/HQ. The second network reflects the way in which the EA committee plans to interact with the engineers to bring the most recent plans for the Repository and the SCP into the EA.

A revised draft of Chapters 2-6 of the EA was delivered to DOE/HQ on August 16, 1984. Activities also included the review of DOE/HQ-prepared EA common sections (Chapters 1 and 7, Foreward, and Section 4.1) and the preparation of comments and presentations relevant to these sections, and to the EA Executive Summary.

A project workshop on Ground Motion at Yucca Mountain induced by earthquakes and weapons testing was held August 6-7 in La Jolla at the request of WMPO. SNL, USGS, and SAIC staff discussed perceived discrepancies and inconsistencies in data and interpretations presented in the EA. The review panel included N. F. Brace, R. Smith, R. Raleigh, and B. Wernike, all of whom are experts on seismicity and tectonics. The outcome of the meeting will be a summary report prepared by SAIC that is expected not only to resolve EA questions but to further refine site characterization activities.

On August 31, SAIC responded to a verbal request from Weston to describe the type of material being sought by the State of Nevada in an EA briefing/workshop.

Site Characterization Plan (SCP)

The SCP network was updated to reflect the status through July 1984. Several "what-if" networks were created to analyze different possible strategies in completing the SCP for presentation at the Project Manager Technical Project Officers (PM-TPO) meeting. Particular emphasis was placed on the participant input and review for Chapter 10. A presentation of new delivery dates for the draft SCP was made at the PM-TPO meeting.

A draft of SCP Chapter 8, Conceptual Design, was sent to SAIC on schedule. Revision of the Chapter 8 draft is planned in response to new Chapter 8 guidelines to be issued by DOE/HQ. Revision will begin when the guidelines are received.

Input was prepared for section 4.6 (Special Geoengineering Properties) of the SCP. The subsection speaks to an assessment of the possibility for very near-field thermal degradation resulting from waste emplacement in fully or partially saturated Topopah Spring tuff. On the basis of experiment and analysis, it was concluded that such degradation is unlikely.

The BWIP is attempting to obtain program-wide support for their approach to the SCP format which is purported to be systems based. The SAIC regulatory compliance staff has participated in BWIP presentations on the organization of the BWIP SCP. The Regulatory Compliance staff will participate in a meeting on SCP content on September 5-6 at which a major discussion topic will be the BWIP systems approach. The final discussion on SCP approaches requires additional input. During September, information will be analyzed such as that contained in the System Description Document (SDD) under preparation at SNL, and further analysis of the BWIP systems approach will be made.

Three major systems networks with alternate SCP schedules have been developed based upon anticipated EA schedule conflicts. The alternatives are May 1, June 15, and September 1 SCP publication dates. The networks reflect an increasing level of sophistication in the incorporation of the system attributes in Chapter 10 of the SCP. This sophistication was reflected primarily in the methodology adopted for prioritization of Information Need data acquisition activities.

During August, an SCP Activity Plan was written. The plan, which is in working draft form, is subject to the constraints on the SCP approach and will be finalized as the above-mentioned data are analyzed.

DOE/NRC Interaction

A meeting was held in Las Vegas on August 31 on the NNWSI Information Management Systems. Personnel from NRC, DOE, SNL, SAIC, and Aerospace Corporation attended. The NRC requested this meeting in order to inform DOE of their charter to begin a requirements analysis for an NRC issue-tracking and information-management system. Part of NRC's work includes becoming familiar

with current and planned tracking and information systems used by each of the repository program offices. A presentation on the NNWSI Project Issue Management System approach was given to NRC.

Comments were prepared for WMPO for transmittal to DOE/HQ on NRC's proposed 10CFR60 revision. This revision is intended to make the procedural portion of the standard consistent with the NWPA. In general, the proposed revisions were consistent with (and frequently exactly duplicated) NWPA wording. Several points were of concern, however, including the NRC's proposed process for SCP review and publication, and NRC's apparent expectation relative to the scope of the conceptual design to be included in the SCP.

Minutes for the July 10-12 DOE/NRC Geochemistry Workshop held at Los Alamos, NM, were finalized and transmitted to NRC for signature. Interactions between workshop participants were effective and professionally conducted. However, it became apparent that the scope of future workshops should be evaluated carefully to ensure that sufficient time and resources are available for in-depth discussion. Future workshops should concentrate on well-defined and bounded technical issues and concerns. Furthermore, representatives of all major project organizations should be present at future workshops to assure continuity and to respond to questions in their area of expertise.

As a result of DOE/NRC discussions, an NRC/DOE geologic data review was scheduled for a two-week period commencing on September 17, 1984. One week of the review will be conducted in the field at the NTS, and the second week will be divided between Menlo Park and Denver.

Regulatory Compliance personnel attended the NRC Advisory Committee on Reactor Safeguards (ACRS) meeting on the 10CFR60, the unsaturated zone amendment, and the Mission Plan. The ACRS position was to support the amendment. Earlier concerns regarding the amendment were resolved.

Environmental Compliance

Formal review comments were transmitted to WMPO on the preliminary radiological monitoring plan prepared by the MITRE Corporation in support of the NNWSI Project. A draft radiological compliance plan was prepared and is in internal review. The purpose of the radiological compliance plan is to establish a system that governs the preparation, evaluation, and documentation of all project material with radiological themes or implications. A draft radiological compliance plan will be available for review by October 1, 1984.

Formal comments on the draft Meteorological Monitoring Plan (MMP) were received from DOE/WMPO on August 8, 1984. Comments were incorporated into another draft that then went through a review by SAIC's technical editing staff. The final MMP will be ready to distribute to various permitting agencies by mid-September.

A meteorological monitoring program review meeting was held with DOE/WMPO on August 15, 1984. Action items from that meeting included preparation of explanations of the following that will be sent to the U.S. Air Force: why the 60 m tower is located south of the road leading up Drillhole Wash; what road improvements are needed up Alice Hill; and why a 10 m tower is needed on Yucca Mountain.

Socioeconomic/Institutional

Economic, social, and community services profiles are being developed for communities that could be affected by potential repository development. A draft report is in internal review that incorporates existing data for these areas.

A second progress report on development of a socioeconomic issue status system was prepared in August. This report will be presented to DOE/WMPO in September.

WMPO and SAIC staff attended DOE/HQ-approved review sessions on criteria to be used in developing a NNWSI Project socioeconomic assessment model. The meetings were held in Atlanta and Washington, D.C.

On August 3, DOE/NV and SAIC representatives met with Resource Concepts, Inc. (RCI), a consultant to Lincoln County and the community of Caliente. In response to their request, information on transportation of radioactive material was sent to RCI on August 28.

On August 14, the Nevada Waste Project Office held the first meeting of the informal state/local advisory group in Carson City. The meeting topics included a summary of current activities. The current situation regarding the EA release and comment procedures was discussed.

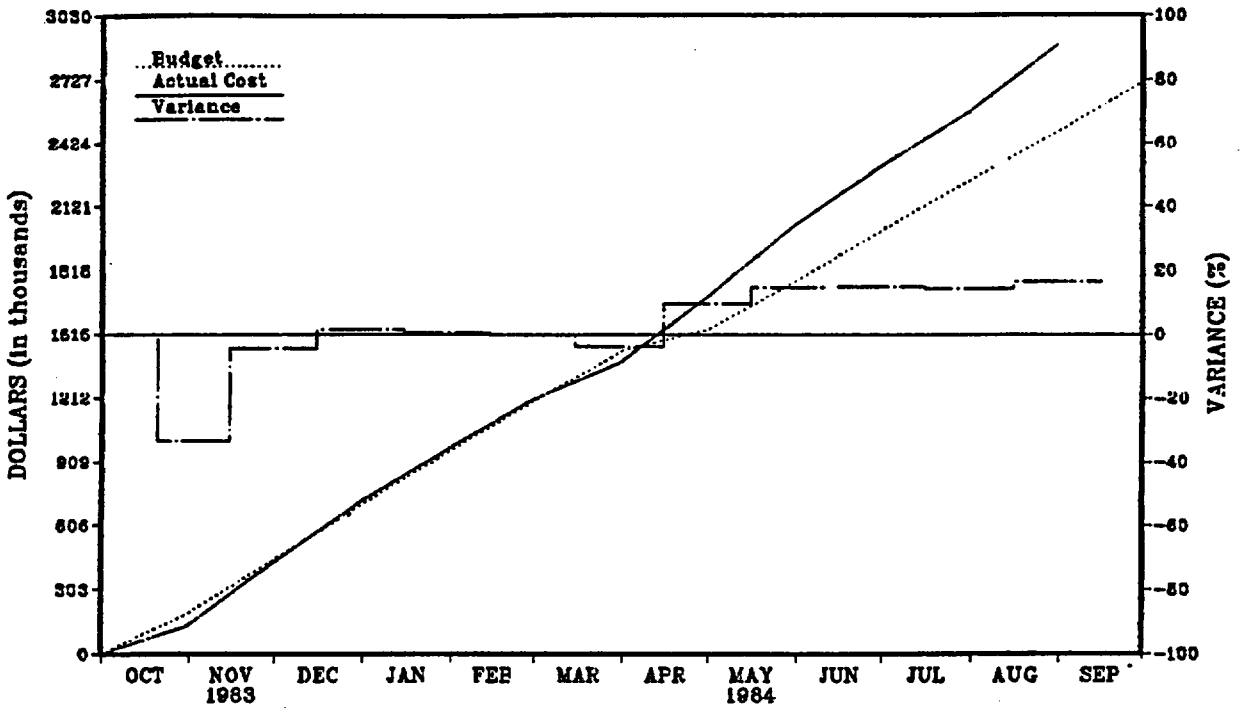
In preparation for the August 16-17 Ben Rusche visit, background material on the Institutional/Outreach activities and the Nevada political structure was prepared and transmitted informally to WMPO. In addition, SAIC staff prepared the agenda for Rusche's visit and managed the arrangements for the reception held on August 16 in Las Vegas.

The Press Outreach Book was completed and the first copy was transmitted to Ben Rusche (HQ) on August 9. In response to subsequent interest, the book has become a controlled document with scheduled, semi-annual updates. A memo with this recommendation and a draft transmittal memo was submitted to WMPO on August 15. Following WMPO approval, controlled copies of the book were disseminated.

In response to a request from WMPO/NV, the current status of the Moapa River Reservation Paiute Indian tribe's request was checked and validated. The tribe had requested and had been denied certification as an affected Indian tribe under the provisions of the NWPA. No off-reservation treaty rights for their tribe exist that would be affected by the potential repository at Yucca Mountain.

WBS 2.5, Regulatory and Institutional

GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	196.	447.	700.	964.	1203.	1440.	1540.	1774.	2010.	2250.	2483.	2715.
Cost (x1000)	130.	427.	719.	969.	1199.	1383.	1688.	2034.	2308.	2573.	2888.	0.
Variance (x1000)	66.	20.	-11.	-5.	4.	57.	-148.	-260.	-298.	-323.	-406.	0.
% Variance	-34.	-4.	2.	1.	0.	-4.	10.	15.	15.	14.	16.	0.

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, 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.

ACCOMPLISHMENTS

The goals and strategy for the data priority study were defined by the Performance Assessments Division in a letter to NV on August 28. This study has been requested to assign priorities to the data necessary for evaluating the postclosure performance of a repository at Yucca Mountain. This new task for performance assessment is to be used as a decision-making tool for the Project. The letter documented the data priority study envisioned by the performance assessment staff and solicited comments from Project participants. It was pointed out that the effective use of the study will depend upon support and concurrence within the project from LLNL, LANL, and USGS. New FY85 milestones were defined for the data priority study, for performance assessment support of the site characterization test plan, and for performance assessment activities in support of the Exploratory Shaft Test Plan (ESTP).

Exploratory Shaft Test Plan

The ESTP Committee evaluated several second-shaft options ranging from a long ramp entry to a 6-ft finished inside diameter rise. Once the 6-ft second-shaft concept was mandated, the ESTP Committee evaluated advantages/disadvantages to various locations where it could be sited. A recommendation was made that it

be located southwest of the 12-ft ES, not too far from USW G-4. The ESTP Committee unanimously agreed on the proposed location for the second shaft and the arrangement for the general underground testing area.

PLANNED WORK

During September, LANL will complete work on early FY85 procurement actions to support the start of ES construction.

The prototype IDS power distribution system will be installed in late September. Also, the weather transducers have been received and will be installed in the next two months.

QA levels (I, II, and III) will be added to each activity on the ESF Construction and Testing Network.

Work continued on developing new strawman subnets for each proposed ES test. Seventeen such subnets have been developed, 15 of which have been given to the PIs. The PIs have been requested to complete and/or correct the logic in the subnets. The completed/corrected logic will then replace the existing logic in the ESF Construction and Testing Network. Also, strawman subnets are being developed to expand existing construction activities into more detail.

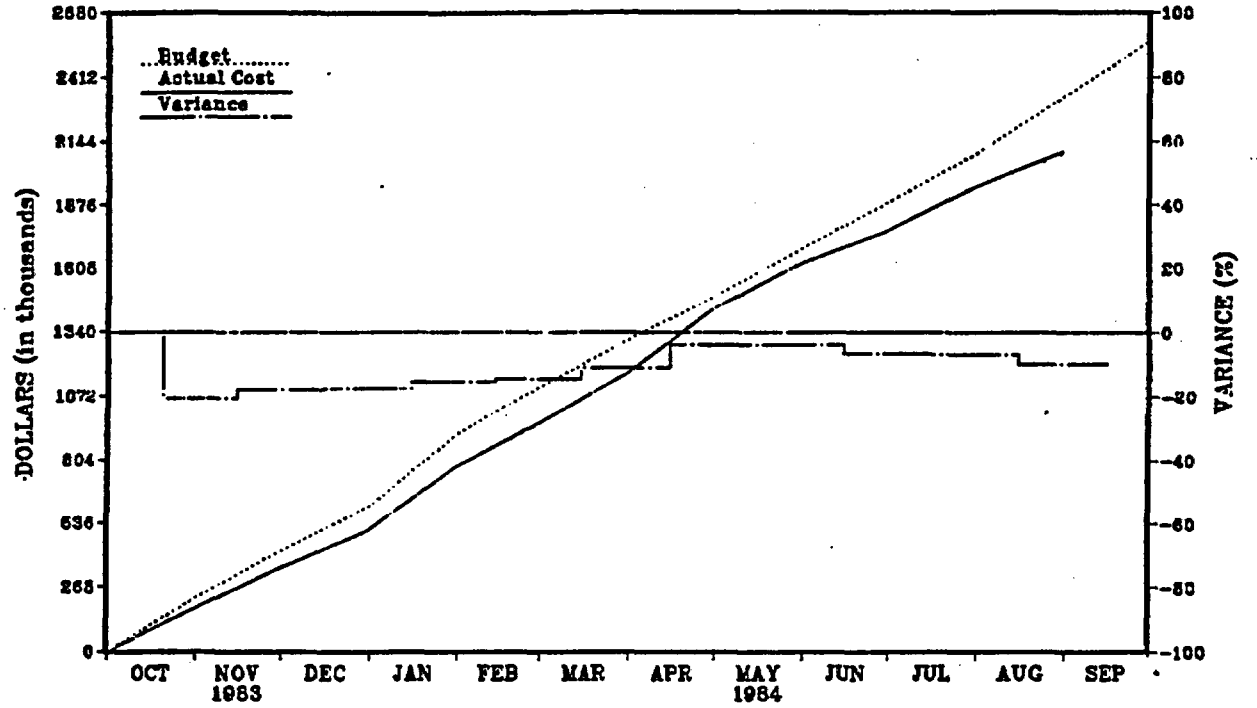
PROBLEM AREAS

Revision of the Exploratory Shaft Test Plan will proceed as soon as the remainder of the review comments from the March ESTP retreat are received. In the interim, the test accounting and scheduling will be revised to reflect changes in the project WBS structure.

Shipment of the final components of the prototype IDS timing system has been delayed by the manufacturer, but this will not delay system development on other components.

WBS 2.6, Exploratory Shaft

GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	224.	421.	612.	817.	1113.	1313.	1492.	1695.	1897.	2094.	2332.	2560.
Cost (x1000)	178.	346.	504.	773.	949.	1169.	1436.	1629.	1762.	1948.	2100.	0.
Variance (x1000)	46.	75.	108.	144.	164.	144.	56.	66.	125.	145.	232.	0.
% Variance	-21.	-18.	-18.	-16.	-15.	-11.	-4.	-4.	-7.	-7.	-10.	0.

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

ACCOMPLISHMENTS - SPENT FUEL TEST-CLIMAX

Post-test laboratory calibrations of transducers deployed on the Spent Fuel Test-Climax (SFT-C) were completed. Data analyses continue to be the dominant activity following completion of field activities. Three draft reports were completed which document the results of borehole jack and petite sismique rock mass modulus measurements. A report comparing measured and calculated radiation doses in the vicinity of canister emplacement boreholes was also completed.

PLANNED WORK

Staff efforts will continue to concentrate on analysis of field data and compilation and analysis of post-test calibration results. Revisions to thermal and thermomechanical models will continue. The production of the SFT-C film update will be completed.

PROBLEM AREAS

None.

ACCOMPLISHMENTS - E-MAD

FUEL TEMPERATURE TEST DECOMMISSIONING PLAN

A draft of the FTT disassembly and Decommissioning Plan was prepared and processed through internal review. Preparation of the final Contract Deliverable document is in process. This is expected to be submitted to DOE/NV by August 30, 1984.

The peak measured canister temperatures and peak predicted fuel assembly temperatures during July are given in the following table. Four canisters in drywells and one canister in the lag storage pit were monitored.

FUEL ASSEMBLY	LOCATION	PEAK CANISTER TEMPERATURE °C	DECAY HEAT RATE kW	PREDICTED PEAK FUEL TEMPERATURE °C
B41	DW#2	77.7	0.4247	112.4
D06	LSP#22	57.0	0.5672	123.4
D09	DW#1	94.0	0.5525	135.3
D16	DW#3	93.0	0.5514	134.4
D22	DW#5	89.1	0.5238	129.3

Surface contamination swipes were taken from fuel rod surfaces of fuel assemblies D34 and B43. These were the last of the Task 16 (Integrity Monitoring) samples to be taken during FY 1984.

PLANNED WORK

The FTT Decommissioning Plan will be issued.

Operator training and qualification on the operation of the digital FTT temperature controller system will be completed.

The identified (See Problem Areas section) FTT leak will be investigated and resolved and operational problems on the boiling water calorimeter will be resolved.

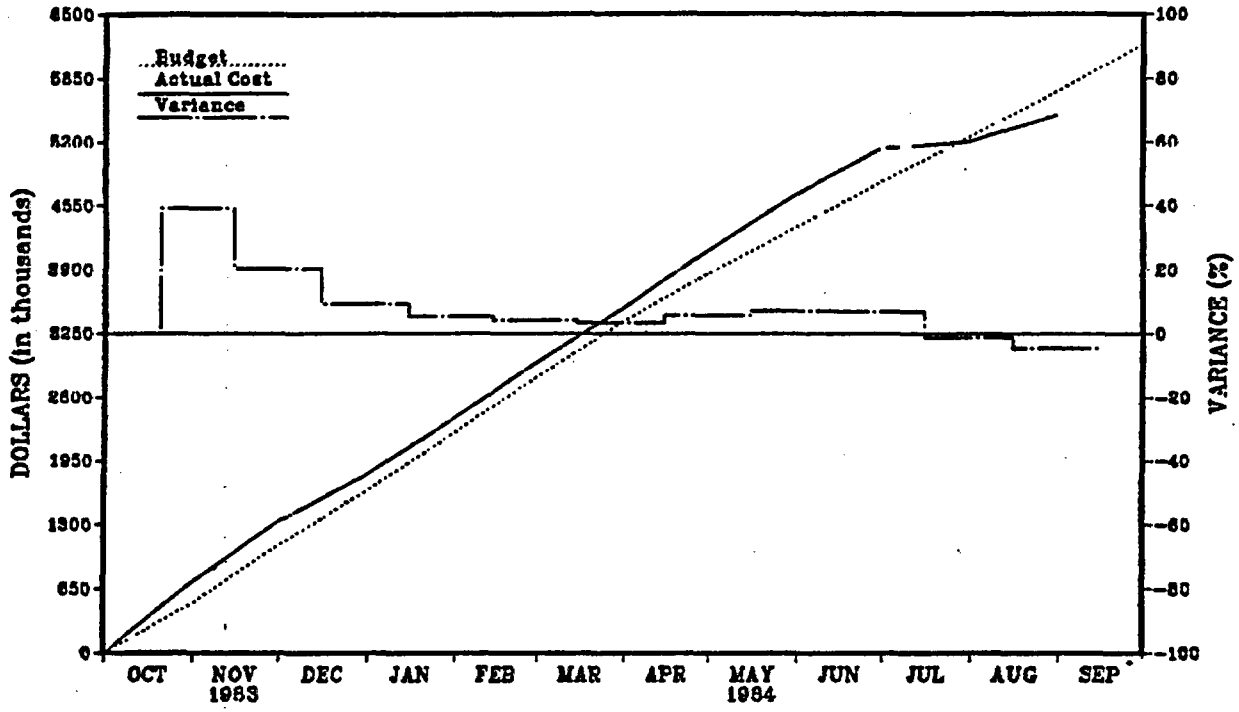
Calorimetry will be performed on fuel assemblies D04, D15, and D34.

PROBLEM AREAS

There appears to be a leak in the FTT Atmosphere Control System which may be allowing infiltration of air into the FTT. PNL has been apprised of the situation. The cause of the leak is most likely a defective valve seat, bellows, or fitting. Since this is an air filled cask simulation, the leak should not affect the validity of the data or compromise the test. Investigation is in progress.

WBS 2.7, Test Facilities

GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	506.	1100.	1651.	2249.	2815.	3389.	3970.	4337.	4797.	5258.	5720.	6198.
Cost (x1000)	705.	1323.	1803.	2373.	2932.	3503.	4090.	4646.	5125.	5197.	5464.	0.
Variance (x1000)	-199.	-223.	-152.	-124.	-117.	-114.	-220.	-309.	-328.	61.	254.	0.
% Variance	39.	20.	9.	6.	4.	3.	6.	7.	7.	-1.	-5.	0.

2.8 LAND ACQUISITION

OBJECTIVE

The objective of this task is to maintain access to the 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 the 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 (QA), and GRD Support.

Project Management System

ACCOMPLISHMENTS

Status of the various USGS activities has been updated through June by SAIC/Golden. Progress in completing the majority of the scheduled events and milestones is good. Only four major milestones have slipped, but all reports are in peer review and should be available in the near future.

The individual USGS WBS schedules were modified, plotted, and included in the FY 85 Planning Packages. The FY 85 Planning Packages have been issued by SAIC/Golden to the Hydrology and Geology Division Coordinators. The SAIC/Golden staff is available to assist any of the PI's in preparing their respective plans.

Detailed geology schedule modifications were incorporated into the Project Management System (PMS). Progress was made on modifications for the detailed site schedule which will become the baseline for modifications by the planning sessions. A preliminary review of the detailed activity schedules for Regional Geology, Site Geology and Tectonics and Volcanism revealed the need for a complete review by the PI's. A schedule for the UZ Hydrology Exploratory Shaft Facility (ESF) activities has been completed and should be ready for review early next month. Two viewgraphs have been completed that summarize the overall UZ Hydrology ESF activities.

A new drilling schedule has been prepared. A program continuing at least to the Christmas holiday has been developed for the daylight crew. The 5 day/week, 24 hour/day crew will be terminated at the end of this fiscal year. The schedule was updated based on the latest available information. Consideration was given to combining the activity schedule with the summary drilling schedule to demonstrate the use of these schedules for project planning. This should provide the basis for developing a borehole testing schedule.

SAIC held a meeting with SNL in mid-August to revise and update the SNL Systems networks. A set of modified networks was forwarded to SNL for their review. Networks for Waste Package activities were updated through the end of July and copies were forwarded to LLNL. LANL geochemistry networks were updated to reflect progress during August. A planning meeting is required to obtain any new logic or impacts due to anticipated FY 1985 and FY 1986 budgets. SAIC received from SNL detail sequences of activities for the repository design effort up to the completion of the conceptual design. This information will be incorporated into the networks during September. Sealing and tuff rock data have not been received.

Work has begun at SAIC to create a separate network for each of the proposed exploratory shaft tests. Half of the proposed test networks were created and given to the responsible PIs for corrections, additions, and concurrence. The remainder will be prepared during September. A network was also created that represents the design and construction phase of the second exploratory shaft. This network will be incorporated into the exploratory shaft construction. A meeting involving SAIC, LANL, REECo, and H&N staff was held August 30 to discuss exploratory shaft scheduling and logic problems. The network was updated according to this discussion. It will be presented to the Exploratory Shaft Construction Committee on September 5 for further review.

DOE/HQ provided a program-wide Work Breakdown Structure (WBS) that will require extensive re-work of the NNWSI Project baseline document. A preliminary WBS was prepared for review and comment by the Project participants at the PM-TPO meeting.

The WBS dictionary that is consistent with the currently baselined NNWSI Project WBS was to be sent to project participants in early September. A complete re-work is now required based upon the DOE/HQ directed program WBS.

PLANNED WORK

The detailed hydrology schedule is being modified. Upon completion, the USGS site schedules for FY 84 will be available for baselining. Input from the various PI's is now needed to detail FY 95 and project outyear activities. The planning packages previously issued should provide the mechanism for the necessary input.

No input has been received from the participants on Level I and II milestones for FY85. DOE/HQ has requested a listing of the FY85 and FY86 milestones by October 15, 1984.

The project participants were reuested to provide their budget baseline breakdown by WBS as soon as the FY85 WBS becomes firm. This is anticipated by the end of September.

No action was taken on the policy, program, and project guidance baseline requirement during August. A set of reference program milestones will be prepared as a planning lease to be used for the NNWSI Project and will be submitted to the CCB for approval.

A draft of a letter requesting TPO Work Plans is in progress and will be issued early in September. These Work Plans will be used as input for the Project Management Plan (PMP), which is now scheduled to be sent to DOE/HQ December 15. Studies are being conducted to analyze the documentation needs for management of the NNWSI Project. An analysis of the PMP requirements is included in these studies. WMPO is being informed of the progress of these studies by way of frequent personal communications.

PROBLEM AREAS

None to report.

Quality Assurance

ACCOMPLISHMENTS

The Los Alamos NNWSI QAPP and eleven supporting procedures were revised to comply with the requirements in NVO 196-17, Rev. 2. NNWSI SOP 02-01 and SOP 15-01 were reviewed by LANL and commented on; comments will be forwarded to WMPO/NV for consideration. A proposed list of implementing SOP for ESF work was prepared and submitted to WMPO/NV. A review is complete of TRACR3D to assure compliance with the requirements of NUREG 0856. The results are favorable for TRACR3D.

Ms. Bonnie Jean Smith has joined the QA staff at LLNL as administrative assistant. Her duties will include coordination with principal investigators to establish and maintain the QA records archives. Ms. Smith assumes her duties on September 10, 1984.

A USGS QA inspection was made of work being performed by USGS at USW UZ-6. Of the many tasks performed there, only one was not properly covered by a QA procedure. That procedure will be added to the QA book at the well site.

QA procedures were prepared for clearing, hosing off, geologic mapping, and the measuring and recording of fracture properetiès on washed pavements of welded tuffs at Yucca Mountain. QA procedures were written for the collection of paleomagnetic samples and the determination of their paleomagnetic properties.

The QA Interview Procedure Form was reviewed by USGS and found to be satisfactory. The next step is to proceed to the test interview using the form. Arrangements were made by SAIC/Golden to conduct the interview at the USGS Denver West Office to evaluate the necessary flexibility of the form to determine whether it will serve as a viable, complete form or as a check list of the desired items for inclusion in the Technical Procedures. The second draft of an interview plan to develop the QA Technical Procedures was reviewed and approved. Interviews were conducted to test the usefulness of the procedures form to acquire the information necessary to prepare the written

technical procedure, minimizing the diversion of project scientific personnel. The input from the magnetics interview was reduced to a format for preparation of a facsimile technical detailed procedure.

The Quality Assurance Plan for fracture flow apparatus and SNL has been completed. Calibration checks on experimental instrumentation were conducted.

Based on comments submitted to SAIC by the NNWSI Project participating organizations and a re-evaluation by the QASC, a number of changes were made to clarify the QAP. The rationale for quality level definitions was expanded, and the section on test control was revised to clarify differences between experiments and tests. These changes will be issued as Revision 3 to the document. The revision was completed on August 29 and is in the WMPO review/approval cycle.

The revised plan and fourteen implementing procedures were submitted to WMPO by QASC on August 3 and are in the WMPO review cycle.

The QASC conducted surveillance activities of G-Tunnel activities on July 10 and of drilling activities on July 11. The surveillance reports were submitted to WMPO for issuance to the inspected participants. Because of the heavy audit schedule during August, there were no surveillance activities conducted. Surveillance activities during the remainder of CY 1984 will be considerably less than planned because of records management plan activities and the review of the participating organizations' revised QAPPs and procedures.

All planned audits have been completed by QASC with the exception of the WMPO internal audit. This audit may be cancelled due to other priority activities.

PLANNED WORK

The Project participating organizations and NTS support contractors have been instructed to revise their QAPPs and QA administrative procedures to meet the new QA requirements invoked by NVO-196-17, NNWSI Project QAP. The target date for their submittal to WMPO has been established as September 1984.

A NNWSI Project SOP is being developed and will establish the responsibilities, requirements, and methods for assuring that data generated before the establishment of a QA program for the NNWSI Project can be validated as acceptable for the licensing process. September 20 is the target date by which to have a draft to WMPO.

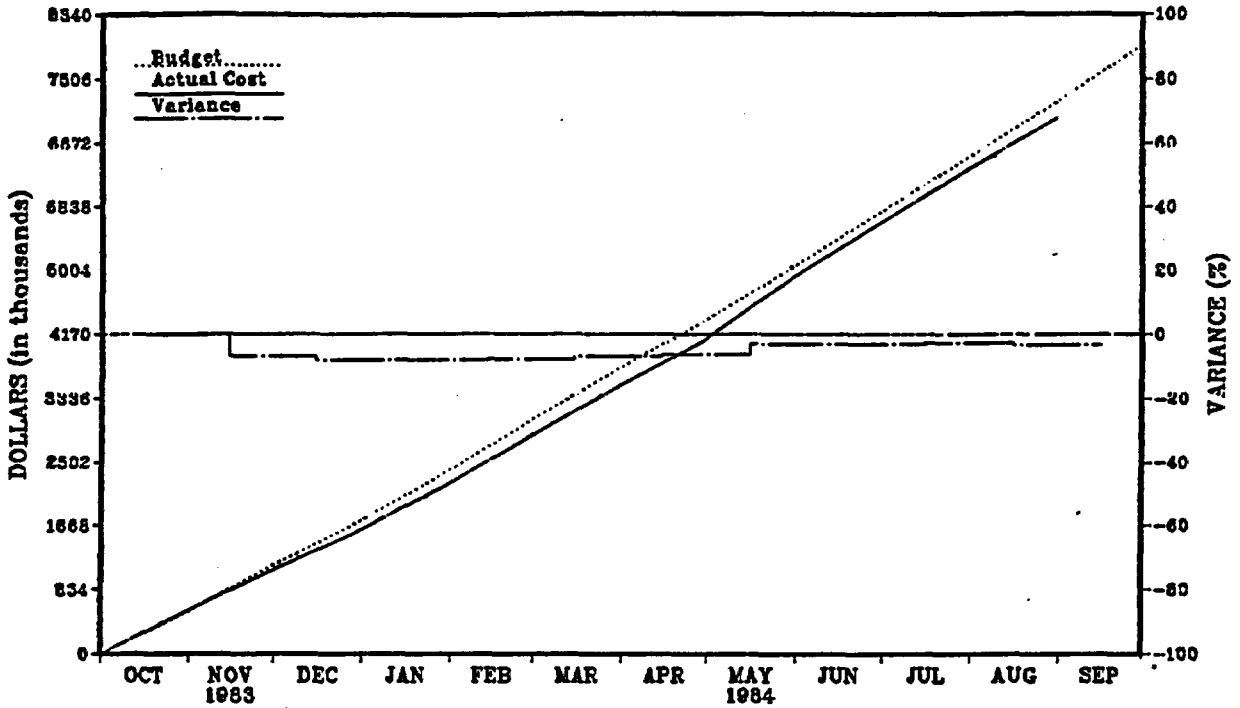
A schedule for FY85 audits will be submitted to WMPO for review and approval by October 31, 1984.

PROBLEM AREAS

If QA levels are to be uniformly assigned to activities throughout the NNWSI Project, it is necessary to have clear and concise definitions of Levels I and II (Level III is clearly defined as any items that are not Levels I or II). The newly published definitions in NVO-196-17 are not entirely clear and are open to widely varying interpretations.

WBS 2.9, Program Management

GOVERNMENT FISCAL YEAR 1984

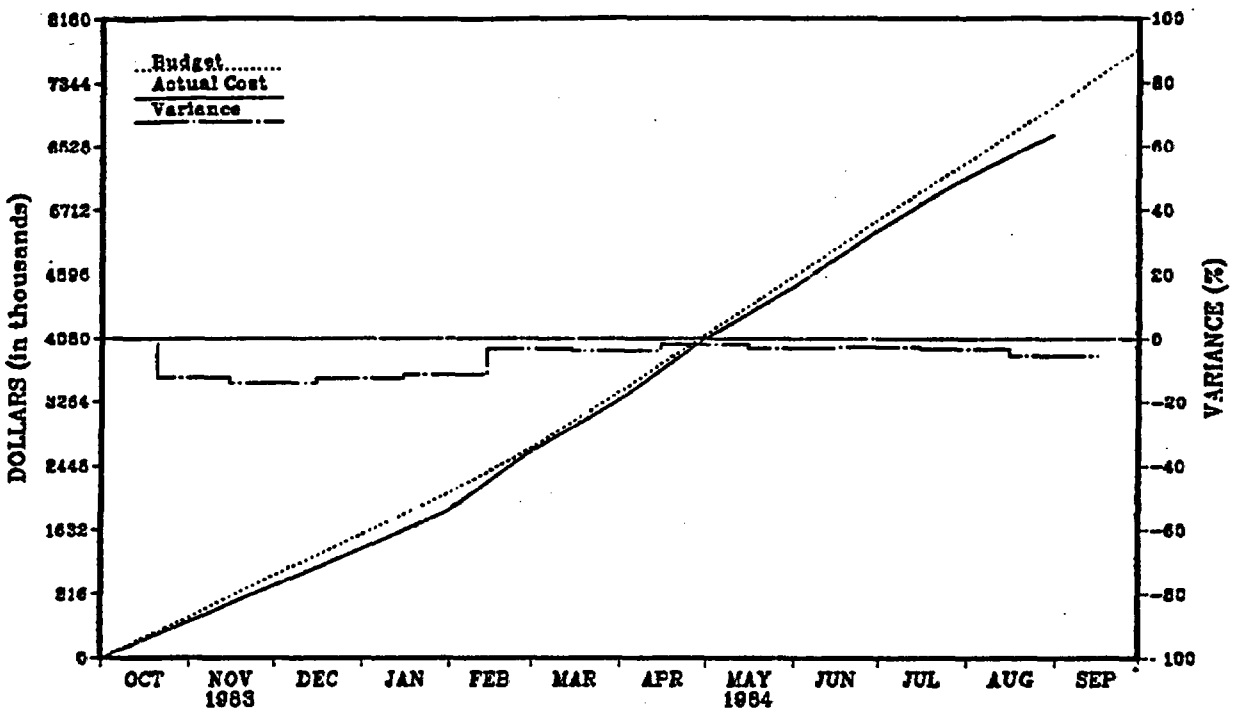


Budget (x1000)	552.	1153.	1736.	2404.	3067.	3761.	4366.	5079.	5787.	6516.	7231.	7945.
Cost (x1000)	551.	1073.	1599.	2206.	2828.	3495.	4091.	4923.	5617.	6328.	6985.	0.
Variance (x1000)	1.	80.	139.	196.	239.	266.	276.	156.	170.	182.	246.	0.
% Variance	0.	-7.	-8.	-8.	-8.	-7.	-6.	-3.	-3.	-3.	-3.	0.

PARTICIPANT

BUDGET vs COST

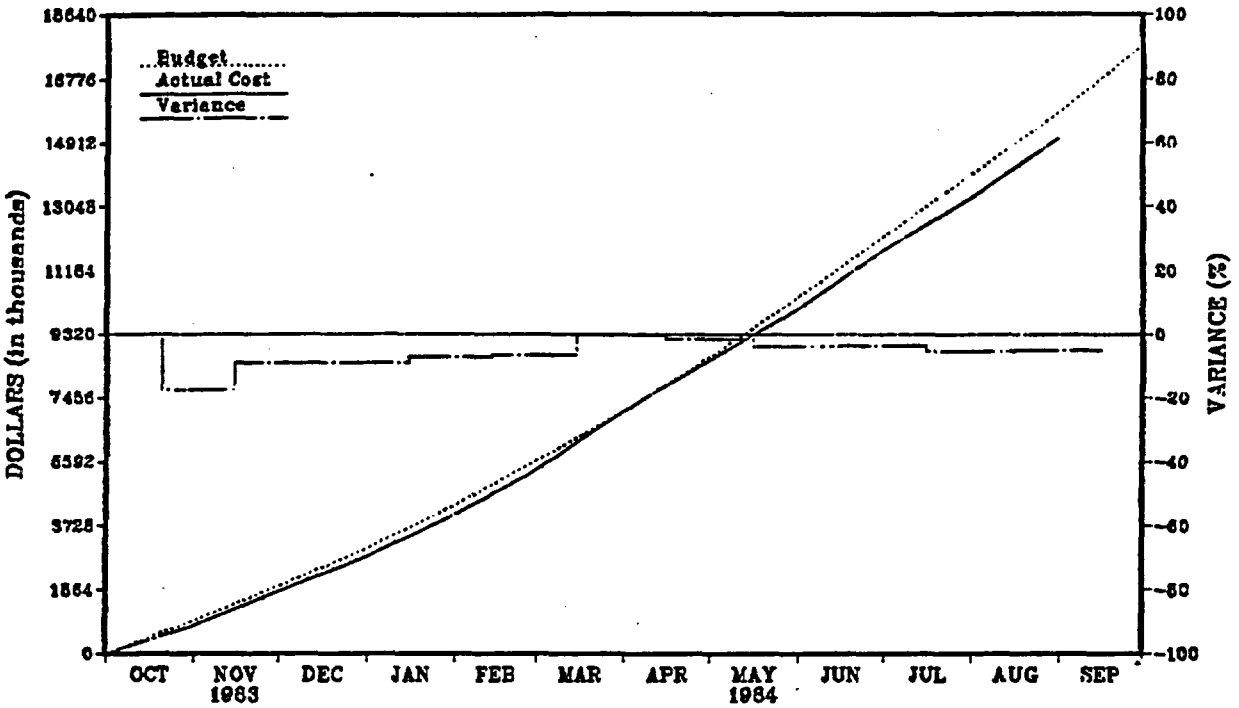
U. S. Geological Survey
GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	524.	1060.	1583.	2100.	2676.	3402.	4145.	4883.	5606.	6334.	7055.	7777.
Cost (x1000)	459.	911.	1383.	1866.	2585.	3268.	4065.	4732.	5451.	6124.	6666.	0.
Variance (x1000)	65.	149.	200.	240.	91.	134.	80.	151.	157.	210.	389.	0.
% Variance	-12.	-14.	-13.	-11.	-3.	-4.	-2.	-3.	-3.	-3.	-6.	0.

Sandia National Laboratories

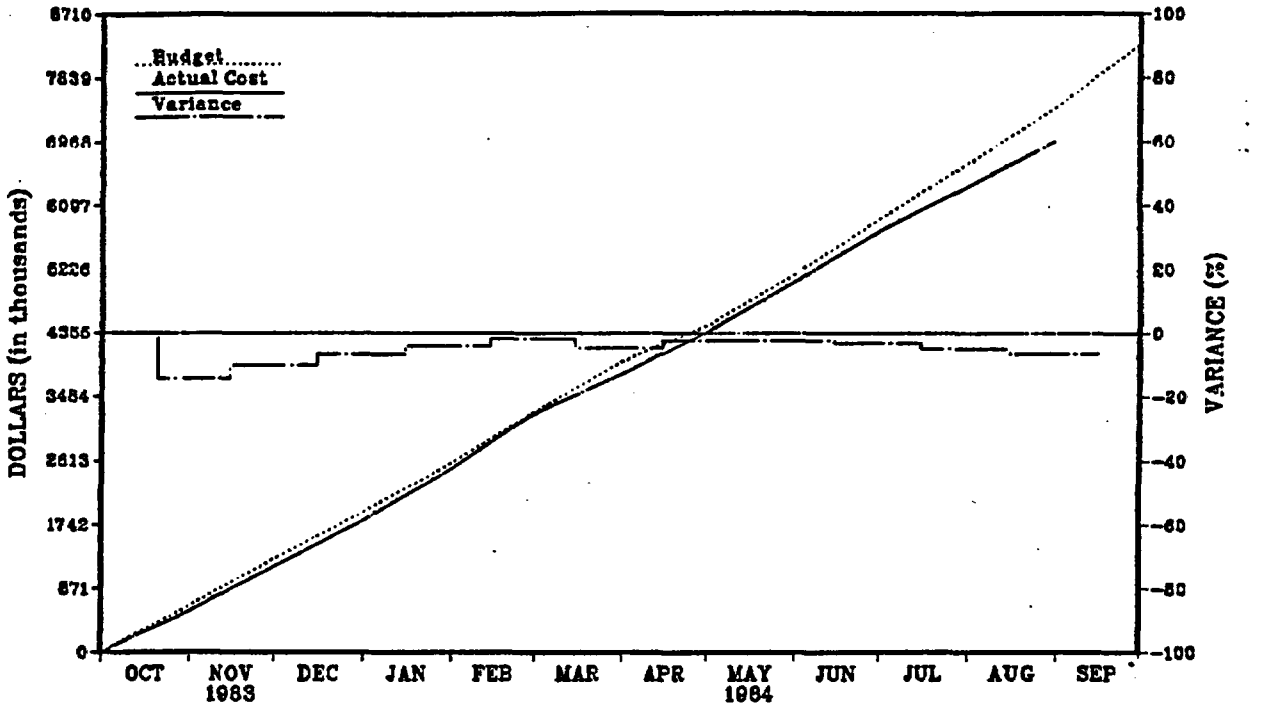
GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	900.	1971.	3000.	4330.	5629.	7000.	8075.	10454.	12195.	13994.	15822.	17757.
Cost (x1000)	790.	1796.	2788.	4025.	5259.	7043.	8536.	10059.	11745.	13245.	15000.	0.
Variance (x1000)	170.	175.	280.	305.	370.	17.	139.	395.	450.	749.	822.	0.
% Variance	-18.	-9.	-9.	-7.	-7.	0.	-2.	-4.	-4.	-6.	-5.	0.

Lawrence Livermore National Laboratory

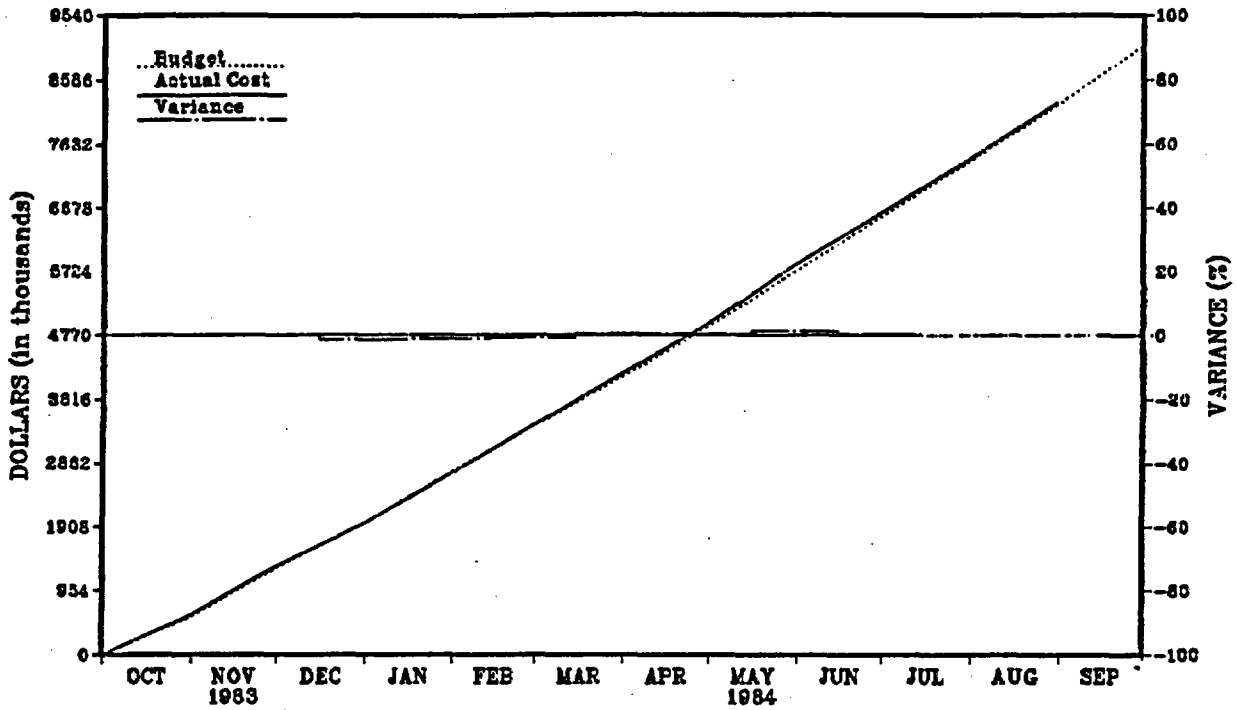
GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	641.	1290.	1920.	2597.	3204.	3972.	4403.	5172.	5911.	6671.	7430.	8298.
Cost (x1000)	549.	1157.	1785.	2490.	3224.	3778.	4361.	5052.	5724.	6340.	6957.	0.
Variance (x1000)	92.	133.	135.	107.	60.	194.	102.	120.	187.	331.	481.	0.
% Variance	-14.	-10.	-7.	-4.	-2.	-5.	-2.	-2.	-3.	-5.	-6.	0.

Los Alamos National Laboratory

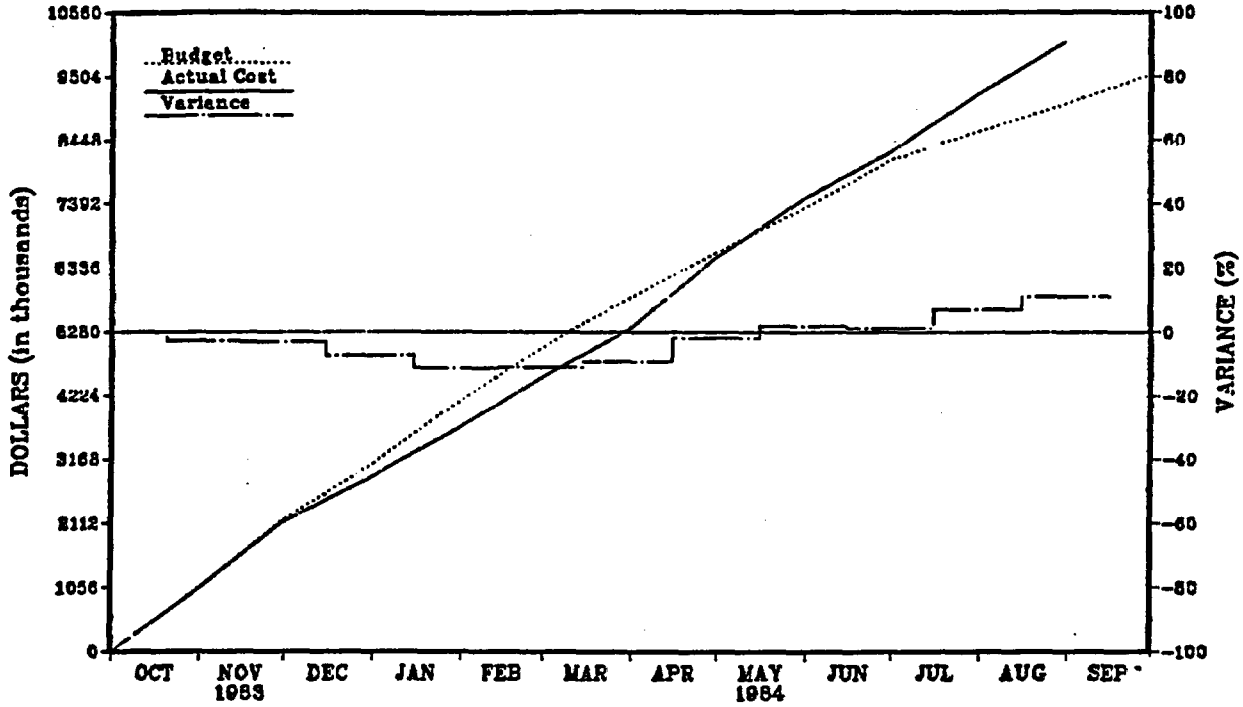
GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	568.	1298.	1971.	2736.	3437.	4193.	4907.	5757.	6568.	7400.	8245.	9090.
Cost (x1000)	568.	1298.	1944.	2703.	3402.	4179.	4923.	5830.	6595.	7393.	8253.	0.
Variance (x1000)	0.	0.	27.	35.	35.	-16.	-16.	-73.	-27.	7.	-8.	0.
% Variance	0.	0.	-1.	-1.	-1.	0.	0.	1.	0.	0.	0.	0.

Reeco

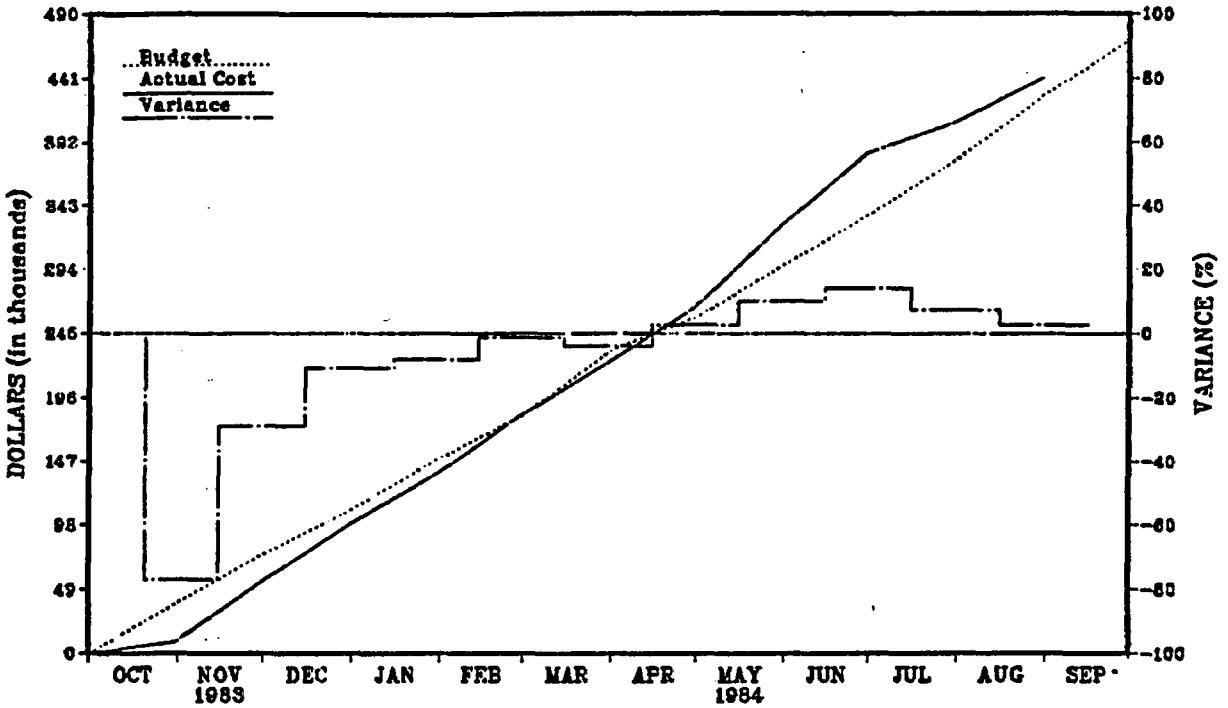
GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	1042.	2102.	3094.	4150.	5043.	5971.	6606.	7346.	8131.	8597.	9063.	9530.
Cost (x1000)	1014.	2115.	2864.	3667.	4485.	5324.	6490.	7470.	8231.	9203.	10062.	0.
Variance (x1000)	28.	67.	230.	469.	558.	647.	115.	-124.	-100.	-606.	-999.	0.
% Variance	-3.	-3.	-7.	-11.	-11.	-9.	-2.	2.	1.	7.	11.	0.

Holmes and Narver, Inc.

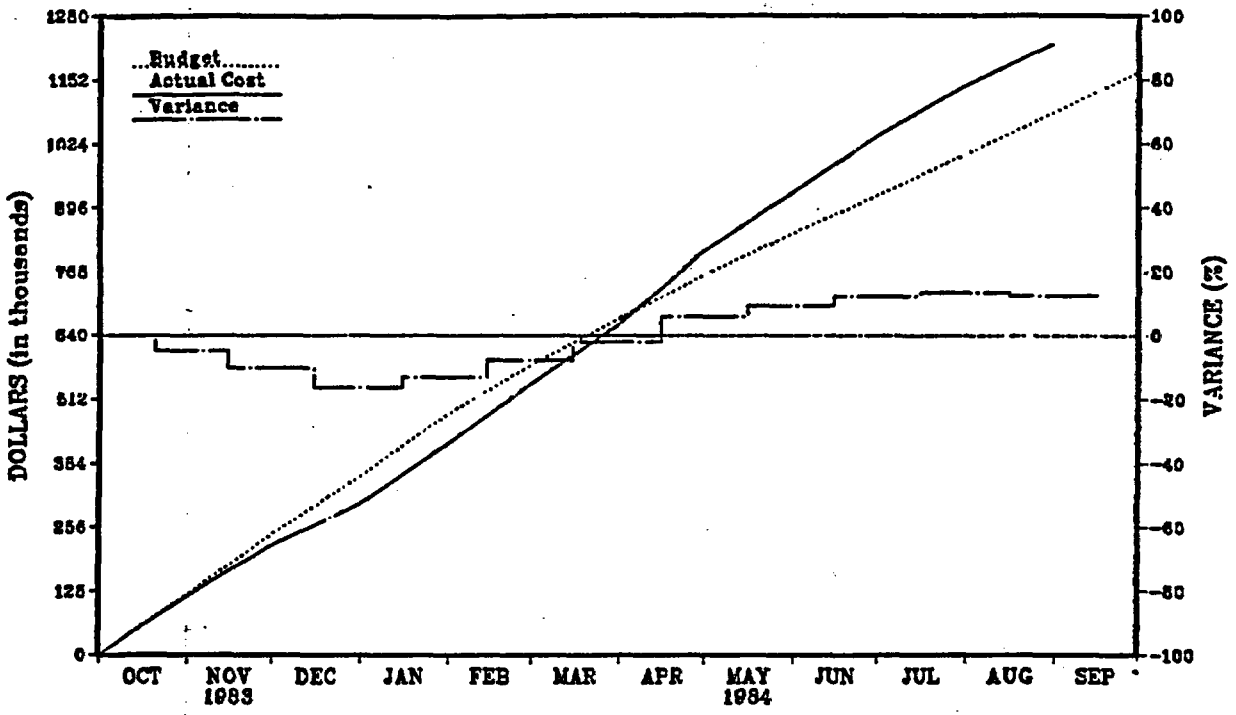
GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	39.	70.	110.	150.	183.	233.	258.	298.	336.	379.	429.	470.
Cost (x1000)	9.	54.	98.	138.	181.	224.	265.	328.	383.	407.	441.	0.
Variance (x1000)	30.	22.	12.	12.	2.	9.	-7.	-30.	-47.	-28.	-12.	0.
% Variance	-77.	-29.	-11.	-8.	-1.	-4.	3.	10.	14.	7.	3.	0.

Fenix and Scisson, Inc.

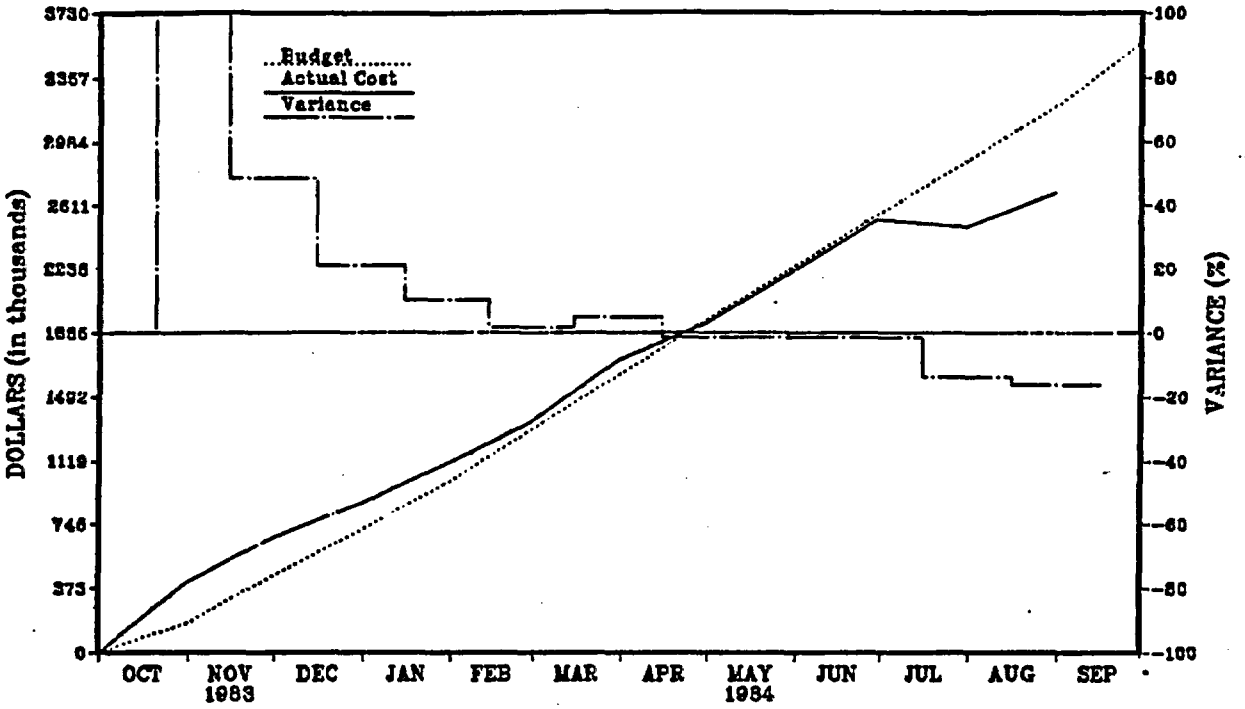
GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	122.	243.	360.	485.	602.	676.	764.	847.	922.	1004.	1087.	1160.
Cost (x1000)	116.	218.	301.	421.	536.	662.	809.	925.	1036.	1139.	1223.	0.
Variance (x1000)	6.	25.	59.	64.	46.	14.	-45.	-78.	-114.	-135.	-136.	0.
% Variance	-5.	-10.	-16.	-13.	-8.	-2.	6.	9.	12.	13.	13.	0.

Miscellaneous Contractors

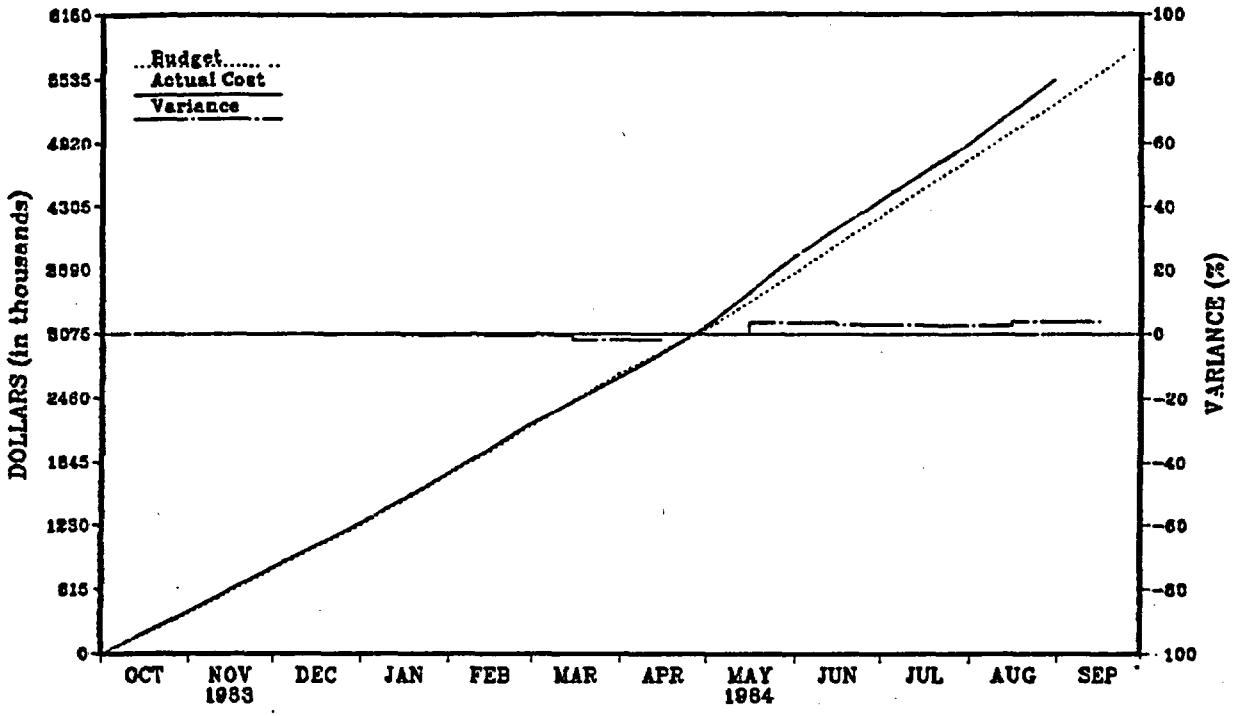
GOVERNMENT FISCAL YEAR 1984



Budget (x1000)	175.	440.	717.	1003.	1311.	1631.	1942.	2255.	2565.	2877.	3197.	3555.
Cost (x1000)	402.	665.	868.	1106.	1332.	1711.	1913.	2223.	2525.	2476.	2680.	0.
Variance (x1000)	-227.	-217.	-151.	-103.	-21.	-80.	29.	32.	40.	399.	517.	0.
% Variance	100.	48.	21.	10.	2.	5.	-1.	-1.	-2.	-14.	-16.	0.

Science Applications, Inc.

GOVERNMENT FISCAL YEAR 1984

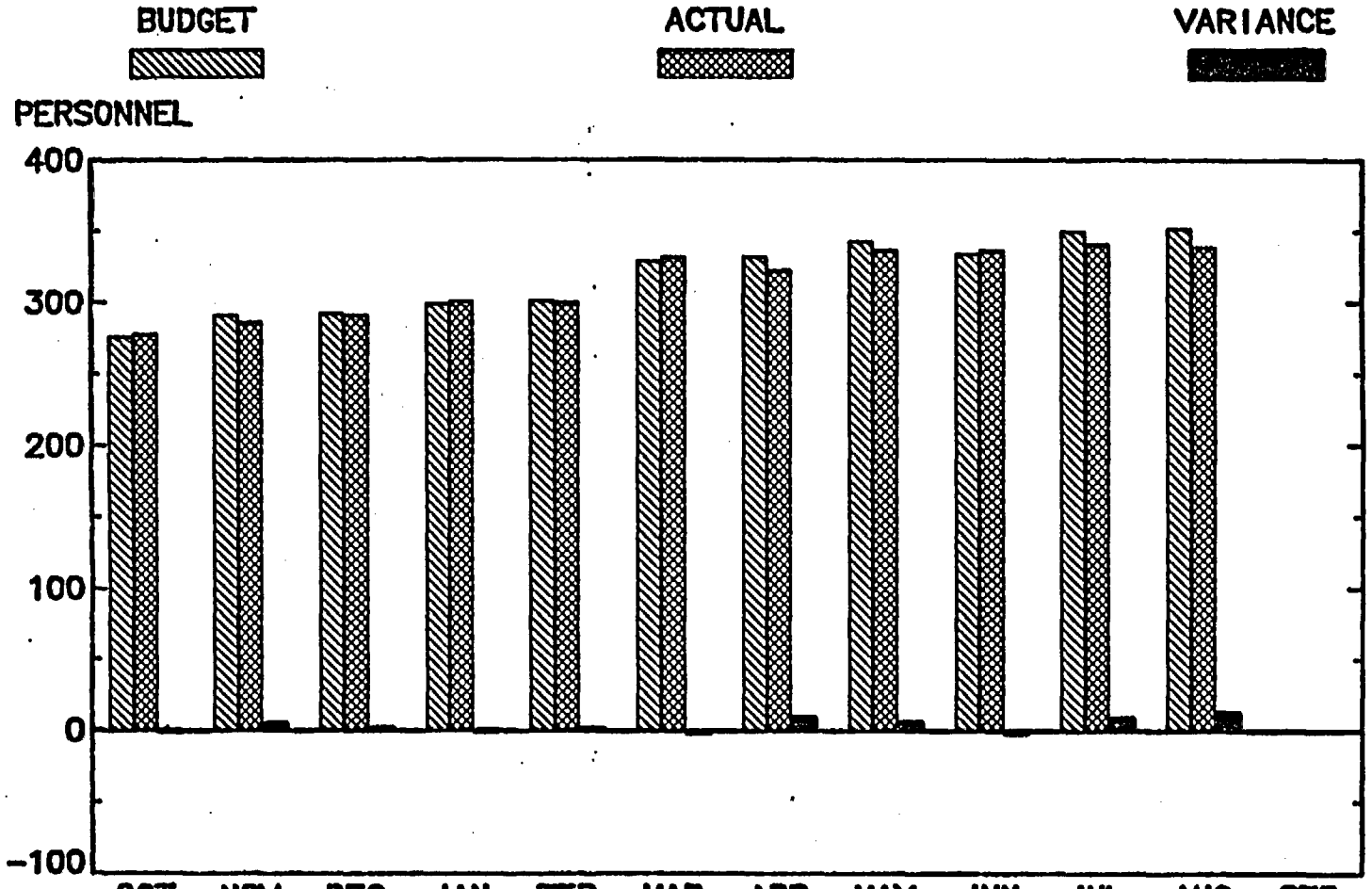


Budget (x1000)	366.	611.	1234.	1727.	2204.	2701.	3126.	3673.	4219.	4766.	5310.	6061.
Cost (x1000)	366.	611.	1232.	1719.	2188.	2650.	3129.	3810.	4350.	4901.	5519.	0.
Variance (x1000)	0.	0.	2.	8.	16.	51.	-3.	-137.	-131.	-135.	-209.	0.
% Variance	0.	0.	0.	0.	-1.	-2.	0.	4.	3.	3.	4.	0.

NNWSI LEVEL I MILESTONES
FY 1984

NNWSI NUMBER	WBS	RESP. AGENCY	MILESTONE DESCRIPTION	PLANNED COMPLETION DATE	ACTUAL COMPLETION DATE	REMARKS	REVISED COMPLETION DATE
M150	2112	SNL	Preliminary Performance Assessment for EA	01/15/84	01/15/84		
M151	2111	SNL	Preliminary System Description Document	08/30/84		Behind Schedule	11/21/84
M152	2111	SNL	Users Manual for Data Base System for Participants	08/30/84		Behind Schedule	09/12/84
——	22	LLNL	Summary Logic Network for WP Design and Development	01/16/84	01/16/84		
M250	2221	LLNL	Establish Interim Product Specifications	08/30/84		Behind Schedule	10/31/84
M251	223	LLNL	Pre-Closure Analysis of Selected Conceptual Designs	09/28/84			
M352	2317	LANL	Draft Report Estimating Water Flow and RN Transport Along Flow Path	02/02/84	02/02/84		
M353	2352	USGS	Groundwater Level Data and Preliminary Potentiometric-Surface Maps, Yucca Mountain and Vicinity, Nye County, NV	06/29/84	03/30/84		
M354	2311	LANL	Letter Report Groundwater Chemistry Along Flow Paths	08/30/84		Behind Schedule	10/31/84
M356	2361	LANL	Complete Report on Volcanic Hazards Analysis	09/28/84			
M355	232	LANL	Progress Report on 3-D Mineralogic Model of Yucca Mountain	08/31/84		Behind Schedule	10/31/84
M357	2364	SNL	Weapons Test Seismic Report	10/30/84			
——	24	SNL	Submit Summary Logic Network for Repository	01/16/84	01/16/84		
M447	2431	SNL	Seal Development Plan for Repository	11/12/84			
M592	252	SAI	Draft EA	02/29/84	02/29/84		
M523	25	WMPO	NNWSI References for EA Complete	08/01/84		Behind Schedule	12/31/84
M521	254	SAI	Draft SCP to HQ	08/15/84		Behind Schedule	07/31/84
M660	2652	LANL	Complete ESTP and Submit to HQ for Final Review and Approval	08/31/84		Behind Schedule	
M701	271	LLNL	Termination of Routine Access and LLNL Tour Support to SFT-C	09/30/84			Open
M706	271	LLNL	Complete Decision Analysis on Use of Climax Facility	Open (in FY 84)			

NNWSI PROJECT STAFFING
- FY 1984 -



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
B	276	291	292	299	301	329	332	343	334	350	352	
A	278	286	291	301	300	332	323	337	337	341	339	
V	-2	+5	+1	-2	+1	-3	+9	+6	-3	+9	13	