Encl. to ltr. of 10/22/86 to REB from Prestholt, rec'd 10/24/86 19,2

U.S. DEPARTMENT OF ENERGY

OCRWM OGR

Nevada Nuclear Waste Storage Investigations PROJECT

YUCCA MOUNTAIN

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT

MONTHLY REPORT

AUGUST 1986

UNITED STATES DEPARTMENT OF ENERGY

NEVADA OPERATIONS OFFICE

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT

MONTHLY REPORT

AUGUST 1986

Prepared by Nevada Nuclear Waste Storage Investigations (NNWSI) Project participants as part of the Civilian Radioactive Waste Management Program. The NNWSI Project is managed by the Waste Management Project Office of the U.S. Department of Energy (DOE), Nevada Operations Office. NNWSI Project work is sponsored by the DOE Office of Civilian Radioactive Waste Management.

UNITED STATES DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE

TABLE OF CONTENTS

ABSTRACT

KEY ACTIVITIES

WBS 1.2.1 Systems

The Waste Management Project Office (WMPO) approved many of the quality assurance level assignments for the Systems tasks. The cost estimate for the repository conceptual design in support of site characterization was completed. The completion of the letter report "A Proposed Approach to Data Transfer and Management by the NNWSI Project" proposes controls for Project technical information and satisfies Milestone R077.

WBS 1.2.2 Waste Package

In response to review comments, revision of the draft report detailing the two-year feasibility study on the use of copper and two copper-base alloys as container materials in the Yucca Mountain repository is in progress. The report "Hydrothermal Interaction of Crushed Topopah Spring Tuff and J-13 Water at 90 °C, 150 °C, and 250 °C Using Dickson-Type, Gold-Bag Rocking Autoclaves" was published. Project participants are reviewing and evaluating all testing activities in the areas of corrosion and oxidation and will propose a schedule for the orderly and timely termination of many of these activities.

WBS 1.2.3 Site Investigations

The stop-work orders remained in effect and almost all site characterization technical activities continued to be suspended. Review of scientific investigation planning documentation and quality assurance level assignments continues. More work using presently successful methods of characterizing the geologic structure, stability, and potential ground-water movement under Yucca Mountain was recommended for fiscal year 1987. The draft Pre-Site Characterization Radiological Monitoring Plan, the Transportation Studies Plan, the draft Socioeconomic Monitoring and Mitigation Plan, and draft Community Profiles Reports are at WMPO for review. The quarterly report on Transportation Issues contains a summary of Nevada organizations that have activities and positions relative to high-level waste transportation.

WBS 1.2.4 Repository Investigations

Preparation of Site Characterization Plan chapters and site investigation planning documentation for quality assurance level assignments required major efforts this month. Final preparation for publication of the document "Effects of Sample Size on the Mechanical Properties of Topopah Spring Tuff" is in progress. A report that assesses the feasibility of emplacing waste in the horizontal orientation and developing the necessary equipment for horizontal emplacement is in review. Recommendations made at a workshop on thermal and mechanical field tests included parameters and physical phenomena of importance to design, model validation, and performance assessment. The draft letter

report "JEM Verification Calculations -- Phase I," which includes four sets of analyses designed to verify aspects of the joint behavior at different loading conditions is nearing completion.

WBS 1.2.5 Regulatory and Institutional Investigations

A summary of the procedural changes to 10 CFR Part 60 and an analysis of their effects on the exploratory shaft was sent to WMPO. "An Evaluation of Repository Boundary and Area Definitions" was also sent to WMPO. The "Regulatory Document Manual" was distributed to Technical Project Officers and WMPO staff members. The "NNWSI Project Information Management System Concepts Evaluation Report" was published, and a supplement to the fiscal year 1988 Information Technology Resources Long-Range Site Plan was submitted to WMPO for approval. The Permanent Internal Review Committees are continuing to review sections of the Site Characterization Plan. A draft "Environmental Monitoring and Mitigation Plan" was submitted to WMPO for review, as well as the draft of the "NNWSI Project Facility Specific Outreach and Participation Plan."

WBS 1.2.6 Exploratory Shaft Investigations

Milestones were established for fiscal year 1987 prototype test activities in the G-Tunnel test facility. Project participants are considering changes to experiments in the exploratory shaft related to repository design, geomechanical analysis, and testing. Project participants continued to concentrate efforts on preparing plans, procedures, and quality assurance level assignments.

WBS 1.2.7 Test Facilities

The E-MAD facility will remain open for possible future uses. The report "Spent Fuel Test--Climax: Technical Measurements Data Management System Description and Data Presentation" was published and publication of the reports "Spent Fuel Test--Climax: An Evaluation of the Technical Feasibility of Geologic Storage of Spent Nuclear Fuel in Granite" and "Post-Test Thermal Calculations and Data Analyses for the Spent Fuel Test--Climax" is in progress.

WBS 1.2.9 Project Management

NNWSI Project personnel at Lawrence Livermore National Laboratory have coordinated the acquisition of a VAX11-750 with the Project Technical and Management Support Services to assure compatibility with the VAX operations for the Project. Because of newly developing requirements, Project participants will provide hard copies of their records to the Project records center. The NNWSI Project procedure for records management was issued. An upgrade of the Dynaplan software at Sandia National Laboratories (SNL) will make plotting of bar charts more effective. Audits of WMPO, Los Alamos National Laboratory, Holmes & Narver, SNL, and Science Applications International Corporation have been postponed because of the stop-work order. The U.S. Geological Survey Quality Assurance Manual, documentation for a scientific investigation plan,

and Quality Assurance Program Plan are at WMPO for review. The USGS milestone list is being modified and updated and will be reissued monthly until the list is baselined.

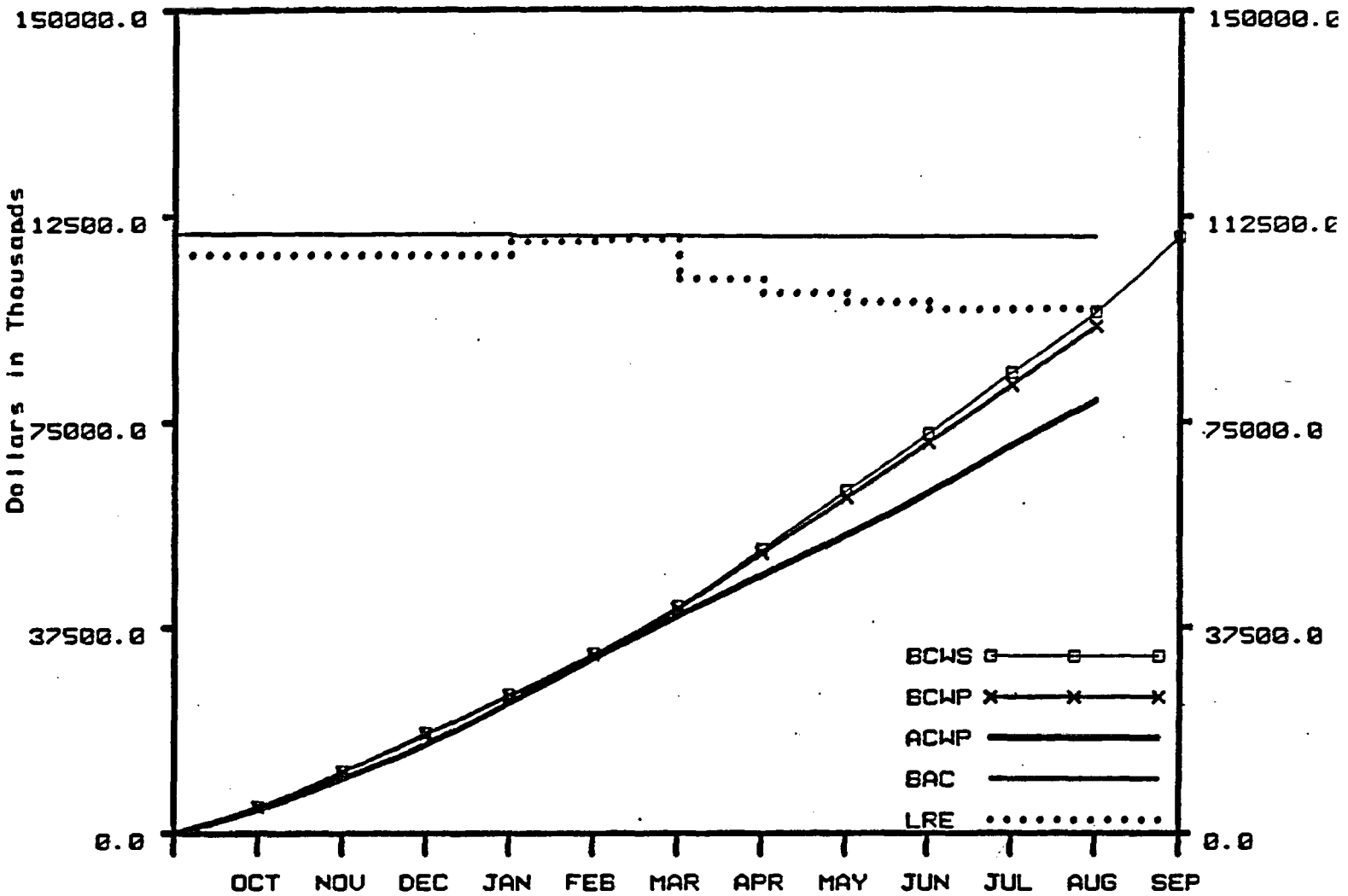
Funding Overview

The month-end estimated costs were $8,193,041 against a plan of $10,964,961 resulting in a cost underrun of $2,771,920.

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

		Plan ($000)	Cost ($000)	Variance	% Variance
WBS 1.2.1	Systems	$ 6,049	$ 5,139	$ 910	15
WBS 1.2.2	Waste Package	6,370	6,056	314	5
WBS 1.2.3	Site	30,241	23,710	6,531	22
WBS 1.2.4	Repository Investigations	12,905	10,160	2,745	21
WBS 1.2.5	Regulatory and Institutional Investigations	11,646	9,028	2,618	22
WBS 1.2.6	Exploratory Shaft Investigations	10,911	9,174	1,737	16
WBS 1.2.7	Test Facilities	971	869	102	11
WBS 1.2.9	Project Management	15,822	14,799	1,023	6
WBS 1.2	NNWSI Project	$94,915	$78,935	$15,980	17

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2



NNWSI - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	10965.0	94915.3
B. BUDGETED COST OF WORK PERFORMED (BCWP)	10591.8	92360.8
C. ACTUAL COST OF WORK PERFORMED (ACWP)	8193.0	78934.6
D. BUDGET AT COMPLETION (BAC)		108760.0
E. LATEST REVISED ESTIMATE (LRE)		95426.7

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-2554.6	-2.69
G. COST VARIANCE (B-C)	13426.1	14.54
H. AT COMPLETION VARIANCE (D-E)	13333.3	12.26

Remarks: The NNWSI Project is behind schedule and underrun to the current baseline plan. The behind schedule condition is due to stop-work orders and to the difficulty with filling technical staff positions requiring specialized skills. The cost variance shows an underrun of $13.4M, 14.5 percent under budget through the end of August and the at-completion variance is now $17.0M. The continued lack of USGS cost performance and milestone status data distorts the cost/schedule status depicted in this report.

NNWSI PROJECT BUDGET BASELINE

AUGUST 1986

CONTRACTORS	($000) ORIGINAL FY 86 FUNDING	($000) CURRENT BASELINED BUDGET	($000) CHANGE
SNL	$25,309	$24,084	(1,225)
LLNL	12,620	12,495	(125)
Los Alamos	13,465	13,149	(316)
USGS	16,645	19,392	2,747
SAIC	14,891	17,524	2,633
REECo	17,476	10,113	(7,363)
H&N	1,153	2,298	1,145
F&S	3,014	2,860	(154)
WSI	221	208	(13)
PAN AM	52	49	(3)
State grant	2,600	4,650	2,050
DRI	160	160	--
EG&G	80	82	2
LBL	400	761	361
NTS allocation	1,314	935	(379)
SUBTOTAL	$109,400	$108,760	(640)
CAPITAL EQUIPMENT	5,400	6,800	1,400
TOTAL	114,800	115,560	760

U.S. DEPARTMENT OF ENERGY

OCRWM OGR

Nevada Nuclear Waste Storage Investigations PROJECT

YUCCA MOUNTAIN

PROJECT STATUS

1.2.1 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

WBS 1.2.1.1 SYSTEMS MANAGEMENT AND INTEGRATION

During August 1986, the modified work plan and quality assurance level assignments sheets (QALAS) for this Sandia National Laboratories (SNL) task were approved by the Waste Management Project Office (WMPO).

A member of the U.S. Geological Survey (USGS) staff continued rewriting the sections of the Nevada Nuclear Waste Storage Investigations (NNWSI) Project Systems Engineering Management Plan (SEMP) assigned at the last meeting of the Systems Engineering Integration Group (SEIG) in Los Alamos on July 27-31. The rewrites should be completed in September, at which time the SEMP will be ready for Project review.

WBS 1.2.1.2

WBS 1.2.1.2.1 System Description

Policy review comments on the system requirements document (SNL Milestone M120) were received from WMPO in late June 1986. Revision of this document will start after completion of the NNWSI Project SEMP.

WBS 1.2.1.2.3 Cost Schedule

SNL staff members completed the cost estimate for the Repository Conceptual Design in Support of Site Characterization (RCD/SC) in accordance with the U.S. Department of Energy (DOE) guidelines for repository cost estimating. The cost estimate was transmitted to the Office of Civilian Radioactive Waste Management (OCRWM) where it will be reviewed and compared to the salt and basalt projects, plus the DOE Independent Cost Estimating estimate. Included in the transmittal were life-cycle cost estimates from the engineering design through closure and decommissioning, individual cost account factors, and operations staffing data. Cost estimates reviews for the individual projects (tuff, salt, and basalt) will be presented by R. F. Weston, Inc., at the offices of the respective architect/engineers on September 8 through 13, 1986. A reconciliation meeting is scheduled for September 30 and October 1, 1986, at the DOE Office of Geologic Repositories (OGR) and the OCRWM. Subsequent to the reconciliatory agreement, the three remaining fuel-rod consolidation study cases will be submitted and reviewed.

The SNL proposed quality assurance level assignments for this task were accepted by WMPO.

WBS 1.2.1.2.4 Systems Engineering Integration

Members of the Science Applications International Corporation (SAIC) systems engineering staff prepared several sections for a new draft of the SEMP based on the SEIG meeting in July 1986 at Lawrence Livermore National Laboratory (LLNL). These sections were forwarded to SNL for integration into the new draft.

A draft of the revised SEMP was sent by SNL for author review on August 18, 1986. A workshop for authors of this revised draft is scheduled for September 3 and 4, 1986, at SNL in Albuquerque, New Mexico. Following this workshop, the draft should be suitable for informal review by each of the Technical Project Officers.

SAIC personnel participated in strategy meetings at WMPO concerning the formation and charter of the NNWSI Project Technical Data Management Coordinating Group.

SAIC and SNL personnel participated in the Performance Assessment Coordinating Group meeting at DOE/HQ on August 13 and 14, 1986, on proposed activities and plans to perform a common (programwide) risk assessment and performance methodology.

WBS 1.2.1.2.5 Configuration Management and Change Control

Drafts of administrative procedures (APs) as defined in the Configuration Management Plan (CMP), are being developed by SAIC personnel for implementing the CMP. The following APs have been identified and are either revisions or new APs:

AP 3.1 Management Baseline - This is the existing Planning and Scheduling Baseline procedure that will be modified in terms of configuration management (CM) classifications for control in consonance with the CMP and will be retitled Management Baseline.

AP 3.3 Change Control Process - This current AP will be modified to account for additional review processes and baseline management methodology as a part of implementing the CMP. No title change is required.

AP 3.4 Technical Baseline - This AP will define the procedure to be used for implementing the CM process for the technical baseline. Implementation of this document is dependent upon the completion and issuance of the NNWSI Project SEMP.

AP 3.5 Regulatory Baseline - This AP will define the procedure to be used for implementing the CM process of the regulatory baseline.

During August 1986 the SAIC configuration management staff distributed revisions and additions to the NNWSI Project Work Breakdown Structure (WBS) and WBS Dictionary for the Site Characterization Plan (1.2.5.1; Geologic Testing 1.2.6.9.2; and Prototype Geologic Testing 1.2.6.9.4) and the NNWSI Project Regulatory Document Manual - Volumes 1 and 2.

The Exploratory Shaft Facility (ESF) Subsystems Design Requirements document was baselined on August 29.

WBS 1.2.1.3 TECHNICAL DATA BASE MANAGEMENT

WBS 1.2.1.3.1 Tuff Data Base

An SNL letter report entitled "A Proposed Approach for Data Transfer and Management by the NNWSI Project," was submitted to WMPO. The salient points of this proposal for control of technical information by the NNWSI Project were presented at the July 1986 Technical Project Officers meeting on August 8, 1986. The presentation and letter report satisfy Action Item #275 and Milestone R077.

Modified work plans for the SNL tuff data base in support of quality assurance level assignments were approved by WMPO on August 8, 1986. It was decided that a quality assurance level assignment was not applicable to the task "Design of the Data Management System," since this task is a management function. This decision means that work can continue on the redesign of the tuff data base.

WBS 1.2.1.3.2 Computer Graphics

WMPO approved the quality assurance level assignments and modified work plans for the SNL computer graphics task.

WBS 1.2.1.3.3 Reference Information Base

SNL modified work plans for the reference information base in support of quality assurance level assignments were approved by WMPO on August 8, 1986. It was agreed that a quality assurance level assignment was not applicable to the design of the reference information base.

WBS 1.2.1.4 TOTAL SYSTEMS PERFORMANCE ASSESSMENT

WBS 1.2.1.4.1 Flow and Radionuclide Transport

On August 11 and 12, 1986, SNL staff members attended a National Water Well Association seminar on ground-water contamination for waste management facilities.

At SNL a contract was placed to provide a broad-based, objective review of current activities for flow and transport analyses and to ensure that all relevant factors have been taken into account.

WBS 1.2.1.4.2 Radionuclide Source Term

At SNL the journal article entitled "A Study of Thermally Induced Convection Near a High-Level Waste Repository" (SAND86-7010J), was peer reviewed and returned to the authors for revision.

The SNL paper entitled "Analysis of a Multiphase, Porous-Flow Imbibition Experiment in Fractured Tuff" (SAND86-1679C), to be presented at the next American Geophysical Union meeting, was submitted for peer review. The paper "Drying Analysis of a Multiphase Porous-Flow Experiment in Fractured Volcanic Tuff" (SAND86-0722C) was also submitted for peer review. This paper will be presented at the ASME/JSME Thermal Engineering Joint Conference.

The SNL position papers on the boundary of the disturbed zone and engineered-barrier system (SAND86-1955 and SAND86-1954, respectively) are moving through the official peer review process for SNL reports. Previously completed reviews of both papers will probably speed the formal review process.

WBS 1.2.1.4.4 Radionuclide Releases from Total System

During August 1986, SNL staff members assigned to this task participated in writing modified work plans and quality assurance level assignments and reviewing SCP material.

PLANNED WORK

A draft of the system description document will be completed and discussed with SNL management. The system requirements document will be revised and submitted for SNL final review.

SNL cost estimate staff members will complete the cost estimate of the horizontal emplacement case for the RCD/SC; complete the cost estimates for rod consolidation study cases 2, 3, and 4; and review the "Repository Cost Estimates for the Tuff, Basalt, Salt, and Crystalline Rock Geologies" for the DOE/OGR and OCRWM. They will also reconcile the cost review comments by DOE/HQ and Weston.

Staff members at SNL will continue work on the development of a new structure for the tuff data base using a relational data management system.

SCP work during September and October 1986 at SNL will focus on the reviews and revision of the performance issue on prewaste-emplacement ground-water travel time. All reviews on Milestone N117 (SAND85-7114) will be completed. Modeling of the fluid flow and radionuclide transport through the Yucca Mountain site will continue.

PROBLEM AREAS

The system studies register (SNL Milestone P126) will be delayed becuase of committments to the SEMP.

MILESTONE PROGRESS

SNL Milestone M870, the letter report on the annual performance assessment scientific support program interactions has been delayed.

Progress on the SNL document (Milestone R058) entitled "Cost Estimate of the Yucca Mountain Repository Based on Design Information Developed for the RCD/SC" (SAND85-1964), was limited to the production of the cost estimate. Writing will probably not resume until mid-October 1986.

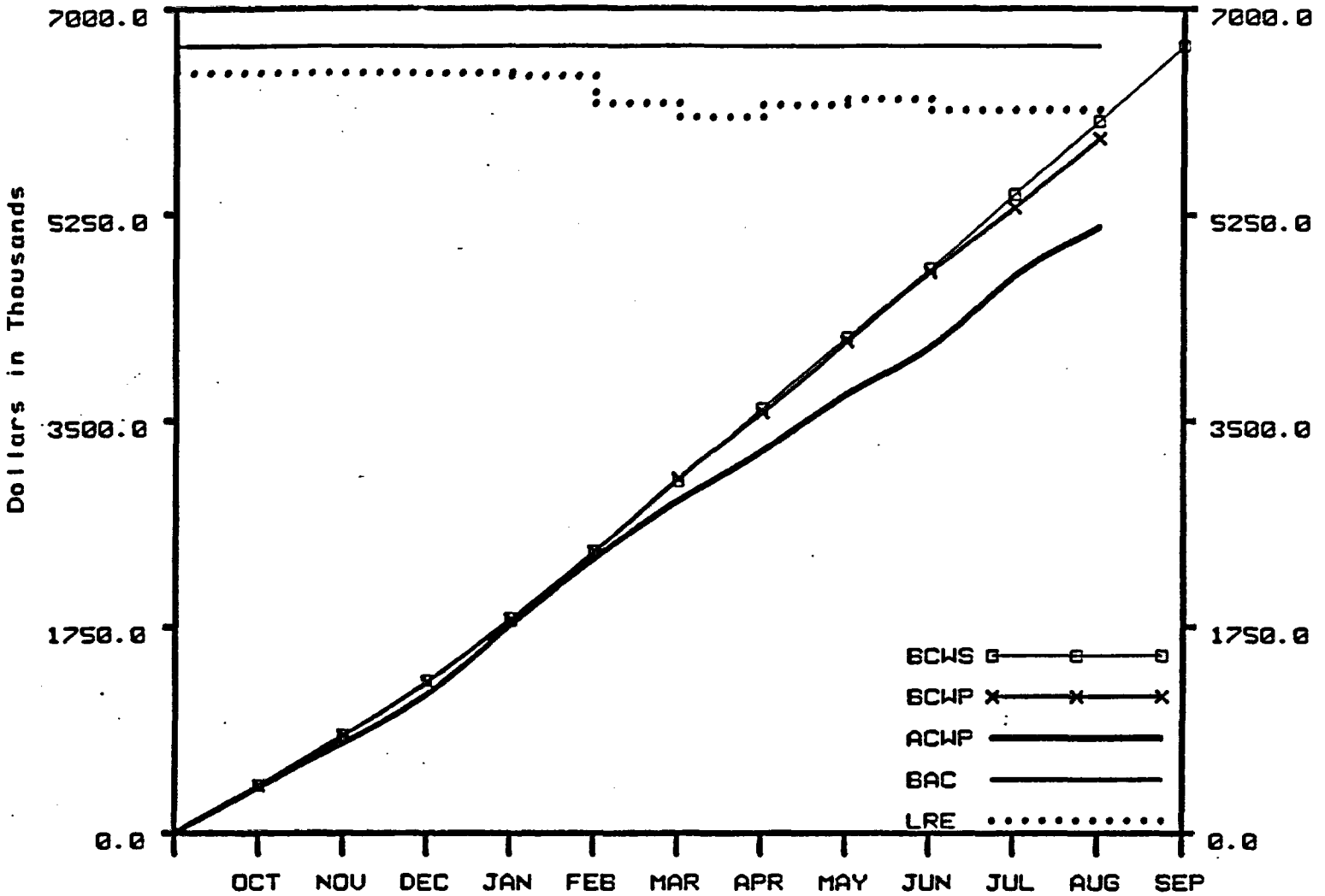
SNL Milestone R077, plans and procedures for the SNL technical data base operations, was completed on August 8, 1986.

SNL milestones R078, the revised three-dimensional reference model of the NNWSI Project repository site, and R079, "Technique for Subterranean Surface Modeling for the NNWSI Project Repository: Software Documentation," are delayed.

SNL Milestone M180, the preliminary analysis of flow and transport from the repository to the accessible environment, is delayed and the estimated date of completion is November 30, 1986.

SNL Milestone M107, the NNWSI Project position paper describing the engineered-barrier-system and disturbed-zone boundaries, is delayed and is currently in review.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.1



SYSTEMS	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	625.6	6048.8
B. BUDGETED COST OF WORK PERFORMED (BCWP)	587.3	5900.3
C. ACTUAL COST OF WORK PERFORMED (ACWP)	406.2	5139.4
D. BUDGET AT COMPLETION (BAC)		6688.0
E. LATEST REVISED ESTIMATE (LRE)		6140.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-148.5	-2.46
G. COST VARIANCE (B-C)	760.9	12.90
H. AT COMPLETION VARIANCE (D-E)	548.0	8.19

Remarks: WBS 1.2.1 shows a cost underrun of $761K, 12.9 percent under budget through August. This cost underrun and the behind schedule condition are attributed to resources in Systems being diverted to preparation of the SCP and work on the Quality Assurance Level Assignment Sheets (QALAS).

COST PERFORMANCE REPORT
WBS LEVEL 4
U.S. DEPARTMENT OF ENERGY
NNWSI PROJECT

For: AUG 1986

Date: September 18, 1986

WBS NUMBER AND DESCRIPTION		YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST
1211	Systems Management and Integration	164.000	164.020	82.000	.020	82.020
1212	Systems Engineering	2,088.837	2,089.185	1,682.372	.348	406.812
1213	Technical Data Base Management	1,034.000	885.036	879.000	-148.964	6.036
1214	Total Systems Performance Assessment	2,762.000	2,762.081	2,496.000	.081	266.081
121	SYSTEMS	6,048.837	5,900.322	5,139.372	-148.515	760.950

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
M277	SNL	1.2.1.1	Annual PASS Program Interaction – (Letter Report) △ 9/85	◆												
M870	SNL	1.2.1.1	Annual PASS Program Interaction – (Letter Report)												△	◇ 10/86
M120	SNL	1.2.1.2	Yucca Mountain Mined Geologic Disposal System (MGSD) Requirements △ 7/85								◇			◇		◇ 1/87
M108	SNL	1.2.1.2	Systems Engineering Management Plan (SEMP) △ 8/85									◇		◇		◇ 11/86
M261	SNL	1.2.1.2	Draft Yucca Mountain Site – Specific Mined Geologic Disposal System (MGDS) Description												△	◇ 11/86

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◈ COMPLETED AS REVISED

1.2.2 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

WBS 1.2.2.2 PACKAGE ENVIRONMENT

The two hydrothermal experiments that were begun in May by LLNL personnel were terminated normally. The IC anion analyses are being done for samples taken during these runs; the ICP cation analyses are being delayed until the analytical bias seen in results from this instrument are corrected.

Because of the delay in the solid phase analyses (hardware problems), the completion date of the LLNL level 2 document reporting the results of the vitric experiments is changed to November 30, 1986.

The LLNL report entitled "Hydrothermal Interaction of Crushed Topopah Spring Tuff and J-13 Water at 90 °C, 150 °C, and 250 °C Using Dickson-Type, Gold-Bag Rocking Autoclaves" has been printed and distributed to Office of Scientific and Technical Information.

Rehydration of the Topopah Spring Tuff sample was started with the sample kept at the same temperature as when it was dehydrated (150-160 °C) upstream and 60 °C downstream). Impedance camera images were taken once every 15 minutes the first day and then just twice a day. Because of the slow rehydration (only 2 cc of water collected in 13 days), the up-stream pore pressure was increased. Early next month, the down-stream pore pressure will be increased so that water permeability can be measured.

WBS 1.2.2.3 WASTE FORM AND MATERIALS TESTING

WBS 1.2.2.3.1 Waste Form Testing

Work continues at LLNL on spent fuel waste form testing activities exempted from the stop-work order, including dissolution tests and thermogravimetric analysis oxidation tests at Hanford Engineering Development Laboratory, writing and review of technical procedures, and preparation of the SCP, which has preempted all work on the SIP for spent fuel waste form testing. Results of this ongoing work will be reported when the work load from SCP and stop-work order issues has eased.

WBS 1.2.2.3.2 Metals Barrier Testing

An LLNL a draft of the report detailing the two-year feasibility study on the use of copper and two copper-base alloys as container materials in the Yucca Mountain repository was completed. Copies of the draft report were sent to DOE/HQ, WMPO, Battelle National Laboratory, and two peer reviewers for the NNWSI Project copper testing activities. Extensive comments on the report were received from all of these organizations, and a final version of the report is being prepared for a September 30, 1986, delivery to DOE/HQ.

Input from LLNL staff members on the status of metal barrier research and development for Chapter 7 of the SCP was completed and they began work on input for Chapter 8, Information Needs). The metal barrier activities will encompass five information need write-ups. A format has been agreed upon and a draft of these information needs is expected to be completed in September. These information needs will also form the basis of the SIP for this subtask.

Work continues under LLNL subcontract at Ohio State University on developing a model to predict the time to sensitization of low-carbon austenitic stainless steels under the thermal conditions expected in the repository. During the past month, information was collected on the chromium diffusivity and thermodynamic activity in 316-types of stainless steel. LLNL personnel plan to meet in September with Ohio State representatives to discuss details of their work. They are planning to complete a report on their activities at the end of the fiscal year.

Work continues under LLNL subcontract at SRI-International on developing a thin-layer, mixed-potential model to predict the changes in the environmental redox potential and the corrosion potential on a metal surface in a decreasing temperature field and a decreasing radiation field. To date, three variations on the model have been developed; these variations differ in the level of sophistication. Personnel from the LLNL metal barriers subtask visited with the researchers at SRI-International on August 8 and reviewed a draft of the work completed thus far. SRI-International will complete the report in September.

Because of the stop-work order and development of a new level of scientific planning, existing testing activities are being evaluated in the areas of corrosion and oxidation at LLNL. The merit of continuing these activities is being reviewed. This review includes copper testing activities, as well as testing of austenitic stainless steels and the high-nickel austenitic materials. While most of these activities were exempted from the stop-work order, it will be virtually impossible to retrofit the procurement of test specimens, apparatus, and procedures to Level I and Level II quality assurance, since many of these activities were begun well before the present QAPP was in place. Also, in rethinking some of the planning and strategy activities for metal barriers, the assumptions made in choosing test environments are no longer valid, and the test techniques themselves may not be the most appropriate ones for demonstrating resistance or susceptibility of the particular kind of corrosion phenomenon of interest. LLNL staff members are reviewing and evaluating all existing activities and will propose a schedule for the orderly and timely termination of many of these activities.

WBS 1.2.2.3.3 Other Materials

The LLNL staff members responsible for this task are working on the SCP. There were no other activities for August.

WBS 1.2.2.3.4 Integrated Testing

Analyses of tuff disks that had been part of glass dissolution studies continued this month. Depth profiles for 21 isotopes have been obtained on 8 tuff disks; an average of 4 depth profiles were taken on each disk. The samples include controls that had been exposed only to J-13 water under the same conditions as those run in solutions with waste glasses. These data are being reduced to provide the distribution of each isotope as a function of depth in the rock sample. For the elements that are not present in large amounts in the rock, distribution coefficients between liquid and solid phases and diffusion coefficients will be calculated. Data reduction is complete for lithium, uranium, and plutonium. Data for boron will be examined in September.

LLNL staff members under the integrated testing task worked on input to Chapter 8.3.5 information needs for the SCP.

WBS 1.2.2.4 DESIGN, FABRICATE, AND PROTOTYPE TESTING

Activities exempt from the stop-work order at LLNL are preparation of the Advanced Conceptual Design (ACD) Subsystem Requirements document and review of proposals for container closure and fabrication development contracts. Staff members are also continuing to address the implications and requirements of the stop-work order.

WBS 1.2.2.5 PERFORMANCE ASSESSMENT

LLNL personnel have completed the performance assessment section of Chapter 7. The chapter is now undergoing final review before transmittal to SAIC. All activities for this subtask have been assigned a QA level and an SIP has been written and internally reviewed. The SIP has been submitted to WMPO for review and action.

PROBLEM AREAS

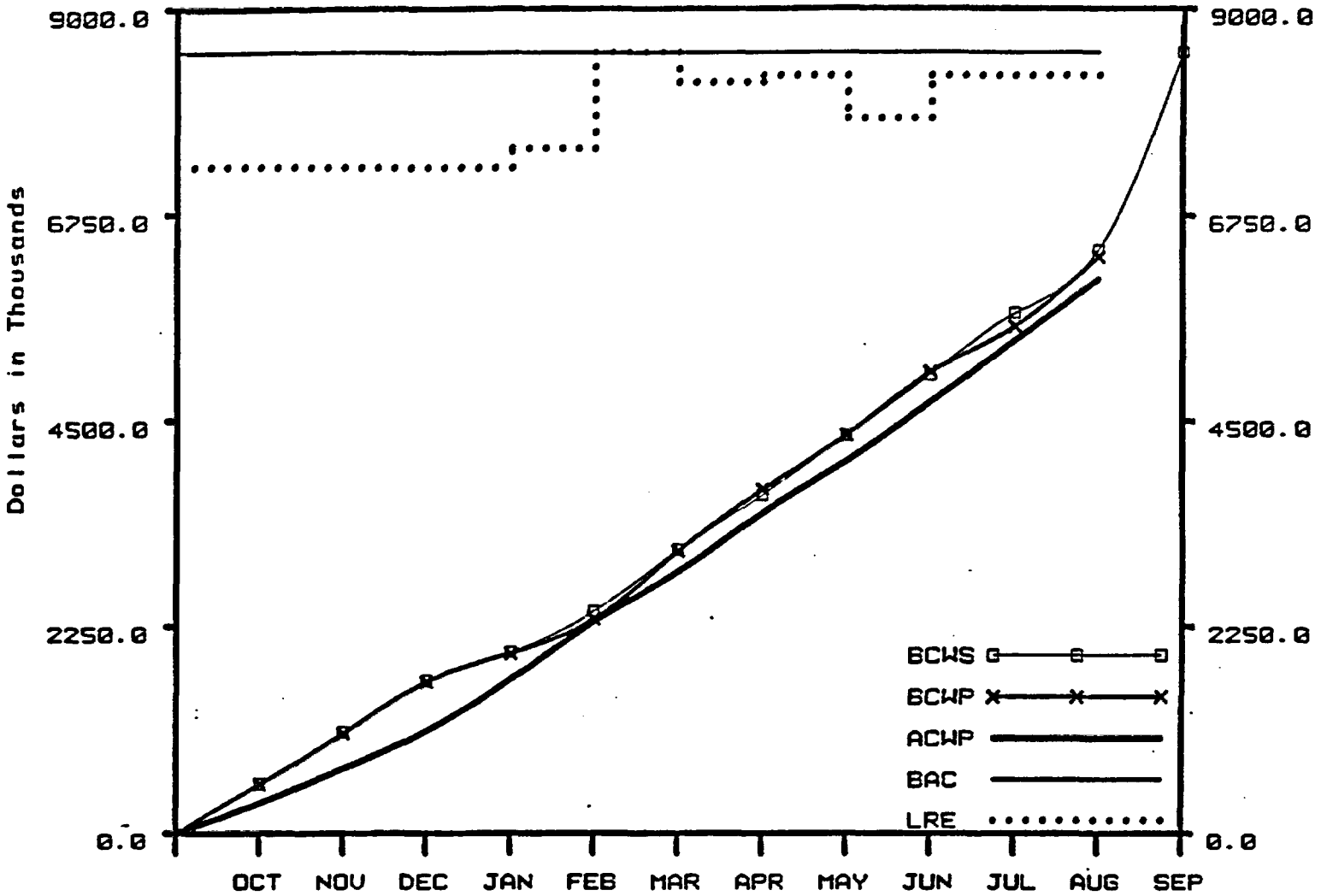
The simultaneous requirements of writing for the SCP and quality assurance level assignment paperwork exceed the available time of the LLNL integrated testing subtask leader and senior staff.

MILESTONE PROGRESS

The LLNL Milestone W244, a report on actinide distribution in rock reaction vessels, has been rescheduled for December 1986.

A new milestone, a report on the actinide distribution in tuff disks that have been part of glass waste form testing, will be completed first. Estimated delivery date for the new milestone is October 1986. Most of the data for the report is in hand; however, the SCP schedule precludes earlier preparation of that report.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.2



WASTE PACKAGE	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	687.9	6369.9
B. BUDGETED COST OF WORK PERFORMED (BCWP)	759.2	6293.9
C. ACTUAL COST OF WORK PERFORMED (ACWP)	674.9	6055.6
D. BUDGET AT COMPLETION (BAC)		8529.8
E. LATEST REVISED ESTIMATE (LRE)		8274.8

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-76.0	-1.19
G. COST VARIANCE (B-C)	238.3	3.79
H. AT COMPLETION VARIANCE (D-E)	255.0	2.99

Remarks: WBS 1.2.2 cost variance does not exceed the threshold. Resources were utilized on preparation of the Copper Report which resulted in some planned milestones not being completed as scheduled.

COST PERFORMANCE REPORT
WBS LEVEL 4
U.S. DEPARTMENT OF ENERGY
NNWSI PROJECT

For: AUG 1986

Date: September 18, 1986

WBS NUMBER AND DESCRIPTION		YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST
1221	Management and Integration	337.900	337.901	346.100	.001	-8.199
1222	Package Environment	756.000	857.000	936.600	101.000	-79.600
1223	Waste Form & Materials Testing	4,454.000	4,241.000	3,915.300	-213.000	325.700
1224	Design, Fabricate, and Prototype Testing	366.000	402.000	386.100	36.000	15.900
1225	Performance Assessment	456.000	456.000	471.500	.000	-15.500
122	WASTE PACKAGE	6,369.900	6,293.900	6,055.600	-76.000	238.300

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
M222	LLNL	1.2.2.3	Input to DOE/HQ Report to Congress on Copper for Waste Packages △ 8/85	◆												
M233	LLNL	1.2.2.4	Initiate Waste Package Advanced Conceptual Design △ 4/85									◇			◇	◇ 1/87
M276	LLNL	1.2.2.5	Report on the System Model for Waste Package Performance Analysis △ 9/85										◇		◇	◇ 10/86
M236	LLNL	1.2.2.3	Progress Report on the Results of Testing Advanced Conceptual Design Metal Barrier Material under Relevant Environmental Conditions for a Tuff Repository							△					◇	◇ 10/86
M247	LLNL	1.2.2.3	Final Report on Feasibility of using Copper as a Waste Package Material												△	
M013	LLNL	1.2.2.4	Revised Draft Waste Package Subsystem Conceptual Design Requirements to DOE/HQ for Review						△		◇		◇		◇	◇ 11/86

△ PLANNED MILESTONE COMPLETION DATE ◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED ◆ COMPLETED AS REVISED

1.2.3 SITE INVESTIGATIONS

OBJECTIVE

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

ACTIVITIES

WBS 1.2.3.1 MANAGEMENT AND INTEGRATION

The stop-work order issued to USGS in March 1986 remained in effect through August and almost all site characterization technical activities continued to be suspended throughout the month.

During the month of August the SAIC staff members prepared summaries of proposed site characterization activities for a letter report to the state of Nevada, for an informal briefing to the State, and for DOE/HQ. The letter report was reviewed by NNWSI Project participants; comments were incorporated and the report was sent to DOE/HQ for review. The final report will be issued to the State by DOE/HQ. The site characterization summary for the State briefing was part of a presentation that also included environmental impacts and the Environmental Monitoring and Mitigation Plan (EMMP). The summary of site activities prepared for DOE/HQ was simply an annotated listing of site activities.

SAIC staff members continued their reviews of participant site investigation planning documentation and QALAS, but the review process was changed to informal committee reviews with the participants, rather than providing individual reviews and comments.

The Site Integration Management Plan has not yet undergone NNWSI Project review. Comments from the SAIC review have been incorporated, and the plan will be released for WMPO and NNWSI Project review in September 1986.

Planning of the Site Atlas continues at SAIC. Transmittal of the criteria letter is planned for mid-September 1986. A draft procedure for assembling site information has been prepared, and is in review.

Preparations continue for a peer review on the calcite-silica deposits research. A field trip, sponsored by WMPO, to the Nevada Test Site allowed participants to examine calcite-silica deposits in trenches and natural outcrops. Geologists from Weston attended the field trip as representatives of DOE/HQ.

SAIC staff members continued work on the development of the core storage facility (CSF) this month. The materials on costs, staffing, physical layout, equipment, and schedules have been through SAIC review and will be completed in early September 1986. A briefing for WMPO is scheduled for September 17, 1986, at which time the CSF package will be presented for WMPO action. The core library task force completed review of core from Drill Hole USW-G4, and prepared a draft document for the steering committee. The steering committee subsequently issued an interim report for WMPO.

WBS 1.2.3.2 GEOLOGY

WBS 1.2.3.2.1 Geologic Investigations

Modified SNL work plans for the site geology task were reviewed at WMPO but required redrafting because all work was judged to be Quality Level 1. Only support activity (e.g., excavation) is of lesser quality level. Redrafted plans were reviewed on August 24, 1986, at SAIC resulting in approval with minor modifications.

SNL staff members prepared test procedures to be used to conduct the seismic-tectonic field investigations. Detailed technical procedures must still be prepared, along with letters of criteria, before the contractor can proceed with the work.

WBS 1.2.3.2.2 Geophysical Investigations

WBS 1.2.3.2.2.1 Gravity and Magnetics

Under an exception to the WMPO stop-work order, USGS staff members located 35 potential magnetotelluric stations across Death Valley and the Amargosa Desert, around Bare Mountain and through Crater Flat, and across Jackass Flats in support of the tectonics program in July and August.

Representatives from USGS prepared and spoke at a geophysical symposium in Denver on August 12 and 13, focusing on which of various methods have been useful in characterizing the geologic structure, stability, and potential ground-water movement at Yucca Mountain. More work using presently successful methods was recommended for the FY 87 NNWSI Project program, but it was concluded that studies using downhole magnetometer logs, hole-to-hole seismic refraction across the gravity gradient, shear-wave techniques, DC resistivity, and scintillometer (radiation) should be instituted next fiscal year. USGS personnel have started pulling together new proposals and integrating them into the present geophysical program.

WBS 1.2.3.2.3 Site Stability

WBS 1.2.3.2.3.1 Tectonics and Volcanism

USGS and Los Alamos representatives held a planning meeting in Denver to discuss future volcanism work and how it would interface with Quarternary and tectonic studies. The Los Alamos site investigation planning documentation for volcanism was reviewed with USGS staff members to ensure that the plans are consistent with the work on potassium-argon age determination.

WBS 1.2.3.2.3.3 Seismicity and Strain

USGS personnel continued operation of the seismic network for recording natural seismic events in southern Nevada during August.

WBS 1.2.3.3 HYDROLOGY

The Holmes & Narver (H&N) Materials Test Lab (MTL) began developing various data base and test data reduction programs for use when NNWSI Project work is resumed. Beckman Associates assisted H&N MTL in setting up and certifying operation of the relocated ultracentrifuge. Final test runs of the ultracentrifuge were initiated.

WBS 1.2.3.3.1 Stream Flow

USGS personnel met with representatives of the Central Regional Research Group, Precipitation-Runoff Modeling Project, August 4 through 6 to reconnoiter Fortymile Wash drainage basin and assess the feasibility of a rainfall and runoff model for that drainage. Conclusions indicate that data collection necessary to verify any modeling would be difficult and costly to obtain. It is recommended that the Project wait for results of ground-water modeling sensitivity analyses to define the overall need for rainfall and runoff modeling before proceeding with further planning to collect field data. However, modeling sensitivity analyses indicate a strong need exists to obtain information on rainfall and runoff relations in Fortymile Wash to allow predictions of future ground-water recharge in the Yucca Mountain area.

USGS personnel participated on August 11 and 12 in a field reconnaissance for planning purposes and an associated conference on the surface water runoff studies that have just begun. The purpose of the studies it to define the runoff component of the hydrologic budget for the unsaturated zone investigation. The session was designed to address field and logistics problems associated with the investigation and brought together about a dozen specialists in streamflow, sediment, and rainfall data collection, and in data handling from several USGS offices in the western United States. The many difficulties in collecting these types of data at Yucca Mountain were discussed and strategies were devised to activate the investigation and obtain the needed data.

Some technical changes were made by USGS personnel following review of the progress report on the potential for severe floods at Coyote Wash, Yucca Mountain. The report has now completed the review and revision process and is being typed prior to transmittal to the NNWSI Project branch office for editing and policy review.

WBS 1.2.3.3.3 Saturated Zone Hydrology

USGS staff members completed a preaward survey of low bids from manufacturers for geophone cable construction.

A USGS abstract titled "Climatic Changes Implied from Organic Carbon and Carbon-14 Analyses of Lake-sediment Cores, Walker Lake, Nevada," to be presented at the 1986 AGU-ASLO meeting to be held in San Francisco, California, December 8 through 12, 1986, was approved both by the USGS and DOE.

A USGS paper entitled "Pore-Water Extraction by Triaxial Compression for Unsaturated Tuff, Yucca Mountain, Nevada," to be published in Water Resources Investigations, is ready to sent out for colleague reviews.

A meeting of modelers of the unsaturated-zone at Yucca Mountain was held on August 5 at the USGS Training Center in Denver. The meeting commenced with progress and status reports from USGS, Colorado State University, and Lawrence Berkeley Laboratories and was then devoted to formulating tasks and plans for all future work.

Lawrence Berkley Laboratories will continue all ongoing tasks, provide a progress report describing the Ghost Dance fault model study, and plan to resume the combined fracture-network and matrix block model simulations.

WBS 1.2.3.4 GEOCHEMISTRY

WBS 1.2.3.4.1.1 Ground-water Chemistry

The SIP documentation for ground-water chemistry was completed by Los Alamos National Laboratory (Los Alamos) staff members and technically reviewed. It is being held until plans are clarified for the FY 87 work. Milestone report M303, "Groundwater Geochemistry at Yucca Mountain, Nevada, and Vicinity" was approved by WMPO for publication.

WBS 1.2.3.4.1.2 Natural Isotope Chemistry

The SIP documentation for this task and the associated QALAS were approved by the Los Alamos NNWSI Project Office and sent to WMPO on August 5. Suggested modifications were incorporated on August 25.

Los Alamos personnel traveled to Tucson for surveillance of the Hydro Geo Chem quality assurance (QA) program as part of the requirements to certify this vendor for NNWSI Project QA Level I work. In addition, the Hydro Geo Chem QA records from a previous contract were examined to help in the disposition of NNWSI Project Nonconformance Report No. LA-0002.

WBS 1.2.3.4.1.3 Hydrothermal Geochemistry

Los Alamos staff members provided additional information to the SIP documentation for this task and to the Site Characterization Plan (SCP). These documents emphasize the need to understand the role of aqueous silica activity in controlling mineral stability in Yucca Mountain and the need for kinetic data on the evolution of silica polymorphs; understanding is also needed of the

relationship between that evolution and evolution of aqueous silica activity. Infrared spectroscopy has been identified as a potentially useful technique for the investigation of the kinetics of silica polymorph evolution.

WBS 1.2.3.4.1.4 Solubility Determination

The solubility experiments reported under this task have been exempted from the stop-work order.

A SIP for the Los Alamos solubility determination task was submitted to WMPO for approval.

Solubility measurements at Lawrence Berkeley Laboratory (LBL) are continuing on americium, plutonium, and neptunium in Well J-13 water at pH 6, 7, and 8.5 and at 60 °C. A representative from LBL visited Los Alamos on August 11 and 12 to discuss quality assurance for the solubility measurements and a continuation of the work for next year.

A Los Alamos abstract describing a consistent set of thermodynamic data for americium hydroxide and carbonate compounds and aqueous species was submitted to the Workshop on Geochemical Modeling, to be held September 14 through 17, 1986, at Fallen Leaf Lake, California.

WBS 1.2.3.4.1.5 Sorption and Precipitation

The sorption measurements reported under this task have been exempted from the stop-work order.

Desorption measurements have been completed by Los Alamos staff members with neptunium on USW-G1-2233 crushed tuff with rock-equilibrated water from Well H-3.

The Permanent Internal Review Committees (PIRCs) for Chapters 4 and 8.3 of the SCP met at Los Alamos; several lengthy discussions were held with committee members.

At a detailed planning session on a new Los Alamos task participants discussed well-to-well tracer tests and contributions of the sorption task to this new task.

Because precipitation may have an effect on the isotherm parameters in the case of barium and strontium tracers, the potential of this effort on adsorption is being investigated at Los Alamos through the use of the MINEQL model to determine the solubility of strontium and barium. The calculated solubilities will be compared to the concentrations observed in the batch adsorption studies.

WBS 1.2.3.4.1.6 Dynamic Transport Process

A Los Alamos staff member will present an invited paper to the American Chemical Society meeting to be held September 8 through 12 in Anaheim, California.

WBS 1.2.3.4.1.7 Retardation Sensitivity Analysis

Los Alamos participants attended the Nuclear Regulatory Commission (NRC) licensing process meeting on August 26.

Los Alamos personnel completed a revised version of the SIP documentation for the retardation sensitivity analysis task.

The following Los Alamos work reported under this task was actually done for the mineralogy and petrology task, for which the stop-work order has been lifted.

A Los Alamos short paper based on earlier work on kriging for interpolation of sparse geologic data was presented as a poster session at the annual joint statistical meetings in Chicago on August 19.

An alternative kriging method, which models the data as observations of an intrinsic random function of order greater than zero (instead of residuals from a least squares fit), is being proposed for implementation at Sandia. Los Alamos personnel will also develop a two-part probabilistic model that takes the thicknesses of stratigraphic units (rather than the contacts between them) as the basic observations, together with a probabilistic fault model, to account for the imprecisely known offsets between holes.

WBS 1.2.3.4.2 Mineralogy and Petrology

A Los Alamos draft procedure on sample identification and control for mineralogy and petrology studies has been completed. This draft incorporates all of the concerns and corrections from within the Mineralogy and Petrology research group at Los Alamos; the draft is now going through technical and quality assurance review within Los Alamos. Provided within this procedure is a method for parallel tracking of samples; samples will be tracked in a write-only computer data base for sample handling within Los Alamos, as well as tracked in a chain of documents and notebooks.

Los Alamos staff members compiled a record of all past drill core and drill cuttings sample use for the task force investigating the quality level of all core studies completed to date.

Following a review by the PIRC, Los Alamos staff members made revisions to Chapter 4.1 of the SCP; the chapter is titled "Geochemistry of the Host Rock and Surrounding Units."

Complete drafts of three Los Alamos test descriptions were made for the Exploratory Shaft Test Plan (ESTP); the tests are (1) stratigraphy and variability of the devitrified Topopah Spring Member, 2) alteration history and mineralogy of past transport through the basal Topopah and upper Calico Hills, and (3) mineralogy of fractures and faults. These test descriptions will be available for the ESTP peer review to be held this fall.

A representative from the University of Missouri at Rolla visited Los Alamos on August 11 through 15 to work on a third-generation computer program for obtaining quantitative mineral abundances from bulk-rock powder x-ray diffraction data. Significant progress was made during this visit, and the program will soon be operational.

Work resumed at Los Alamos on the separation of drusy quartz from Trench 14 for stable isotope analysis of fluid inclusions. Fracture mineralogy studies are being compiled in a report (Milestone R345) on the saturated-zone fractures in USW G-4. Petrographic studies were completed and writing began for a report (Milestone R319) on the mineralogy of faults, springs, and soils around Yucca Mountain.

A Los Alamos document titled "Effects of Long-Term Exposure of Tuffs to High-Level Nuclear Waste Repository Conditions: Final Report" (LA-9330-MS) was printed and distributed. Final revisions were also made to the report "Evaluation of Past and Future Alterations in Tuff at Yucca Mountain, Nevada, Based on the Clay Mineralogy of Drill Holes USW G-1, G-2 and G-3" (LA-10667-MS).

WBS 1.2.3.5 DRILLING

WBS 1.2.3.5.2 Drilling, Construction, Engineering

USGS Test Hole UZ-8 remained at a temporary depth of 58 feet as all drilling continued to be suspended under the stop-work order.

H&N staff members submitted a revised estimate for the NNWSI Project Atlas of Field Activities (Atlas) to WMPO and SAIC. The estimate reflects a first issue of maps using existing topography in FY 86 and a second issue using new aerial survey in FY 87.

F&S personnel prepared a program for recompletion of the J-13 water well in Area 25 of the Nevada Test Site (NTS).

WBS 1.2.3.5.3 Field Geology/Hydrology

A paper on the tensiometer and transducer system was prepared by F&S staff members for a presentation at the National Water Well Association conference at Denver in October 1986.

WBS 1.2.3.6 ENVIRONMENT

WBS 1.2.3.6.1 Environmental Monitoring

Work continued at SAIC on the Radiological Monitoring Plan and the Pre-Site Characterization Radiological Monitoring Plan. A draft of the latter was forwarded to WMPO for review. A pathways analysis is also in progress to support development of the plan.

WBS 1.2.3.6.2 Transportation

SIP documentation for SAIC transportation planning was completed and submitted to SAIC quality assurance personnel in response to WMPO comments on QALAS.

The revised Transportation Studies Plan (TSP) was submitted by SAIC to WMPO. The plan was revised to more accurately reflect the nature of the current transportation work.

SAIC awarded a subcontract to DeLeuw, Cather and Company for the preparation of a plan to develop data needed to assess the feasibility of alternate rail access routes to the Yucca Mountain repository site. Data development will take place during the next 14 weeks. The plan will identify routing and access options, develop access route evaluation criteria, develop engineering and alignment for route options, perform initial evaluation of routing options, and develop work elements required to consider environmental conditions and impacts, obtain necessary approvals, and construct and operate the rail access system,

An SAIC independent review of the event frequency analysis of the U. S. Air Force (USAF) overflight risk-related study was completed. Written comments were received on improvements to the use of the methodology to assess the frequency of USAF aircraft accidents involving the Yucca Mountain repository system. Additional sensitivity analyses are recommended prior to sending the draft report to WMPO.

The SAIC transportation branch staff completed milestone E454 (Level 3) and sent it to the SAIC institutional branch. The milestone is a quarterly report on Transportation Issues. The report contains a summary of Nevada organizations with activities and positions relative to high-level waste transportation.

Staff members of the SAIC transportation branch prepared comments on DOE/HQ proposals for the delineation of boundaries for study between the project offices and DOE/HQ. The DOE/HQ proposal would limit the NNWSI Project to the state of Nevada. This was viewed as inadequate due to current and planned work for transportation and radiological monitoring. A meeting to discuss the issue further was proposed.

An SAIC representative attended a DOE/HQ sponsored meeting on risk integration on August 13 and 14. OGR staff members proposed a study to generate risk information for all waste management operations under OCRWM in FY 87. The study, to be conducted primarily by OGR, was reportedly in response to the need for risk information to report to Congress. In the opinion of the attending Project representatives and contractors, independent study of risks would damage both future efforts by the Projects in the area of risk analysis and possibly the Environmental Impact Statement (EIS) process. A compromise was worked out where OGR staff would attempt to make use of published information on risk until assessments by the individual projects could be completed.

WBS 1.2.3.7 SOCIOECONOMICS

Work continued at SAIC on the Socioeconomic Monitoring and Mitigation Plan. Staff members defined issues and parameters to be monitored and developed plans to monitor the parameters. The preliminary rough draft of the plan was submitted to WMPO for transmittal to DOE/HQ.

The draft Community Profiles Reports were reviewed by SAIC and transmitted to WMPO in early August for final policy review.

WBS 1.2.3.8 PERFORMANCE ASSESSMENT

Review of the draft SIP documentation for the EQ3/6 task has been completed by LLNL staff and will be forwarded to WMPO in September together with the associated QALAS.

The LLNL software QA requirements and procedures review has been completed and suggested changes are being evaluated. The coding standards and code development sections of the EQ3/6 SQAP have been revised. A schedule for the completion of all procedures is being prepared.

Staff members at LLNL prepared a section on "Geochemical Modeling Codes: EQ3/6" for Section 7.4.4 of the SCP; also, the section "Develop Geochemical Speciation and Reaction Modeling" was prepared for the waste package part of SCP Chapter 8.

PLANNED WORK

A Los Alamos staff member will travel to Menlo Park to help write the final draft of the USGS SIP documentation for potassium-argon age determinations, but the trip will be delayed until the stop-work order is lifted so that work can be accomplished with the USGS geophysicists on siting of volcanism drill holes.

Measurements of chlorine-36 in the calcium salts that are observed in Trench 14 might help to date the deposition of these salts. The feasibility of using this dating technique will be investigated by Los Alamos personnel.

Work on Los Alamos milestones will resume once the stop-work order is lifted. The Los Alamos work plan for this task will be revised to reflect a more reasonable and accurate milestone schedule.

At Los Alamos further evaluation will continue of x-ray diffraction data. In particular, they will compare data from the Topopah Spring Member of the Paintbrush Tuff with modal count data of the matrix, and the distribution of glass (milestones to be proposed).

Los Alamos personnel will also review and summarize work on variance of stereological volume estimation (such as the modal count procedure).

In September, Los Alamos mineral and petrology work will focus on completing Milestone R345 and on preparing reviewable drafts of Milestones R323 and R319.

Field work by SNL personnel for the site geology task will commence in FY 87.

PROBLEM AREAS

Some Los Alamos FY 87 milestones may be delayed by the relocation of analytical facilities within the Earth and Space Sciences Division at Los Alamos. The analytical instruments will be moved sequentially so that the delays will be minimized.

Existing stop-work orders for USGS and REECo have shut down all core testing activities.

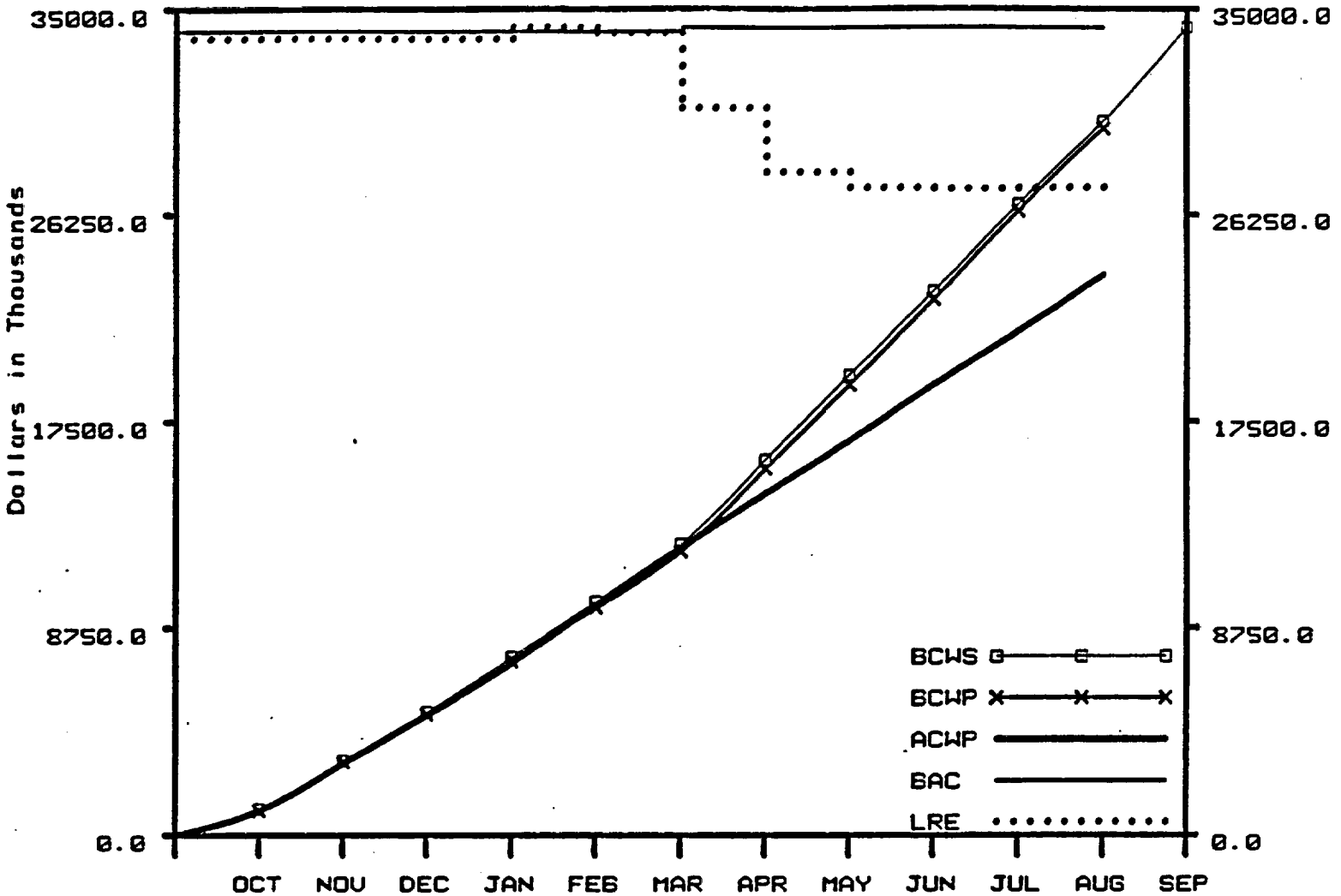
Progress on LLNL technical milestones for the EQ3/6 has been delayed due to the redirection of effort to the completion of required quality assurance documents.

MILESTONE PROGRESS

Los Alamos Milestone R308, the report "Determination of the Solubilities and Complexation of Waste Radionuclides Pertinent to Geologic Disposal at the Nevada Test Site, Quarterly Progress Report, April 1-June 30, 1986," was sent to WMPO for policy review on September 3.

The major LLNL Milestone M247 (level I), the delivery of the copper feasibility report, is on schedule. LLNL milestones in the metal barriers testing subtask are being reviewed and reevaluated as part of the SCP and SIP.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.3



SITE INVESTIGATIONS	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	3539.5	30240.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	3526.5	29949.9
C. ACTUAL COST OF WORK PERFORMED (ACWP)	2390.8	23710.5
D. BUDGET AT COMPLETION (BAC)		34224.8
E. LATEST REVISED ESTIMATE (LRE)		27390.9

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-290.7	-0.96
G. COST VARIANCE (B-C)	6239.4	20.83
H. AT COMPLETION VARIANCE (D-E)	6833.9	19.97

Remarks: WBS 1.2.3 shows a cost underrun of $6.2M, 20.8 percent under budget through August. The cost underrun and delayed schedule partially resulted from the stop-work order issued in March 1986. Site drilling, core sampling, and almost all site characterization technical activities are suspended.

COST PERFORMANCE REPORT
WBS LEVEL 4
U.S. DEPARTMENT OF ENERGY
NNWSI PROJECT

For: AUG 1986

Date: September 18, 1986

WBS NUMBER AND DESCRIPTION		YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST
1231	Management & Integration	2,490.815	2,490.523	2,086.929	-.292	403.594
1232	Geology	6,476.460	6,439.678	6,047.571	-36.782	392.107
1233	Hydrology	4,890.912	4,861.965	4,728.333	-28.947	133.632
1234	Geochemistry	5,566.900	5,302.493	5,195.100	-264.407	107.393
1235	Drilling	8,690.451	8,681.350	3,538.789	-9.101	5,142.561
1236	Environment	876.499	827.770	806.004	-48.729	21.765
1237	Socioeconomic	460.570	339.157	427.380	-121.413	-88.423
1238	Geochemical Modeling Code EQ3/6	788.000	1,007.000	880.200	219.000	126.800
1239	Deferred Site Close Out	.000	.000	.000	.000	.000
123	SITE INVESTIGATIONS	30,240.607	29,949.936	23,710.507	-290.671	6,239.429

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
M364	WMPO	1.2.3.6	Implementation of Meteorological Monitoring Plan △ 6/85								◆					
M325	LANL	1.2.3.4	Report on Geochemistry Simulation of Yucca Mountain Using Best Available Data on Mineralogy, Water Chemistry, Flow Rates & Crack Statistics										△			◇ 10/86
M897	SAIC	1.2.3.6	Final Radiological Monitoring Plan Complete					△								◇ 2/87
P029	SAIC	1.2.3.7	Draft Socioeconomic Monitoring and Mitigation Plan									△				◇ 10/86

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

1.2.4 REPOSITORY INVESTIGATIONS

OBJECTIVE

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

ACTIVITIES

WBS 1.2.4.1 MANAGEMENT AND INTEGRATION

WBS 1.2.4.1.1 Management

Work has been initiated by SNL staff members on the FY 87 budget and milestone information for the Management Information System Survey. Other activities scheduled for this WBS task during August 1986 were suspended because of the effort required for the activities of SCP PIRC 6.

WBS 1.2.4.1.2 Basis for Design

Personnel from Bechtel National, Inc., Parsons Brinckerhoff Quade & Douglas, and SNL attended a meeting on August 4 and 5, 1986, in San Francisco, California, to update the subsystem design requirement. The changes are implemented by Engineering Change Request #004. Engineering Change Request #002, "18-Assembly Boiling Water Reactor Consolidation Container," was approved for use in the OGR consolidation and option studies being performed by the Project architect/engineers.

A sample men-and-materials shaft interface control drawing was produced by Parsons Brinckerhoff Quade & Douglas.

WBS 1.2.4.1.3 Major Design Deliverables

At SNL preparation of Chapters 6, 7, and 8 of the repository conceptual design in support of the site characterization and quality assurance level assignments superseded all other activities under the major design deliverables task for the month of August 1986.

WBS 1.2.4.1.5 Management and Integration Support

Staff members at SAIC provided SCP Chapter 6 PIRC review comments to WMPO and initiated PIRC review comments for SCP Chapter 8.

WBS 1.2.4.2 DEVELOPMENT AND TESTING

WBS 1.2.4.2.1 Rock Mechanics

WBS 1.2.4.2.1.1 Rock Mass Analysis

Efforts by SNL staff to complete the modified work plans, the QALAS, and SCP Chapters 6 and 8 superseded all other work under this task. The modified work plans and QALAS were approved by WMPO. Text inputs for SCP Chapters 6 and 8 were completed and submitted for review.

WBS 1.2.4.2.1.3 Laboratory Properties

SNL staff members involved in the laboratory properties task participated in the preparation and review of quality assurance procedures required in support of the SNL Quality Assurance Program Plan (QAPP) and SCP-related work on Chapters 2, 6, and 8.

The SNL document entitled "Effects of Sample Size on the Mechanical Properties of Topopah Spring Tuff" (SAND85-0709), was approved for publication. Final report preparation is in progress.

WBS 1.2.4.2.1.4 Water-Migration Analysis

FY 87 budget and milestone information for SNL was prepared and submitted for approval. No other activities were completed at SNL for this task because of the staff's involvement with the SCP. Sections of the SCP that are the responsibility of PIRC 3 were reviewed and comments provided to the chairman of the committee.

Management review comments on the SNL document entitled "Calculation of Hydrologic Properties for Tuffs from Yucca Mountain, Nevada, Using Mercury Porosimetry Results" (SAND86-0286), have been received and are being incorporated. The report supports the completion of Milestone N498. The milestone has been delayed because of involvement in SCP activities.

The conference paper entitled "Influence of Transverse Microfractures on the Imbibition of Water into Initially Dry Tuffaceous Rock" (SAND86-0420C) was submitted to WMPO for approval. The paper will be presented at the next American Geophysical Union meeting.

WBS 1.2.4.2.2 Equipment and Instrumentation Development

Agreement was reached between quality assurance personnel at SNL and the Robbins Co. on the quality assurance plan for fabrication and testing of the development prototype boring machine. All quality assurance related matters pertinent to this contract have now been resolved.

Work by SNL staff during the past several weeks has focused on completing Milestone M295, feasibility analysis of horizontal emplacement and retrieval, which must be completed prior to placement of the contract for the development prototype boring machine. A report has been written that assesses the feasibility of emplacing waste in the horizontal orientation and developing the necessary equipment. The report is currently in management review.

WBS 1.2.4.2.3 Sealing

WBS 1.2.4.2.3.1 Seal Performance Requirements

SNL staff members continued preparation of Milestone P404, "Performance Goals, Design Requirements, and Materials Recommendation for the NNWSI Project Repository Sealing Program." As part of this effort, Chapters 4 through 7 were prepared and Chapters 1 through 3 revised. No additional calculations to support the document are planned, but existing calculations are being verified.

WBS 1.2.4.2.3.2 Seal Materials Evaluation

Work efforts by SNL personnel continued on supporting documents for the SCP. These include "Preliminary Survey of Silica-Rich Cementitious Mortars (82-22 and 84-12) with Tuff," "Reactivity of a Tuff-Bearing Concrete: CL-40 CON14," and "Ancient Concrete Studies as Analogs of Cementitious Sealing Materials for a Tuff Repository."

Sealing materials evaluation conducted at Los Alamos and through Los Alamos at Pennsylvania State University will be terminated at the end of September. Current work is directed to completing three reports: "Preliminary Survey of the Stability of Silica-Rich Cementitious Mortars (82-22 and 84-12) with Tuff," "Reactivity of a Tuff-Bearing Concrete: CL-40 CON-14," and "Ancient Concrete Studies as Analogs of Cementitious Sealing Materials for a Tuff Repository."

Pennsylvania State University has also been requested by Los Alamos to summarize additional work that they believe would be necessary if cementitious sealing materials are to be incorporated in a repository design.

WBS 1.2.4.2.3.3 Seal Concepts Development

During August 1981, SNL staff members identified sealing design options and defined associated design requirements. These options include all of the potential design options that may be required depending on the hydrologic conditions encountered at Yucca Mountain. All options will be evaluated during the Advanced Conceptual Design using trade-off analyses to arrive at a reference design.

WBS 1.2.4.3 FACILITIES

WBS 1.2.4.3.2 Surface Facilities

Draft reports on the preclosure safety-analysis study and Q-list for items important to safety are currently under SNL internal technical review. Development of a Q-list for items important to retrievability and waste isolation during the preclosure period is also underway.

WBS 1.2.4.3.4 Underground Excavations

SNL received a report prepared by Parsons Brinckerhoff Quade & Douglas entitled "Study of the Significance of Rock Discontinuities and State of Stress to Underground Openings." this report will be peer-reviewed for publication as a contractor-prepared SNL document.

Parsons Brinckerhoff Quade & Douglas staff members have prepared inputs for the Site-Generated Waste and the Repository Options Study being prepared at Bechtel National, Inc. The site-generated waste study will include a proposal for onsite, underground disposal. For this option, Parsons Brinckerhoff Quade & Douglas will prepare cost estimates for the excavations required.

The tour of mines in welded tuff at Creed, Colorado, was conducted on August 21, 1986. The results of the observations made during this tour have not yet been compiled.

WBS 1.2.4.3.5 Underground Service System

Work is underway at SNL to analyze the effects of mine ventilation fan reversal. This work is being done to build a definitive case for excluding fan reversal as a requirement for the ventilation system design.

SNL staff members are researching the potential for design problems related to the accumulation of radon and its daughter elements in repository underground facilities. The research will support an evaluation of the currently proposed approach of using ventilation to control repository worker hazards that may be associated with radon emanation from excavated rock. Current work involves a literature and record search. Further work may involve meeting with the NTS personnel responsible for radon monitoring at the NTS tunnel facilities to obtain the data that they have acquired.

WBS 1.2.4.4 OPERATIONS AND MAINTENANCE

Bechtel National, Inc. (BNI), continued the development of requirement allocation sheets and timeline diagrams. Parsons Brinckerhoff Quade & Douglas now has the contractual requirements in place and is ready to proceed with the engineering of the Reference Configuration Operations Plan.

The SNL staff reviewed a proposed revision (dated July 7, 1986) of Appendix B.1, Waste Source System Interface, of the Generic Requirement Document. Comments were submitted in several areas of potential importance to the design of the Yucca Mountain repository:

1. The proposed revision retains two-stage waste-handling building construction and at-repository fuel consolidation as design requirements. In view of the conclusions reached in the NNWSI Project fuel consolidation study, it was suggested that these design features should be optional.

2. Despite the recent delay in the schedule for the second repository, the revision specifies that only half of the 8,000-metric-tons-uranium inventory of defense high-level waste and only half of the 640-metric-tons-uranium inventory of West Valley high-level waste will be disposed of in the first repository. The suggestion was made that it may be more cost effective to emplace the entire inventory in just one--preferably the first--repository. The unique configuration of the defense and West Valley high-level waste canisters, the relatively small inventory of those waste types, and the need for separating "commercial" and "defense" costs all support one-repository disposal.

It was also noted that there might be an advantage to removing all the West Valley high-level waste from the West Valley facility as soon as possible after the first repository becomes operational.

3. The new schedule for spent fuel discharge (from reactors) is based, in part, on the "mid-case reference increasing burnup scenario" of DOE/EIA-0436 (85). The suggestion was made that the proposed change to a high-burnup fuel cycle be baselined as soon as possible because of its possible effect on disposal container and emplacement panel design.

A revised draft of the "Report on Spent Fuel Rod Consolidation" (Milestone R266) is currently under review at SNL.

A preliminary repository life-cycle cost estimate for Case 1 (no monitored retrievable storage, at-repository consolidation) of the OGR fuel consolidation study has been completed. The cost estimate for Case 2 (no monitored retrievable storage, no consolidation) will be completed in early September 1986. Work on Case 3 (monitored retrievable storage, consolidation at monitored retrievable storage facility) and Case 4 (monitored retrievable storage, no consolidation) has been delayed by other cost-estimating activities.

On August 21, 1986, representatives of DOE/HQ and R. F. Weston, Inc., visited SNL to review the NNWSI Project progress in the OGR consolidation study. The same team had reviewed the basalt and salt programs on the previous two days, so NNWSI Project personnel had the benefit of feedback from the earlier meetings. Preliminary NNWSI Project facility design drawings were reviewed during the meeting but were not released for later in-depth study by DOE and Weston. Review team comments generated as a result of this meeting will be discussed in detail at the September 3, 1986, design review meeting to be held at Bechtel National, Inc.

WBS 1.2.4.5 DECOMMISSIONING

The work plan for this SNL task has been rewritten, reviewed, and approved by SNL and DOE quality assurance and management groups. Milestone P312, a deliverable report entitled "A Preliminary Plan for the Decommissioning of the Yucca Mountain Repository" (SAND85-1965), has been rescheduled from August 1, 1987, to February 1, 1988.

WBS 1.2.4.6 REPOSITORY PERFORMANCE ASSESSMENT

WBS 1.2.4.6.1 Repository Performance Code Development and Certification

The modified work plans and QALAS for this SNL task were approved by WMPO. Text inputs to chapters 6 and 8 were completed and submitted for review.

On August 7 and 8, 1986, SNL personnel and representatives of LLNL, Los Alamos, and the USGS participated in an ESTP workshop on thermal and mechanical field tests. The primary objective of the workshop was to ensure that the thermal and mechanical tests currently planned for the exploratory shaft adequately

address the design, model validation, and performance-assessment data needs as presently defined. The principal investigator for this WBS task led a discussion on thermomechanical needs for model validation. Recommendations for parameters and physical phenomena of importance to design, model validation, and performance assessment were made to the group.

Work will continue by RE/SPEC for the next few months to revise and edit the report "The SPECTROM-31 Compliant Joint Model: Verification and Validation Studies" based on preliminary comments provided to the contractor by SNL staff. The report summarizes the material model's capabilities and assesses the range of stress states for which it can be applied to problems.

RE/SPEC, Inc., staff completed and summarized in a draft letter report the work on Thermomechanics Analysis #12, "JEM Verification Calculations--Phase I." SNL staff reviewed and returned the report to RE/SPEC. The work includes four sets of analyses designed to verify aspects of the joint behavior at different loading conditions. Four verification tasks have been completed: Task 1, normal stress/normal strain response; Task 2, shear stress/shear strain response under constant normal stress applied normal to joint set (with and without dilatation); and Task 4, shear stress reversals. These analyses were all single-element problems. A final letter report will be revised and submitted in August 1986.

WBS 1.2.4.6.2 Design Analysis

During August 1986, work was begun by SNL staff members on a memo comparing the capacity of Yucca Mountain to the size of the underground facility. This memo reviews current information considering the effects of areal power density, uncertainty in the geology, and waste characteristics to determine the area available and compare it to the area needed. Recommendations for site characterization and designs are made.

The SNL memo documenting the COVE III calculations done with the code ARRAYF was corrected and reissued for inclusion in the RCD/SC as an appendix.

Staff of Agapito and Associates reviewed the draft document entitled "Sensitivity Analyses of Underground Drift Temperature, Stresses, and Safety Factors to Variation in the Rock-Mass Properties of Tuff for a Waste Repository, Yucca Mountain, Nevada" (SAND86-1250), which will satisfy Milestone N457. The reviewers indicated that additional probabilistic calculations comparing the results of different approaches would enhance the document. Consequently, coding was developed and tested using Monte Carlo simulation and second-order uncertainty techniques. The comparison of results between these methods and the point estimate method will be documented in an appendix to SAND86-1250.

Agapito and Associates responded to a SNL draft problem-definition memo defining the reference calculation for the vertical emplacement borehole. Because of the three-dimensional nature of the problem, additional effort is required in the planning of this future work.

WBS 1.2.4.6.3 Preclosure Safety Analysis

Based on comments made by WMPO, changes were made by SNL staff members to the modified work plan and the QALAS submitted during July 1986. The altered modified work plan and QALAS were resubmitted to WMPO and have been approved.

Work on the development of a Q-list for the SCP and the RCD/SC began at SNL and considerable progress has been made. Bechtel National, Inc., has submitted the first section of the Q-list report for SNL review and comment. The first section deals with the identification of items important to safety and relies heavily on the work done by Bechtel for the Preliminary Preclosure Radiological Safety Analysis for Accident Conditions (this report is currently undergoing comment resolution). The rest of the Q-list report will deal with the identification of items important to retrievability and items important to waste isolation.

Members of the SNL staff began review of the NRC "Draft Generic Technical Position on Items and Activities in the High-Level Waste Geologic Repository Program Subject to 10 CFR Part 60 Quality Assurance Requirements. This is NRC guidance on the development of a Q-list.

A first review of the NRC draft Generic Technical Position suggests that a conflict may exist between the current SNL and NRC definitions of items and activities important to waste isolation. Also, the NRC Generic Technical Position does not recognize items important to retrievability, but only items and activities important to safety and waste isolation.

PLANNED WORK

Participants at a meeting scheduled in Las Vegas, Nevada, during the week of September 8, 1986, will discuss the systems engineering focus on the design work. It is anticipated that the SDR may require some revision as a result of DOE direction given at this meeting.

SCP Chapters 6 and 8 will be modified through the PIRC process, and this work will supersede all work planned for the rock mass analysis task at SNL. All work schedules are expected to be delayed.

The SNL pressurized slot testing will resume with WMPO approval of quality assurance level assignments for the field testing task.

The following work is planned for the SNL laboratory properties task for September through November 1986:

Two draft reports on properties of the Topopah Spring Member will be completed. The report subjects include thermal properties of lithophysae-rich material and a summary of bulk, thermal, and mechanical properties of matrix material.

Contracts will be placed to perform heat-capacity measurements and high-temperature, low-strain-rate tests.

Mechanical testing will be initiated (assuming approval of quality assurance level assignments) to determine matrix tensile strength and potential anisotropy of compressive strength and elastic properties of the welded, devitrified Topopah Spring Member.

Upon completion of SNL Milestone M295, the contract for the development prototype boring machine will be placed with the Robbins Co. It is anticipated that the contract will be placed by October 1, 1986.

Work on SNL Milestone P404 will continue. SNL work on the extended exploratory shaft performance analyses study will resume.

When the required SNL quality assurance documents and procedures have been prepared for the surface facilities task, other special studies will be initiated.

A design review and status meeting for the Reference Configuration Operations Plan is scheduled for September 3 and 4, 1986, in San Francisco, California. The block flow diagrams and the in-process issues of the timeline diagrams, requirement allocation sheets, and sketches of the repository facilities will be compared for design compatibility.

Work at SNL on the SCP and the RCD/SC will continue at SNL through the end of this calendar year.

SNL staff members will begin preparation of written documentation of SPECTROM-31 and the Joint Empirical Model. Other efforts at SNL will concentrate on writing a plan for documenting compliant joint material models.

SNL personnel will continue to work on preparing reports of contractor work (Milestone N414 and N452) and other documentation required for support of the SCP. The PIRC 8 review of the SCP radiological safety section will begin and should be completed.

Plans for radiological-safety analyses of normal and accident conditions to support the advanced conceptual design will be discussed by SNL and Bechtel staff members; work will begin on these tasks at a later date. Performance allocation for Issues 2.2, 2.3, 2.4, and 2.7 will also be discussed with staff at Bechtel.

PROBLEM AREAS

The limitations on SNL special studies imposed by the requirement for completing QA documentation may affect the schedule of the advanced conceptual design special studies and the development of the reference configuration for the advanced conceptual design.

Because of the delayed start by Parsons Brinckerhoff Quade & Douglas on the Reference Configuration Operations Plan, special effort by SNL staff will be required to integrate its activities with those of Bechtel National, Inc., to maintain a cohesive engineering work effort.

MILESTONE PROGRESS

The SNL Milestone R083, numerical analysis of small-diameter heater experiments, has been delayed.

The SNL peer review of a contractor report by Bechtel National, Inc., was interrupted during August 1986 in order to accomplish the quality assurance related work required for the activities in the engineering design support, special studies, task. This SNL Milestone R060 is entitled "An Engineering Study of the Impact on Costs and Schedules of Using a Monitored Retrievable Storage Facility in Conjunction with a Repository in Tuff at Yucca Mountain" (SAND85-7112). The estimated completion date for this milestone is January 16, 1987.

SNL Milestone R086, the definition of technical procedures required to be prepared for exploratory shaft testing, will be completed on schedule by September 30, 1986.

The SNL Milestone R083, numerical analysis of small-diameter heater experiments, has been delayed.

Two SNL Milestones are delayed: M437, the report on pressurized slot measurements, with an estimated date of June 30, 1987, and M455, the report on G-Tunnel underground facility summary, with an estimated date of November 1, 1986.

SNL Milestone N444, G-Tunnel small-diameter heater experiments, was completed on August 19, 1986.

The estimated date for delivery of SNL Milestone N429, parameter effects on mechanical properties of the Topopah Spring Member, is October 31, 1986.

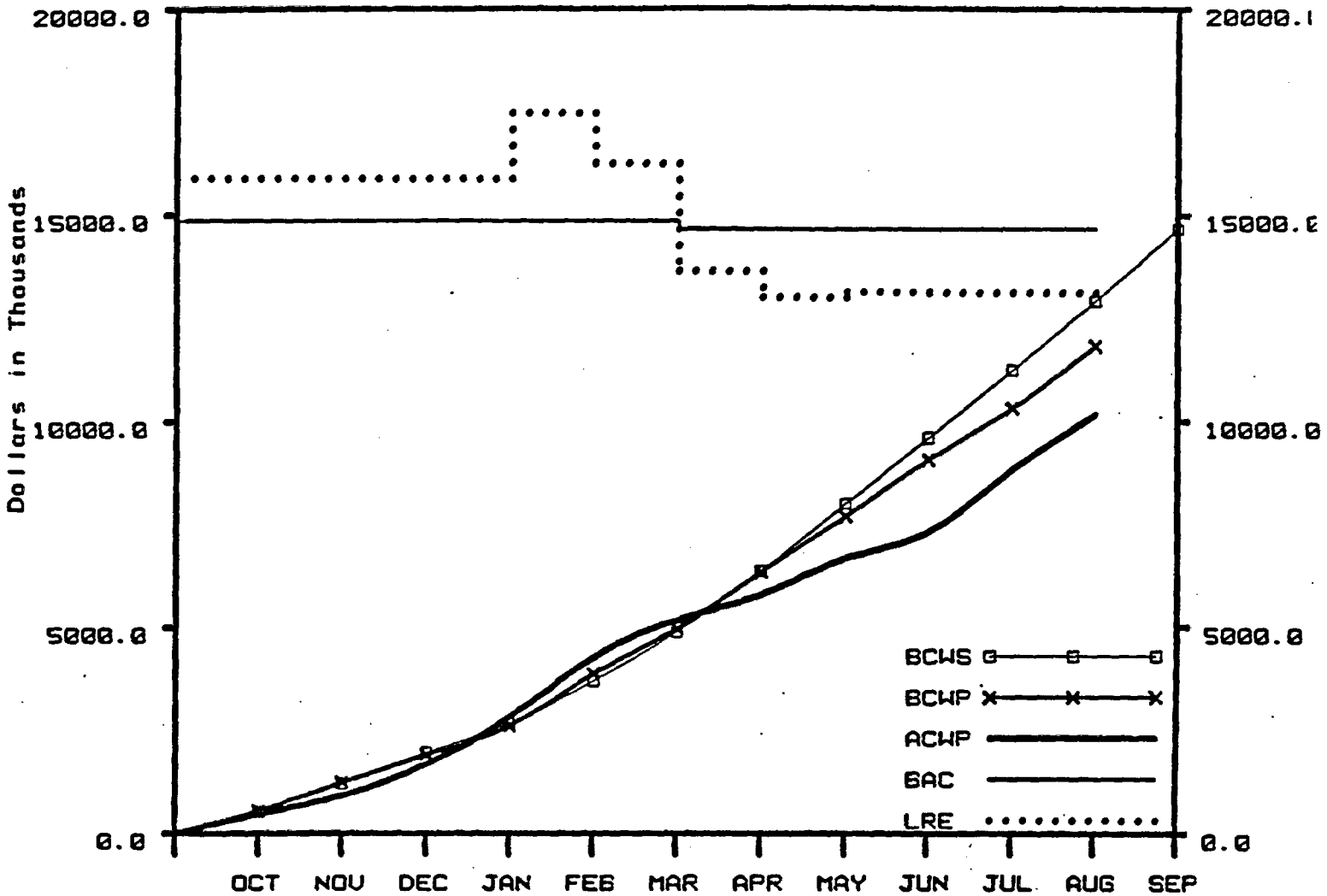
The SNL Milestone N427, the task to initiate procurement of development prototype boring machine, has been delayed. The new estimated date is October 1, 1986.

Milestone P131, the SNL report on an all-electric transporter for waste at the Yucca Mountain repository, is on schedule for the due date of September 30, 1986.

SNL Milestone R766, completing the Phase I reference configuration, is delayed. The new estimated date of completion is December 1, 1986.

Two SNL Milestones, N463, system requirements and design guidance for control of radiation exposures associated with naturally occurring radioactivity at the prospective Yucca Mountain repository, and N464, normal conditions, accident scenarios, and source terms for preclosure safety analysis of the prospective Yucca Mountain repository, have been delayed by work on the SCP and quality assurance level assignments and will be rescheduled.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.4



REPOSITORY INVESTIGATIONS	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1669.0	12984.9
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1504.2	11819.7
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1333.2	10159.9
D. BUDGET AT COMPLETION (BAC)		14664.6
E. LATEST REVISED ESTIMATE (LRE)		13092.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-1085.1	-8.41
G. COST VARIANCE (B-C)	1659.8	14.04
H. AT COMPLETION VARIANCE (D-E)	1572.6	10.72

Remarks: WBS 1.2.4 shows a cost underrun of $1.6M, 14.0 percent under budget through August. The cost underrun and behind-schedule condition are a result of the delay in the start of the Repository Advanced Conceptual Design (ACD), the redirection of resources to the SCP, and the stop-work order.

COST PERFORMANCE REPORT
WBS LEVEL 4
U.S. DEPARTMENT OF ENERGY
NNWSI PROJECT

For: AUG 1986

Date: September 18, 1986

WBS NUMBER AND DESCRIPTION		YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST
1241	Management and Integration	4,427.283	4,427.170	4,079.418	-.113	347.752
1242	Development and Testing	4,473.600	3,389.316	3,296.500	-1,084.284	92.816
1243	Facilities	2,506.000	2,505.335	1,780.000	-.665	725.335
1244	Operations and Maintenance	388.000	388.014	317.000	.014	71.014
1245	Decommissioning	41.000	41.000	.000	.000	41.000
1246	Repository Performance Assessment	1,069.000	1,068.912	687.000	-.088	381.912
124	REPOSITORY INVESTIGATIONS	12,904.883	11,819.748	10,159.918	-1,085.135	1,659.830

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
N457	SNL	1.2.4.6	Preliminary Study of the Effects of Uncertain Geologic Data on Design of the Underground Facility											△		◇ 2/87
P404	SNL	1.2.4.2	Prepare Design Requirements & Materials Recommendation Report										△		◇	
M802	SNL	1.2.4.1	Review of Concepts Developed by HEDL for Remote/ Automated Waste Handling Systems										△	◆		
M806	SNL	1.2.4.1	Assistance to HEDL in Defining Remote/Automated Waste Handling Systems	△											◇	
N430	SNL	1.2.4.1	Start Repository Advanced Conceptual Design △ 9/85													◇ 11/86
N432	SNL	1.2.4.1	Repository Conceptual Design in Support of Site Characterization △ 9/85													◇ 12/86
N433	SNL	1.2.4.1	Initial Subsystem Design Requirement (SDR)	△												◇ 10/86
M295	SNL	1.2.4.2	Feasibility Analysis o Horizontal Emplacement & Retrieval - Letter Report	△											◇	◇ 11/86
N406	SNL	1.2.4.2	Horizontal Waste Emplacement Equipment Development Plan △ 8/85													◇ 10/86
M455	SNL	1.2.4.2	Report on G-Tunnel Underground Facility (G-TUFF) Summary												△	◇ 11/86

△ PLANNED MILESTONE COMPLETION DATE ◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED ◆ COMPLETED AS REVISED

1.2.5 REGULATORY AND INSTITUTIONAL INVESTIGATIONS

OBJECTIVE

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

ACTIVITIES

WBS 1.2.5.2 LICENSING

WBS 1.2.5.2.1 Regulatory Interactions

Planning for future NRC interactions continued at SAIC with the identification of and schedule development for interaction prerequisites. Currently there are ten interactions proposed. They are primarily based on information in the SCP and are scheduled in accordance with the SCP schedule.

A coordinating group has been formed at SAIC to implement the SNL proposal on data transfer and management. One result of this work will be the capability of the NNWSI Project to satisfy the requirements of the DOE/NRC Site-Specific Agreement regarding the data catalog and data availability.

The procedures for NRC interactions are nearing completion as NNWSI Project Administrative Procedures. The procedures are:

7.1 Conduct and Documentation of NRC Meetings.
7.2 Attendance at Technical Meetings with the NRC Conducted by other Projects.
7.3 Scheduling and Preparation for NNWSI Project/NRC Technical Meetings.
7.4 Scheduling and Preparation for NNWSI Project/NRC Management Meetings.
7.5 Controlling Data Release.
7.6 Communications with the NRC.
7.7 NNWSI Project Interactions with the NRC OR.

During August, the NRC released its final procedural amendments to 10 CFR 60 and five generic technical positions (GTPs). The SAIC regulatory branch summarized the procedural changes to 10 CFR Part 60 for WMPO and the TPOs and drafted an analysis of the effects of the changes on the exploratory shaft. The analysis was sent to DOE/HQ. SAIC comments on the Peer Review GTP and Qualification of Existing Data GTP were also sent to DOE/HQ.

The SAIC regulatory branch completed a report, An Evaluation of Repository Boundary and Area Definitions, for WMPO.

Staff members at SAIC completed compilation and reproduction of the Regulatory Document Manual in August. The manual was distributed on a controlled basis to WMPO and all NNWSI Project participants.

The Final "NNWSI Project Information Management System Concepts Evaluation Report was issued by SAIC during August. Copies of the final report were transmitted on the standard DOE distribution list and to OSTI.

SAIC personnel completed a supplement on management to the FY 88 Information Technology Resources Long-Range Site Plan during August and transmitted it to WMPO for approval.

The draft generic technical position paper entitled "Peer Review for High-Level Nuclear Waste Repositories, June 1986" was reviewed by SNL personnel and comments submitted to WMPO.

To provide background information on the licensing process, a one-day licensing briefing was held on August 27, 1986, in Albuquerque. NNWSI Project personnel from SNL and the major contractors attended.

WBS 1.2.5.2.2 Site Characterization Plan

The process for completing the SCP is continuing at SAIC through the use of the PIRCs. The status of the PIRCs is as follows:

PIRC 1, Geology with Tectonics and Erosion. Comment Response Forms were received and a review meeting was held August 20-22 in Las Vegas. Most comments were resolved for Chapter 1. Those comments not resolved during the meeting are being resolved at present. Section 1.7 is being rewritten and has not been received by the PIRC as yet. It will be available September 18, 1986. An additional meeting is planned in September 1986 to review the Chapter 8 sections.

PIRC 2, Geoengineering with Rock Characteristics. The comments on Chapter 2 have been resolved. The Chapter 8 material is undergoing revision, primarily to add an issue resolution strategy to each of the issues. The issue resolution strategy will be developed with the USGS and the resulting text will receive additional review by PIRC 2.

PIRC 3, Hydrology with Ground-Water Travel Time. A review meeting was held August 25 through 29 in Las Vegas. Some sections of Chapter 3 are to be rewritten, while other sections will be modified based on the PIRC comments. The Chapter 8 sections will be modified to include issue resolution strategies and justification for the characterization activities. Resolutions may not be available until late October 1986.

PIRC 4, Geochemistry with Dissolution and Total Releases. A review meeting was held in Los Alamos. Comments on Chapter 4 are being resolved. The Chapter 8 sections are being modified to satisfy the level of detail requirements from DOE/HQ.

PIRC 5, Meteorology and Climate. A comment consolidation meeting was held August 11 through 14. Some sections of Chapter 5 have been rewritten. Questions regarding plans to examine future climates will be addressed in a meeting in Boulder on September 23, 1986.

PIRC 6, Repository Design with Seals. PIRC 6 held its first comments resolution meeting in Albuquerque, New Mexico, on August 11 through 13, 1986, to resolve reviewer comments on Section 6.0 through 6.2. A second meeting was held on August 25 through 29, 1986, to resolve comments on Sections 6.3 and 6.4, and those subsections of 8.3.2, 8.3.3, and 8.3.5 assigned to this committee. Approximately 1,000 comments were discussed and resolved. Mark-up of the text to reflect the resolutions is in progress. A completed draft of this package should be available by mid-September 1986.

PIRC 7, Waste Package. This package will be sent out in September 1986.

PIRC 9, Reference Verification. Chapters 2 and 4 have been sent out for reference verification. Chapters 1, 3, and 6 are being prepared for verification.

PIRC 10, Site Preparation. This package is on hold pending guidance from WMPO.

PIRC 11, Schedules. Initial schedules have been developed based upon the draft input provided with Section 8.3. These will be updated as new information becomes available.

PIRC 12, Performance Assessment. Approximately 50 percent of the material for this PIRC is being reviewed. A review meeting is scheduled for late September 1986.

PIRC 13, Higher Level Findings. This material is expected to be distributed in early September 1986.

PIRC 16, Editorial Consistency Review. This PIRC should begin its work in early September 1986.

Revisions to the SCP Management Plan are being made by SAIC personnel to incorporate the PIRC review process and a new SCP management structure. The revisions will be reviewed by the SCP Management Group before being submitted to WMPO for approval.

A meeting was held to discuss the level of detail in the SCP and the development of the study plans. It appears that, in general, the level of detail presently in Section 8.3 is sufficient for DOE/HQ. DOE/HQ is still insisting on a December 1986 completion date for the SCP.

At SAIC/Golden, SCP-related activities during August included: (1) participation in the PIRCs for the Geology, Hydrology, and Climatology portions of the site characterization plan; (2) coordination of revisions to SCP Chapter 8; and (3) technical reviews of the NRC ground-water travel time position paper and the USGS hydrologic prototype test plans. SCP-related input to the USGS scientific investigation planning documentation was also prepared.

A revised list of USGS study prepared as a part of SCP-related activities. The study plan list was updated to reflect a closer SCP association and to reduce the total number of documents required. Present estimates are that about 30-35 study plans will need to be prepared as SCP supporting documents.

SAIC/Golden SCP staff met with USGS managers to express concerns about the general PIRC process and to discuss concerns about the major technical programs. Technical workshops (formal and informal) were tentatively planned for climate modeling, the hydrology program, and the tectonics program These meetings will involve DOE Project and USGS staff. SAIC/Golden SCP staff met with the USGS Regulatory Analysis section chief to discuss future directions in supporting the SCP, PIRC, and Study Plan activities.

Reviews of "Generic Technical Positions on Groundwater Chemistry and Peer Review for High Level Nuclear Waste Repositories" were completed by Los Alamos personnel and sent to WMPO.

Contributions from Los Alamos were revised and incorporated in the letter to the State of Nevada regarding field and experimental activities that are ongoing and planned at Yucca Mountain.

WBS 1.2.5.3 ENVIRONMENTAL COMPLIANCE

WBS 1.2.5.3.1 Environmental Assessment

The EA Administrative Record was reviewed by SAIC staff for completeness, updated, and submitted to WMPO. Activities in this cost account ended this month.

WBS 1.2.5.3.2 Environmental Impact Statement

The DOE/HQ EIS Implementation Plan Working Document was reviewed by SAIC personnel and comments were provided to WMPO for submittal to DOE/HQ at the working group meeting in Denver on August 21.

WBS 1.2.5.3.3 Environmental Regulatory Interaction

The draft Environmental Permit Plan (EPP) was reviewed by WMPO and revised in August. The revised plan will be ready for review in September 1986. Preparation of the permit applications continued during this report period. Representatives from SAIC attended the DOE/HQ Environmental Regulatory Working Group meeting in Denver on August 20.

SAIC staff members submitted a draft of the Environmental Monitoring and Mitigation Plan to WMPO on August 29 for submittal to DOE/HQ. DOE/HQ comments are due in September 1986.

A revised draft of the Issues Hierarchy Key Issue 3 was prepared and sent to the NNWSI Project Issues Hierarchy Working Group for review. Staff members attended the DOE/HQ Key Issue 3 Working Group meeting on August 19 in Denver. Work has also begun on preparing the EPP that will explain how issues and information needs will be resolved. A draft EPP Annotated Table of Contents was presented to WMPO for review.

WBS 1.2.5.4 COMMUNICATION AND LIAISON

WBS 1.2.5.4.1 Institutional Studies

Background material for use in consultation and cooperation negotiations was prepared in August. Preparation of this material will be an ongoing task.

SAIC staff members completed a preliminary draft of the "NNWSI Project Facility Specific Outreach and Participation Plan" and submitted it to WMPO for review.

PLANNED WORK

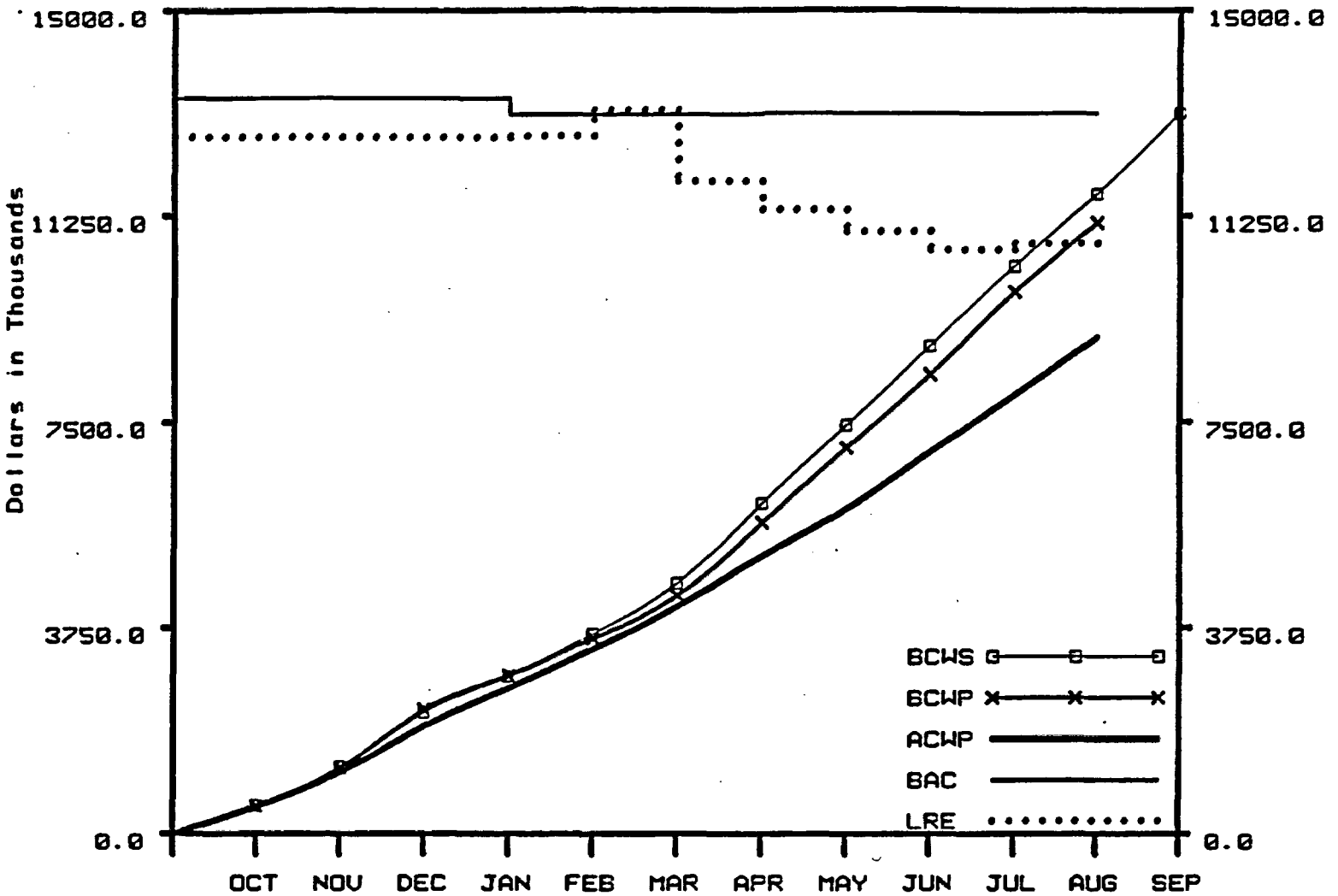
Staff members at SNL will finalize plans to set up a seminar for the NRC licensing briefings. This seminar is tentatively planned for August 27, 1986, at SNL.

PIRCs 8 and 12 have scheduled reviews and comment-resolution meetings in September 1986.

MILESTONE PROGRESS

The Los Alamos Milestone M578 has been reached by submission of the draft sections of 8.3 of the Site Characterization Plan to WMPO.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.5



REGULATORY AND INSTITUTIONAL INVESTIGATIONS	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1311.3	11646.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1260.4	11119.3
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1043.8	9027.7
D. BUDGET AT COMPLETION (BAC)		13103.0
E. LATEST REVISED ESTIMATE (LRE)		10741.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-526.8	-4.52
G. COST VARIANCE (B-C)	2091.7	18.81
H. AT COMPLETION VARIANCE (D-E)	2362.0	18.03

Remarks: WBS 1.2.5 shows a cost underrun of $2.1M, 18.8 percent under budget through August. The cost underrun is created by delays from the State of Nevada in requesting their approved state grant money.

COST PERFORMANCE REPORT
WBS LEVEL 4
U.S. DEPARTMENT OF ENERGY
NNWSI PROJECT

For: AUG 1986 Date: September 18, 1986

WBS NUMBER AND DESCRIPTION		YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST
1251	Management and Integration	700.132	700.013	726.657	-.119	-26.644
1252	Licensing	5,386.327	4,920.984	5,174.490	-465.343	-253.507
1253	Environmental Compliance	1,328.856	1,267.552	1,188.646	-61.304	78.906
1254	Communication and Liaison	266.645	266.646	234.195	.001	32.451
1255	Technology and Financial Assistance	3,964.153	3,964.139	1,703.689	-.014	2,260.450
125	REGULATORY AND INSTITUTIONAL INVESTIGATIONS	11,646.113	11,119.333	9,027.677	-526.780	2,091.656

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
M521	SAIC	1.2.5.2	Draft Site Characterization Plan △ 10/84											◇		◇ 10/86
M522	SAIC	1.2.5.2	Site Characterization Plan △ 5/85													◇ 12/86
M504	SAIC	1.2.5.3	Final Environmental Assessment				▲									
M855	SAIC	1.2.5.2	Issue IMS Requirement Study to WMPO/NV for Review and Comment												△	◇ 12/86
P054	SAIC	1.2.5.3	Revised Camera-Ready Environmental Assessment/Comment Response Appendix							▲						

△ PLANNED MILESTONE COMPLETION DATE ◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED ◆ COMPLETED AS REVISED

1.2.6 EXPLORATORY SHAFT INVESTIGATIONS

OBJECTIVE

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

ACTIVITIES

WBS 1.2.6.1 MANAGEMENT AND INTEGRATION

SAIC personnel supported WMPO in the development and transmittal of the Subsystem Design Requirements Document (SDRD) to the architect-engineers (AEs).

The SAIC engineering staff prepared a draft for WMPO of the outline for the ESF study plan and reviewed and provided comments on the AE study plans outline for the ESF conceptual design. They also attended meetings with F&S and H&N to initiate work related to the ESF study plans.

SAIC engineering staff members began preparation of the ESF interface control procedure to comply with QA requirements for the release of the stop-work order.

WBS 1.2.6.1.1 Exploratory Shaft Management, Planning, and Design Review.

Los Alamos personnel completed Appendix B to the ESF Subsystems Design Requirements document in draft form. Before being issued, it is being reviewed by the appropriate participants, including Stearns-Catalytic.

A new computer program for program and project management, entitled "Primavera," was installed by F&S at Los Alamos. The computer is still lacking a plotter and some software. This problem should be solved soon. All the available information of network logic and cost for prototype testing was input to the new computer program. This information came from the Principal Investigators, SAIC, Los Alamos, REECo, F&S, and H&N. At present, the network diagram is being plotted by SAIC from a second (synchronized) data base.

The estimate for the cost of prototype testing was completed and is currently being reviewed by Los Alamos personnel. It includes both construction support of prototype testing and the actual prototype testing. Some of the tests were scaled down and combined in order to reduce the costs of the tests and to reduce the need to make extensive modifications to the G-Tunnel utilities systems.

A meeting was held at SAIC in Las Vegas on August 20 to discuss prototype testing. Representatives of the Bureau of Reclamation, SNL, F&S, H&N, SAIC, and Los Alamos were present. Representatives from SNL discussed the limitations of G-Tunnel and work that will be done concurrently (in G-Tunnel) with the prototype testing. The SAIC network for accomplishing the testing was discussed at length. The network was developed to account for only one ODEX drill rig and crew resulting in a series-type drilling operation, which should reduce the strain on the power, compressed air, and ventilation systems. Ventilation may still be a problem.

A meeting was held at SAIC on August 22 to discuss hydrologic testing and its effect on G-Tunnel operations. Representatives attended from USGS, Bureau of Reclamation, SNL, F&S, SAIC, and Los Alamos. Discussion also centered on the thermal stress test that will be conducted by SNL.

H&N and F&S staff members met to discuss design interface control, method of developing specifications, and study plans.

F&S personnel issued the Project Control Manual with Project Management Plan and Design Control Procedures for WMPO review. The F&S Interface Control Plan was also issued to WMPO for review.

F&S personnel developed additional WBS numbers, schedules, and estimates and issued the draft Special Study Work Plans. Cost at completion estimates and schedules will be completed and delivered to the Project Manager during the week ending September 5, 1986.

F&S and H&N management personnel met to discuss interface control procedures to be used during design of the ESF.

On August 18 F&S, H&N, and REECo personnel met at the NTS to discuss ESF site configuration. A follow-up estimate of material storage space was prepared by F&S and submitted to H&N.

WBS 1.2.6.1.2 Safety and Quality Assurance

REECo personnel incorporated comments received from other Project participants on the ESF Safety and Health Plan draft and a revised draft of the plan was transmitted to all Technical Project Officers (TPOs) and WMPO for final review.

REECo QA personnel processed 86 procedures for review, comments, and approval; forwarded the action items required for the response to WMPO Audit 86-3 to WMPO and SAIC on August 8, 1986; and assisted the training department in the formation, presentation, and evaluation of NNWSI Project classes for inspector training, indoctrination, and departmental quality coordinator.

WBS 1.2.6.4 FIRST SHAFT

WBS 1.2.6.4.1 Shaft and Liner

A draft of requirements for shaft sinking methods was completed by F&S staff.

WBS 1.2.6.6 SUBSURFACE EXCAVATIONS

F&S staff reviewed requirements for loading pockets, shaft sinking method requirements, and requirements for the 1,020-foot level.

WBS 1.2.6.7 UNDERGROUND SERVICE SYSTEMS

WBS 1.2.6.7.1 Utilities and Communication

F&S personnel reviewed electrical grounding methods, conducted discussions with a ventilation consultant, and reviewed requirements for a shaft control system.

WBS 1.2.6.9 TESTING

WBS 1.2.6.9.1 Exploratory Shaft Test Plan

Reviews at Los Alamos of proposed prototype tests for geology, hydrology, geomechanics, geochemistry, waste package, and air coring constituted the major effort during August. A review package and status presentation were prepared for the meeting of the Project Manager and Technical Project Officers, in Las Vegas on September 3.

The SIP documentation for the LLNL exploratory shaft investigations was reviewed with SAIC and WMPO personnel at a meeting in Las Vegas. The documentation was subsequently revised and resubmitted to WMPO for formal approval. QA level assignments were also resubmitted for four exploratory shaft investigation activities.

LLNL staff completed design reviews for a prototype borehole deformation gauge that uses fiber optics strain sensors. Fiber optics technology offers possible improvements in gauge reliability while maintaining gauge sensitivity.

LLNL exploratory shaft personnel reviewed SCP Chapter 6 and SCP Chapter 2 with respect to technical content and implications for the near field waste package environment.

Milestones were established for FY 87 LLNL prototype test activities in the G-Tunnel test facility. Work on the prototype waste package environment test will begin (tentatively) in the third quarter of FY 87 and continue into the first quarter of FY 88.

LLNL staff members reviewed a draft paper comparing the technical rationale for various methods of lateral exploration around the exploratory shaft. Written comments were provided to Los Alamos and to the USGS. A draft American Society for Testing and Materials technical procedure for cross-hole tests of hydraulic conductivity was reviewed.

WBS 1.2.6.9.2 Hydrologic Testing

WBS 1.2.6.9.2.1 Geologic Testing

Work continued at USBR on development and evaluation of techniques to map fractures in the shaft and drift walls. Both the strike rail goniometer and

close-range photogrammetry methods are being pursued. Site investigation plans are being prepared for these prototype tests.

WBS 1.2.6.9.2.2 Hydrologic Testing

Prototype Investigation Plans were revised by USBR staff and resubmitted to Los Alamos.

USBR personnel completed a three-dimensional computer plot of G-Tunnel to aid in planning of prototype activities.

WBS 1.2.6.9.2.3 Geomechanical Testing

The first cycle of performance allocation in the area of rock mechanics was completed with a meeting at SNL on August 7 and 8, 1986. Although the participants were primarily from the repository design, geomechanical analysis, and geomechanical testing areas at SNL, selected participants from LLNL, USGS, and Los Alamos made significant contributions. As a result of this meeting, changes to experiments in the exploratory shaft will be considered. A need for room-size heater experiments during performance confirmation will also be addressed. The agreements reached during the meeting will be reflected in changes to the SCP and other documents.

WBS 1.2.6.9.2.4 Geochemical Testing

A Los Alamos study plan for the chlorine-36 water movement tracer test was prepared in collaboration with a representative from SAIC. A preliminary version of this study plan was reviewed by DOE/HQ for conformance with the DOE content requirements for descriptions of studies in study plans. The DOE/HQ personnel suggested some minor modifications, which will be incorporated in the final version.

The Los Alamos QALA paperwork for prototype geochemical testing was approved by the Los Alamos NNWSI Project Office and sent to WMPO on August 8.

WBS 1.2.6.9.3 Exploratory Shaft Integrated Data System

Los Alamos personnel are proceeding with development of a complete and current integrated data system (IDS) requirements document. The document will be baselined after revision and approval. It will also be the basis for a procurement solicitation to determine alternatives and potentially more cost-effective equipment for the complete IDS.

The fourth draft of the Los Alamos document was given to the affected Principal Investigators (PIs) at the July 25 meeting of the ESTP Committee, with a request for comments and corrections. The undefined specifications for measurement range, accuracy, and resolution are of particular concern. We have not received any major comments from the PIs to date.

The final Los Alamos internal review draft of the IDS document was finished. As of the date of this report, all of the chapters have been distributed within Los Alamos for review and have been favorably received. The required technical review is being conducted in parallel with document preparation. Technical review comments were received on all but the last chapter. After all comments

are received, a week will be required for final editing, followed by the required policy review and transmission to WMPO for approval. The document will be released for policy review about September 12.

WBS 1.2.6.9.4 Prototype Testing

H&N, Los Alamos, F&S, SAIC, and USGS personnel met to discuss Survey support for prototype testing. The H&N FY 87 budget requirements for the prototype testing program was submitted.

PLANNED WORK

The requirements for SNL Milestone R085 will be completed.

Personnel at SNL will continue work on the analysis of the proposed plate loading experiment and the sequential drift mining experiment. The sequential drift mining analyses will begin redirection to the "plan view" geometry.

Los Alamos received the formal written response by WMPO to the third submission of the QALAS. The fourth submission can now be finalized.

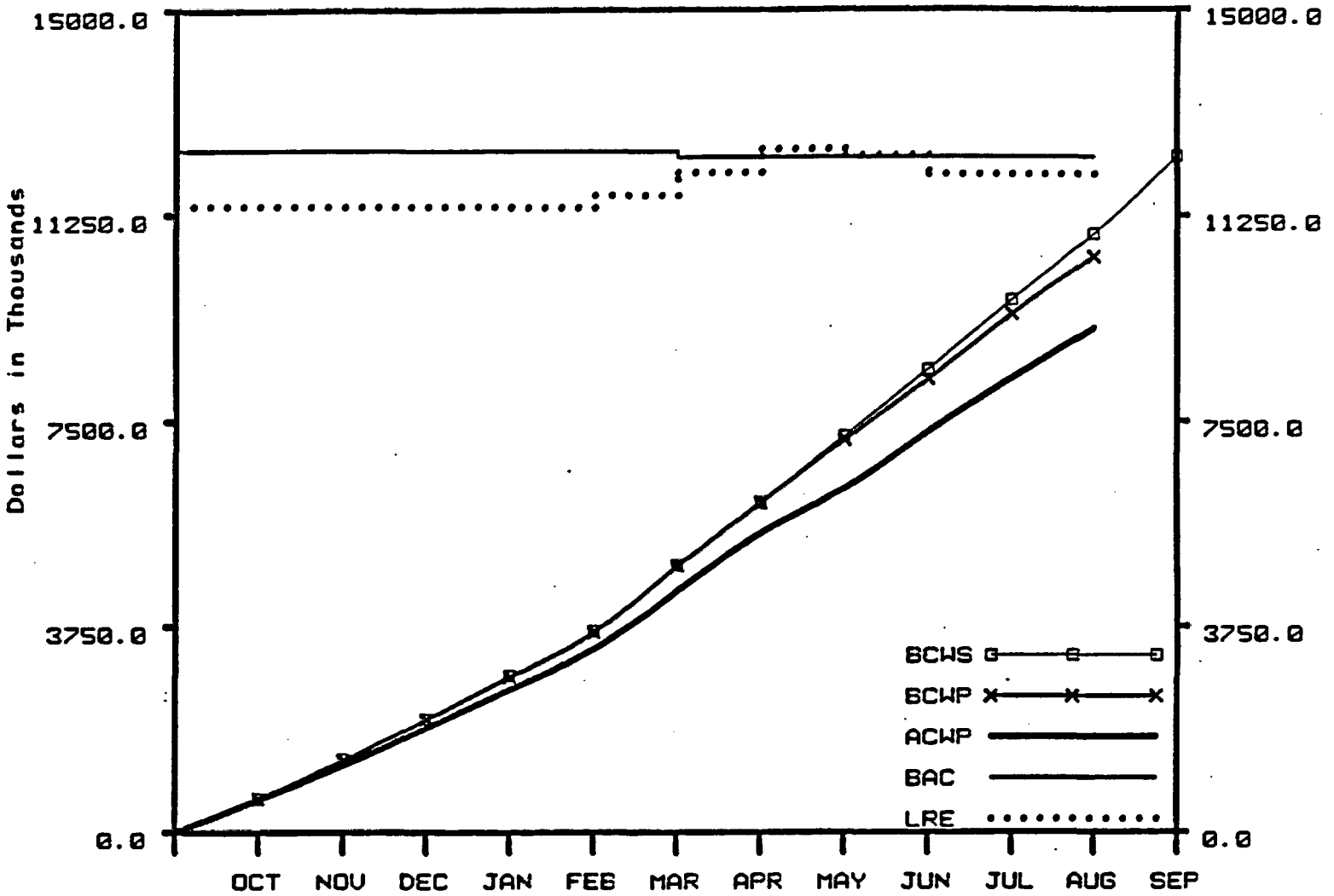
The final recommendations for Los Alamos prototype testing are to be completed and submitted to WMPO by September 19. The prototype testing logic network and budget estimates will be updated once more before the final recommendation report is completed.

PROBLEM AREAS

Los Alamos is still experiencing difficulty in getting appropriate requirements definitions from the PIs. Numbers and types of instruments, range, accuracy, resolution, etc., are some of the unknowns. In addition, ESF design information is not available in some cases. As a result, the technical chapters of the requirements document will often include the phrase "to be determined."

The documentation and quality assurance level assignments for work in LLNL exploratory shaft investigations are awaiting resolution at WMPO.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.6



EXPLORATORY SHAFT INVESTIGATIONS	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1215.7	10911.3
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1038.2	10483.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	889.9	9173.7
D. BUDGET AT COMPLETION (BAC)		12341.7
E. LATEST REVISED ESTIMATE (LRE)		12004.4

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-428.3	-3.93
G. COST VARIANCE (B-C)	1309.3	12.49
H. AT COMPLETION VARIANCE (D-E)	337.3	2.73

Remarks: WBS 1.2.6 shows a cost underrun of $1.3M, 12.5 percent under budget through August. The preparation and approval of QALAS are taking longer than planned and interface control procedures have not been completed resulting in a delay in the design efforts.

COST PERFORMANCE REPORT
WBS LEVEL 4
U.S. DEPARTMENT OF ENERGY
NNWSI PROJECT

For: AUG 1986

Date: September 18, 1986

WBS NUMBER AND DESCRIPTION		YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
					SCHEDULE	COST
1261	Management and Integration	2,766.117	2,765.940	2,561.979	-.177	203.961
1262	Site Preparation	109.475	109.475	124.075	-.000	-14.600
1263	Surface Facilities	19.200	19.200	14.100	.000	5.100
1264	First Shaft	106.418	106.418	262.502	.000	-156.084
1265	Second Shaft	25.694	25.694	69.932	.000	-44.238
1266	Subsurface Excavations	288.096	288.096	180.281	.000	107.815
1267	Underground Service Systems	236.850	236.850	266.709	-.000	-29.859
1268	Operations	.000	.000	.000	.000	.000
1269	Testing	7,359.400	6,931.300	5,694.102	-428.100	1,237.198
126	EXPLORATORY SHAFT INVESTIGATIONS	10,911.250	10,482.973	9,173.680	-428.277	1,309.293

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
M022	LANL	1.2.6.1	ESF Shaft and Mining Subcontract Awarded						△							◇ 8/87
M243	LANL	1.2.6.1	Complete Exploratory Shaft Readiness Review					△								◇ 8/87
M652	LANL	1.2.6.1	Start First Shaft (ES-1) Construction							△						◇ 5/88
M645	LANL	1.2.6.2	Start ESF Site Preparation						△							◇ 12/87
M612	LANL	1.2.6.9	Begin ESF Testing											△		◇ 5/88

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

1.2.7 TEST FACILITIES

OBJECTIVE

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

ACTIVITIES

WBS 1.2.7.2 TESTING

WBS 1.2.7.2.1 Climax

Members of the H&N staff photographed and inspected the Area 15 Pile Driver Hoist House to aid in determining an estimate for replacing the wood-frame structure with a prefabricated metal building. They delivered a preliminary estimate for the prefabricated building along with electrical upgrades to meet current codes.

The final LLNL report entitled "Spent Fuel Test--Climax: An Evaluation of the Technical Feasibility of Geologic Storage of Spent Nuclear Fuel in Granite" was submitted to LLNL publication services.

The LLNL report "Spent Fuel Test--Climax: Technical Measurements Data Management System Description and Data Presentation" was published and released.

The LLNL report "Post-Test Thermal Calculations and Data Analyses for the Spent Fuel Test--Climax" is undergoing author revision prior to submission to publication services.

The LLNL report "Post-Test Thermomechanical Calculations and Preliminary Data Analysis for the Spent Fuel Test--Climax" is in final author review prior to publication.

An LLNL peer review of the report "Geomechanics of the Spent Fuel Test--Climax" was completed and revisions are in progress.

The LLNL paper entitled "Effectiveness of Geologic Characterization Techniques, Climax Granite Stock, Nevada Test Site" was accepted for publication. Revisions are in progress.

WBS 1.2.7.2.2 E-MAD

Westinghouse personnel met with the DOE/NV manager to discuss possible future uses of E-MAD.

Due to a DOE/NV decision to keep the E-MAD facility open for an additional period of time, scheduled Westinghouse staff layoffs have been discontinued until FY 87 manpower levels have been finalized.

Westinghouse personnel have completed the hot bay and equipment decontamination effort. Waste water is being held in the rad waste tank for REECo collection, which is scheduled for September 10, 1986. The wall-mounted handling system manipulators have been deactivated and are in storage mode. The calorimeter system was removed from service, packaged, and shipped to INEL-EG&G, Idaho. Drawings, operating instructions, instrumentation, and spare parts were included. The PWR fuel grapple was decontaminated, packaged, and shipped to INEL-EG&G, Idaho. Master Slave Manipulators, installed at the hot bay viewing windows, have been deactivated and stored. Air samples and vacuum pumping systems have been shutdown. The canister cutter system has been dismantled and stored pending further disposition instructions. The canister evacuation backfill system has been deactivated and removed from service. The railroad transport system L-3 locomotive and cars were used to move mine hoist equipment from storage areas back to E-MAD for storage.

The support services contractor personnel (REECo) have been instructed by their management not to shut down E-MAD utility and HVAC systems that they operate. Progress on this activity has stopped.

Westinghouse quality assurance personnel continued to review and verify quality records. Eleven more boxes were shipped to the Records Library. Verification and indexing of remaining records is continuing and should be completed by mid-September.

The report on the terminal condition of the E-MAD Facility Spent Fuel Dry Storage Demonstration Test Location is still in final Westinghouse review. The document will be completed by September 30.

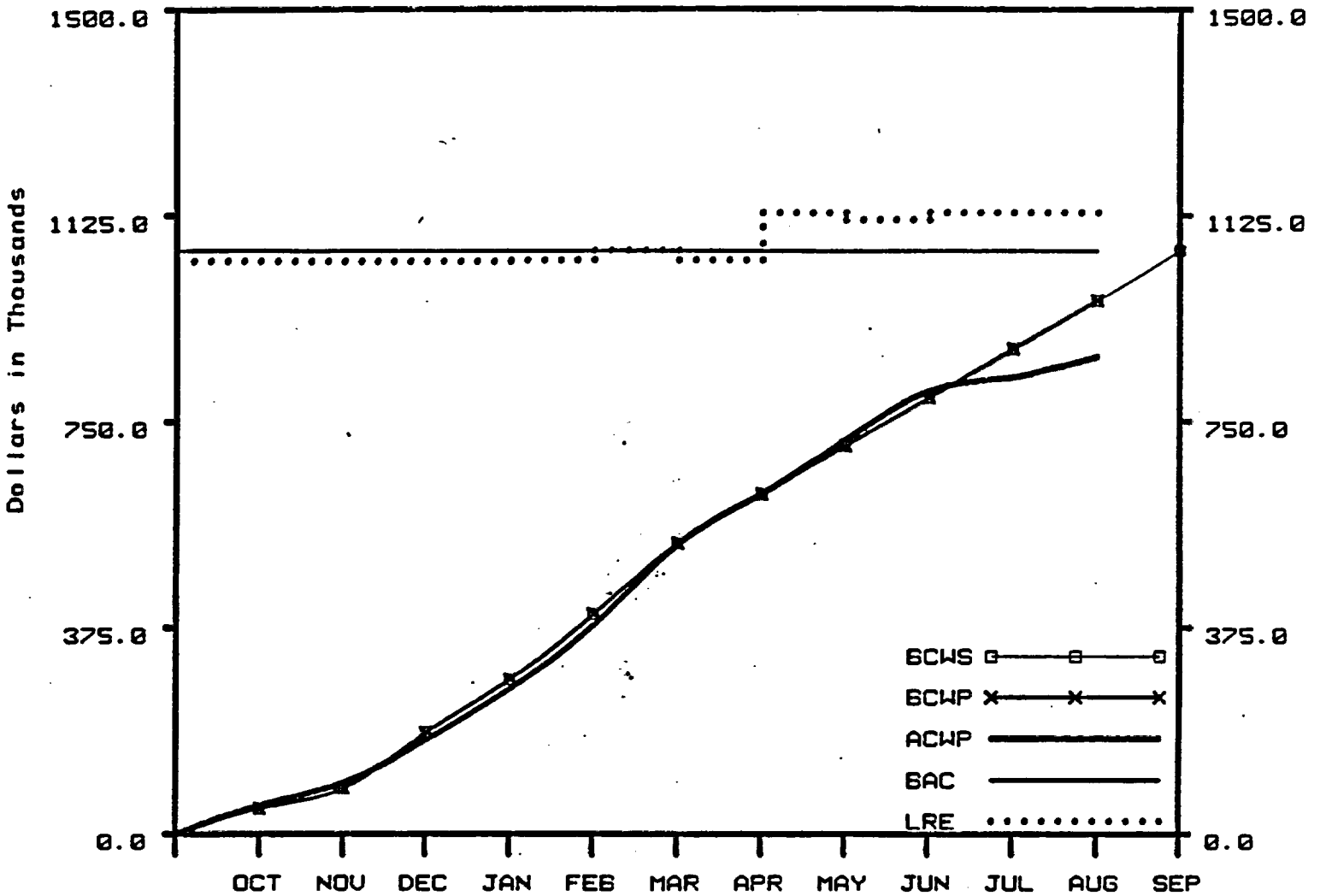
WBS 1.2.7.2.3 G-Tunnel

The following REECo activities support ongoing experiments that are exempt from the stop-work order: REECo personnel cleaned extensometer drift holes in slots on the left and right ribs and drilled and blasted those holes; drilled for and installed twenty-four 8-foot rockbolts and two 16-foot rockbolts and hung 65 feet of wire mesh in the laser drift.

PROBLEM AREAS

H&N staff contacted Los Alamos regarding the USGS request for H&N Survey support on shaft and drift wall mapping in G-Tunnel and the test pits at Fran Ridge. H&N cannot provide Survey support until formal approval is received from WMPO and NTSO.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.7



TEST FACILITIES	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	88.5	971.3
B. BUDGETED COST OF WORK PERFORMED (BCWP)	88.5	971.3
C. ACTUAL COST OF WORK PERFORMED (ACWP)	37.6	869.2
D. BUDGET AT COMPLETION (BAC)		1060.8
E. LATEST REVISED ESTIMATE (LRE)		1129.4

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	102.1	10.51
H. AT COMPLETION VARIANCE (D-E)	-68.6	-6.47

Remarks: WBS 1.2.7 shows a cost underrun of $102.0K, 10.5-percent under budget through August. Cost underrun is due to difficulty in staffing technical positions.

COST PERFORMANCE REPORT
WBS LEVEL 4
U.S. DEPARTMENT OF ENERGY
NNWSI PROJECT

For: AUG 1986

Date: September 18, 1986

WBS NUMBER AND DESCRIPTION		YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
					SCHEDULE	COST
1271	Management and Integration	.000	.000	.000	.000	.000
1272	Testing	971.309	971.308	869.199	-.001	102.109
1273	New Facility Acquisitions	.000	.000	.000	.000	.000
127	TEST FACILITIES	971.309	971.308	869.199	-.001	102.109

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
M708	LLNL	1.2.7.2	Final Report on the SFT-C			△						◇			
M279	SNL	1.2.7.2	Completion of Mining for G-Tunnel Welded Tuff Mining Evaluations								△	◆			

◇ 11/86

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

1.2.8 LAND ACQUISITION

OBJECTIVE

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

ACTIVITIES

None to report.

1.2.9 PROJECT MANAGEMENT

OBJECTIVE

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

ACTIVITIES

WBS 1.2.9.1 MANAGEMENT AND INTEGRATION

WBS 1.2.9.1.1 Management

Comments on the Exploratory Shaft Project Management Plan (ESPMP) draft Revision 1 were due to SAIC on July 30, 1986, but had not been received in August from Los Alamos or WMPO.

Preliminary development of the T&MSS FY 87 task plans is continuing. Task assignments have not been received from WMPO as yet; the Project budget for FY 87 has not been decided.

Staff members from F&S provided the USGS with a complete listing of all NNWSI Project geophysical logs; prepared NNWSI Project drill hole histories for publication; transmitted the F&S Tulsa ESF Design Project Control Manual, which contains the Project Management Plan and Design Control Procedures, to DOE; submitted a list of comments on the ESF Subsystems Design Requirements and ESF Special Studies to DOE; and worked on a prototype testing estimate for work in G-Tunnel.

H&N personnel completed review and comments on the Draft Summary of Ongoing and Planned Site Characterization Activities and submitted a response to WMPO.

The LLNL Project control group has completed negotiations to take over a VAX11-750 which is being excessed from the Military Applications Group. They expect to take possession of the VAX in mid-November. Peripheral equipment and software evaluation, training, and equipment purchases have taken place. They have been working with SAIC to assure compatibility with the VAX operations for the NNWSI Project.

The draft NNWSI Project Management Plan is being reviewed at WMPO.

WBS 1.2.9.1.4 Records Management

Microfilming facilities at the USBR were visited by the DOE Records Manager and SAIC and USGS staff members and a review was conducted of the microfilming capabilities at the USBR for possible in-records management.

The QARMC met on August 21, 1986, to discuss NNWSI Project Records Management SOP-17-01 and the status of the Records Management activities of participant

organizations. The recently approved NNWSI Project-SOP-17-01, Revision 0, was distributed and discussed. Each NNWSI Project participant must design an implementing procedure based on this SOP. The USGS QA Manual, which is currently under DOE review, already incorporates most requirements of the SOP. The NNWSI Project SOP-17-01 was issued to controlled distribution on August 25.

The QARMS software is currently being piloted at the Project Record Center. The SNL NNWSI Project records staff will continue developing the overall records management system in coordination with the quality records management system.

The WMPO Records Administrator spent part of the week of August 11 with SAIC records management personnel visiting USGS personnel to discuss the records program and to evaluate the potential for microfilming the records program and for microfilming the records at USGS. The microfilming issue appears to be resolved by the current desire to have all hard copies delivered to the Project records center because of newly developing requirements. It became apparent that the lack of space and proper storage conditions for one-of-a-kind items such as magnetic tapes and develocorder films is an issue.

REECO personnel received additional training from SAIC personnel on August 20, 1986, relating specifically to indexing of the Quality Assurance records, formatting, and how to backup files.

All guidelines received by REECo to date have been incorporated into a Quality Assurance Records Management Handbook for use by REECo personnel. A revised draft of this Handbook has been transmitted to Quality Assurance for submittal to WMPO for approval. Other activities included preparation of internal procedures for the Local Records Center and forms that are needed to implement the procedures.

Effective Solutions, Inc. (ESI) representatives conducted a training session for F&S records management personnel on the NNWSI Project Records Management System (RMS) computer data base.

NNWSI Project fiscal year 1986 capital equipment plans have been approved and issued to REECo by DOE. Funding authorization letters are being prepared by DOE and will be issued soon. Procurement activities should start in September for items not affected by the stop-work order.

WBS 1.2.9.2 PROJECT CONTROL

SAIC planning and scheduling staff members helped create a master milestone network for the NNWSI Project during the August PM-TPO meeting. The network was prepared using the SAIC planning and scheduling software and was sent to the TPOs for review and comment.

SAIC personnel continued development of cost data for construction estimates on the exploratory shaft and the repository and completed an analysis of the budget impact due to a six-month delay in construction of the exploratory shaft.

SAIC staff installed an upgrade to the Dynaplan software at SNL. This upgrade will make the plotting of bar charts more effective.

USGS personnel completed rewrites of the Prototype Investigation Plan (PIP) for in situ recalibration and sensor verification for G-Tunnel prototype investigations and for air permeability testing in G-Tunnel.

PIPs for infiltration, intact fracture, bulk permeability, and excavation effects tests for Los Alamos were rewritten by USGS staff and submitted for review.

The first scientific investigations planning documentation (for site geology) finalized by SAIC/Golden was submitted to the DOE quality assurance office. The final draft included the plan and quality assurance level assignments. The DOE-recommended modifications consisted of additions to complete the activity interfaces. These additions were added to the plan and the final version prepared for submittal to the principal investigator. After review and modification the plan can then be submitted to the approval process.

The USGS group of seven preliminary drafts for the remaining scientific investigations, identified as "ongoing activities," were prepared by SAIC/Golden. Input from the Site Characterization Plan was reformatted for these plans. Interfaces were identified and described . This group should be distributed by the end of the month.

Modifications and updates continue to be made to the existing USGS NNWSI Project milestone list by SAIC/Golden as new data become available. The milestone list was sorted to coincide with the information needs. The list will be recommended for inclusion in Chapter 8 of the SCP. The list was also modified to reflect changes in the schedule due to the stop-work order, assuming an October restart. The milestone list will be updated and reissued monthly until the list can be baselined.

WBS 1.2.9.3 QUALITY ASSURANCE

Formal comments on the review of Revision 3 of the T&MSS Quality Assurance Program Plan (QAPP) and supporting procedures were submitted to WMPO on July 15, 1986, and have not been returned to date. Upon resolution and incorporation of WMPO comments, the revised QAPP and supporting procedures will be sent to appropriate T&MSS personnel for implementation.

The quality assurance training status report has been updated from the Management Information and Committment Control (MICC) data base to track all T&MSS Project personnel QA level assignments, responsibilities, orientation and/or indoctrination dates, QA and technical training accomplished, the date of their last proficiency review (for quality Level 1 work activities), as well as home office location. Update of the QA training status report will continue on a two-week basis until the report is considered static. At that time consideration will be given to changing the update period to quarterly or semiannually.

The subject of the WMPO NCR issued to SAIC T&MSS on June 9, 1986, and the resultant suspension of work was that SAIC T&MSS was operating without approved

QALAS. Corrective action (submission of 26 QALAS) was completed and submitted to WMPO dated June 24, 1986; corrective actien to prevent recurrence was completed on July 18. Formal approval to the disposition was received from WMPO on August 27, 1986.

Four audits have been conducted to date as scheduled in FY 86. The audit schedule was revised on July 21, 1986. The following organization and NTS contractor audits have been postponed until further notice: Los Alamos, WMPO, H&N, SNL, and SAIC/T&MSS. The schedule changes were due to the WMPO stop-work order issued to the participating organizations on June 9-10, 1986. The WMPO audit has been rescheduled for the week of September 8-12, 1986.

Of the 15 audits conducted in FY 85, 8 audits remain open. However, additional corrective actions to findings have been implemented by the auditee and verified by WMPO.

As a result of the stop-work orders issued to all NNWSI Project participants, activities for surveillances in August were limited and only four surveillances were conducted during the month at LLNL in Livermore, California; Holmes & Narver at the Nevada Test Site, SAIC/T&MSS in Las Vegas, Nevada; and Los Alamos National Laboratory in Los Alamos, New Mexico.

A total of 50 surveillances have been conducted in FY 86 and 223 items or activities monitored. During this effort, 33 NCRs were recorded.

Completed drafts of the NNWSI Project QA Plan and the associated SOPs will be forwarded to WMPO, QAD, and OGR for formal review by September 30, 1986.

The review of the USGS QAPP and its supporting Quality Management Procedures was completed on August 26. Formal review comments were transmitted to WMPO on August 29 for submittal to USGS. The USGS submitted its proposed SIP format for WMPO review on July 29, 1986. After WMPO review, a meeting was held with the USGS on August 13. WMPO has approved the format of the USGS SIP.

SAIC QA personnel continue to support the core sample task force. The EPA "chain-of-custody" procedure has been evaluated against SOP-02-01 requirements. This evaluation indicates that the SOP addresses all the needs and the EPA document would require major revision to meet Project needs. The use of the EPA chain of custody requires personal custody as opposed to organizational custody. This is not a requirement of the NVO-196-17.

A review of the QALAS for the IDS was completed and comments forwarded to Los Alamos. The advanced conceptual design phase for the IDS has been authorized to proceed under a QA Level II assignment.

The draft revision to the Los Alamos QAPP, which incorporates the latest changes to the NNWSI Project QA Program, was received by WMPO on August 21. This document and one additional QA procedure (TWS-TSTQA-QP-07) are currently being reviewed in preparation for a comment resolution meeting during the latter part of September 1986.

A DOE letter in reply to the Los Alamos response to the WMPO "suspension of work" directive issued in June, 1986, concurred with specific work activities that are exempted from the suspension of work directive.

Efforts continue to complete reviews and approvals of various Los Alamos SIP documentation and/or associated QA level assignments. To date, 13 documents have been submitted and 2 approved.

Ten LLNL procedures were submitted for WMPO review and approval on August 6. Only four procedures remain to complete the revision of the QAPP. These four procedures are currently undergoing internal Project review.

WMPO comments on the LLNL procedure "Operational Test Plan for the Evaluation of Electromagnetic Tomography in G-Tunnel" were summarized in a letter dated August 14.

A meeting was held with LLNL, WMPO, and SAIC personnel on August 14 to review the SIP documentation and the QALAS for the waste package environmental tests. Comments initiated as a result of the meeting will be incorporated into a revised SIP and quality assurance level assignments that will be resubmitted for approval.

SAIC staff members reviewed the REECo NNWSI Project QAPP to verify compliance to the NNWSI Project NVO-196-17, Revision 4. Comments were summarized in a transmittal letter that was sent on August 28.

SAIC NNWSI Project QA personnel reviewed the SAIC/T&MSS QAPP and its implementing procedures against the requirements of NVO-196-17. The T&MSS QAPP and procedures generally meet those requirements. There were four observed areas where program improvements were advisable and approximately ten minor deficiencies.

WMPO personnel reviewed the SNL QAPP and implementing procedures (Revision 0) and forwarded comments to SNL for resolution. It should be noted that only nine sections were approved. The total NNWSI Project QAPP for SNL is not approved for use at this time since not all sections have been received. Quality assurance level assignments for the activities within 29 of the SNL NNWSI Project WBS tasks had been approved by WMPO by the end of August 1986.

Personnel of the SAIC QA Engineering Branch participated in surveillance of F&S and H&N to determine their readiness to develop the ESF design under a QA level III assignment. Although H&N is nearing completion of procedures and training (projected to be complete in late September), but is not yet ready to implement their program, F&S appears to be ready.

At a meeting on August 26, DOE/NV and SAIC representatives discussed QA concerns regarding the approach to the ESF design effort. A list of sequential steps for resolution was drafted and agreed upon.

Los Alamos Technical Associates (LATA) was awarded a contract for quality assurance support of the Los Alamos NNWSI Project. A transition period for transfer of this responsibility to LATA began on August 15; on October 1, LATA will assume full responsibility for QAS.

A writing session for Los Alamos QA administrative procedures was held; four procedures and eight change requests (CRs) were reviewed for internal concurrence. During the session, informal concurrence was obtained from WMPO for these procedures.

Los Alamos staff met with the PI from Lawrence Berkeley Laboratory (LBL) who is responsible for solubility determinations. The topics discussed included LBL procurement and documentation activities.

USBR staff members released data from the Probable Maximum Flood (PMF) study to the data base.

USGS representatives completed QALAS for the SIP on the deep unsaturated-zone percolation studies.

USGS personnel delivered the responses to the 1986 DOE audit of the Denver area USGS NNWSI Project work to WMPO and discussed them with WMPO personnel.

SAIC/Golden prepared a response letter to WMPO regarding outstanding responses to action items issued to the USGS. A matrix of 32 items was developed to provide the status of all the outstanding items and to give a projected schedule for their completion. Of these 32, 22 were audit findings that were recently responded to but that require tracking. A tracking system is being implemented for the QA office to maintain the status of open items to ensure a timely follow up.

The first draft of the USBR QA Manual was completed by SAIC/Golden. Review of this draft will be made by the USBR; then a conference among USBR, USGS, and SAIC personnel will be arranged to discuss changes from the USBR manual. Upon receiving approval of the USGS manual, the USGS then will be in a position to apply this manual for QA covering work done by the USBR.

The full backlog of USGS technical procedures that were in the QA office for review and approval have been processed. Additional procedures are in various states of preparation. The distribution of all approved technical procedures is now current.

F&S QA personnel reviewed and commented on ESF Design Control Procedures and reviewed and approved the F&S program for the recompletion of the J-13 water well in Area 25 of the NTS.

SAIC conducted a surveillance of H&N procedures and qualifications with emphasis on design.

H&N received WMPO approval of NNWSI Project Amendments to the QA Manual, Revision 1 and final approval signatures on the QA procedure for generation and control of NNWSI Project procedures.

PLANNED WORK

The operating procedures for the SNL records management system are being revised, and plans are being made for the initiation of data entry of indexing information for Q1 and Q2 documents in early October 1986. Transmittal of documents will not occur until operating procedures have been given SNL approval.

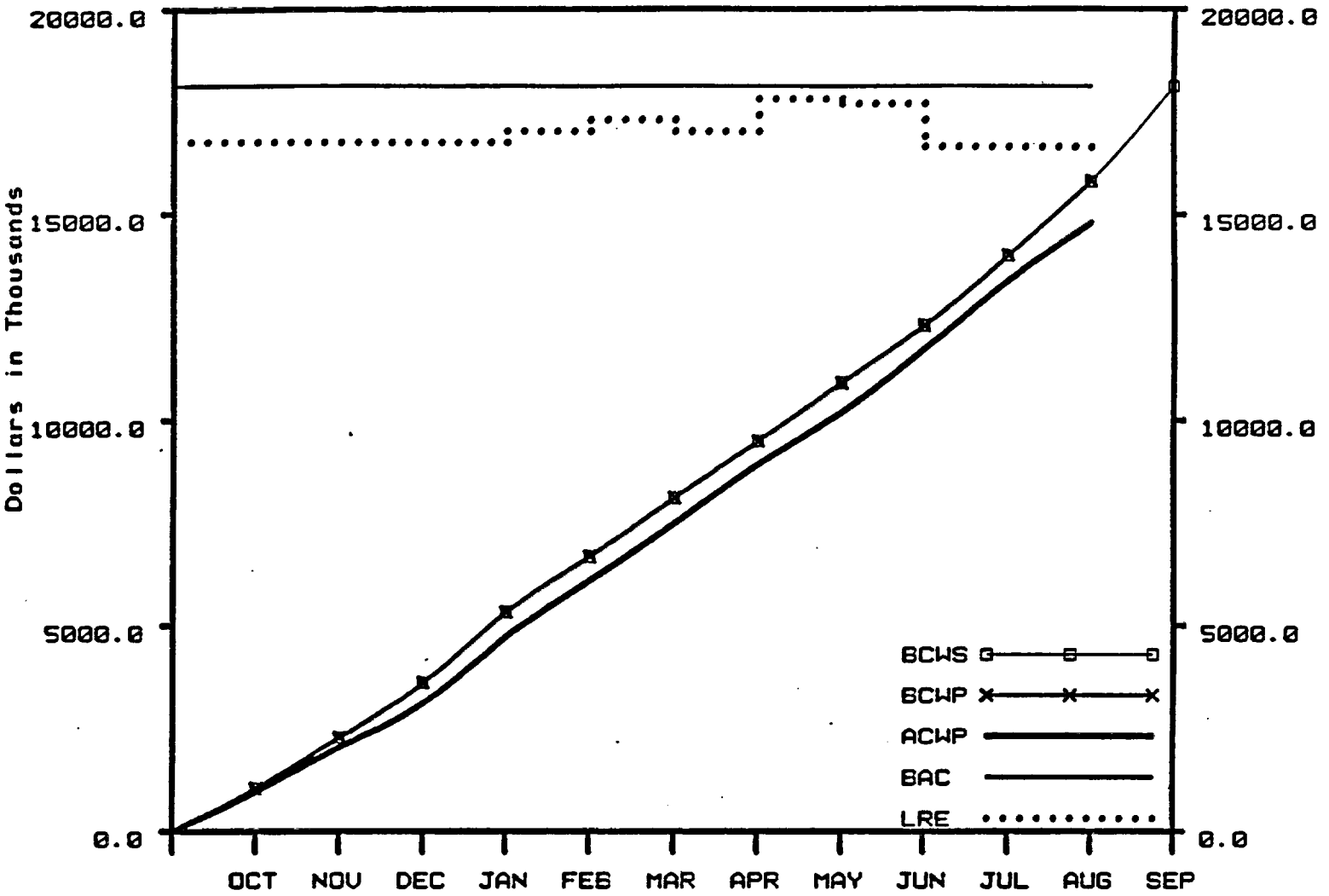
SNL NNWSI Project quality assurance staff will continue to work on the QAPP, quality assurance level assignments, quality assurance procedures and department operating procedures, and quality assurance training.

PROBLEM AREAS

H&N is waiting for clarification from WMPO and SAIC on assigning QA levels to projects completed prior to approval of the H&N Quality Assurance Manual.

Mixed signals are still being received by Los Alamos on what "ideal" SIP documentation and QALAS should contain. Deviations from the mineralogy and petrology model are now being required.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.9



PROJECT MANAGEMENT	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1827.5	15822.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1827.5	15823.2
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1416.7	14798.7
D. BUDGET AT COMPLETION (BAC)		18147.3
E. LATEST REVISED ESTIMATE (LRE)		16654.2

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.8	0.01
G. COST VARIANCE (B-C)	1024.6	6.48
H. AT COMPLETION VARIANCE (D-E)	1493.1	8.23

Remarks: WBS 1.2.9 cost variance does not exceed the threshold.

COST PERFORMANCE REPORT
WBS LEVEL 4
U.S. DEPARTMENT OF ENERGY
NNWSI PROJECT

For: AUG 1986

Date: September 18, 1986

WBS NUMBER AND DESCRIPTION		YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST
1291	Management and Integration	8,040.478	8,040.400	7,697.119	-.078	343.280
1292	Project Control	3,451.225	3,451.775	3,168.944	.550	282.831
1293	Quality Assurance	4,330.716	4,331.067	3,932.598	.351	398.469
129	PROJECT MANAGEMENT	15,822.419	15,823.242	14,798.661	.823	1,024.581

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
R448	SAIC	1.2.9.1	Final NNWSI Project Management Plan to WMPO/NV and DOE/HQ									△				◇ 12/86
M901	SAIC	1.2.9.1	Submit FY 85 NNWSI Project Plan to DOE/HQ for Approval △ 3/85	◆												
M719	WMPO	1.2.9.1	Submit FY 88 Budget to DOE/HQ								◆					
M720	SAIC	1.2.9.2	Implementation of Phase I of Earned Value System (80 percent level of effort)		▲											
M893	SAIC	1.2.9.2	List of Project Office Controlled Milestones Complete			△										◇ 11/86
M722	SAIC	1.2.9.2	FY86 Project Budget Baseline Approved	△						◆						

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

U.S. DEPARTMENT OF ENERGY

OCRWM OGR

Nevada Nuclear Waste Storage Investigations PROJECT

YUCCA MOUNTAIN

PARTICIPANT

BUDGET vs COST

COST PERFORMANCE REPORT - LEVEL 3
WORK BREAKDOWN STRUCTURE (FORMAT 1)
U.S. DEPARTMENT OF ENERGY

CONTRACTOR:	CONTRACT TYPE NO.:	PROJECT NAME/NUMBER:	REPORT YEAR AND MONTH:	SIGNATURE:
NNWSI Project		NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS	AUG 1986	
LOCATION: P.O. Box 14100 Las Vegas, NV 89114				TITLE: PROJECT MANAGER
				Date: September 29, 1986

WBS NUMBER AND DESCRIPTION		CURRENT PERIOD					YEAR TO DATE					FISCAL YEAR COMPLETION		
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST	BASELINED BUDGET	LATEST REVISED ESTIMATE	VARIANCE
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
121	SYSTEMS	625.639	587.309	406.232	-38.330	181.076	6,848.837	5,988.322	5,139.372	-148.515	700.950	6,688.000	6,139.998	548.002
122	WASTE PACKAGE	687.000	759.200	674.000	71.300	84.300	8,369.000	8,293.000	8,055.000	-76.000	238.300	8,529.000	8,274.789	255.011
123	SITE INVESTIGATIONS	3,639.466	3,526.457	2,390.764	-13.000	1,135.692	30,240.007	29,949.936	23,710.507	-290.071	6,239.429	34,224.000	27,390.066	6,833.934
124	REPOSITORY INVESTIGATIONS	1,868.958	1,804.243	1,333.213	-164.715	171.031	12,994.883	11,819.748	10,150.918	-1,085.135	1,659.830	14,664.000	13,091.994	1,572.006
125	REGULATORY AND INSTITUTIONAL INVESTIGATIONS	1,311.300	1,260.368	1,043.799	-50.932	216.569	11,846.113	11,119.333	9,027.677	-526.780	2,091.656	13,103.000	10,741.018	2,361.982
126	EXPLORATORY SHAFT INVESTIGATIONS	1,215.742	1,038.243	889.860	-177.499	148.383	10,911.250	10,482.973	9,173.680	-428.277	1,309.293	12,341.700	12,004.401	337.299
127	TEST FACILITIES	88.491	88.491	37.000	-.000	50.891	971.309	971.308	869.199	-.001	102.109	1,000.000	1,129.400	-68.000
128	LAND ACQUISITION	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
129	PROJECT MANAGEMENT	1,827.465	1,827.467	1,416.673	.002	410.794	15,822.419	15,823.242	14,798.661	.823	1,024.581	18,147.300	16,654.233	1,493.067
12	NNWSI - TOTAL	10,864.961	10,591.778	8,193.841	-373.183	2,398.737	94,915.318	92,360.762	78,934.614	-2,554.556	13,426.148	108,768.000	95,426.699	13,333.301

COST PERFORMANCE REPORT - LEVEL 4
WORK BREAKDOWN STRUCTURE (FORMAT 1)
U.S. DEPARTMENT OF ENERGY

CONTRACTOR:	CONTRACT TYPE NO.:	PROJECT NAME/NUMBER:	REPORT YEAR AND MONTH:
NNWSI Project		NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS	AUG 1986
LOCATION: P.O. Box 14100 Las Vegas, NV 89114			

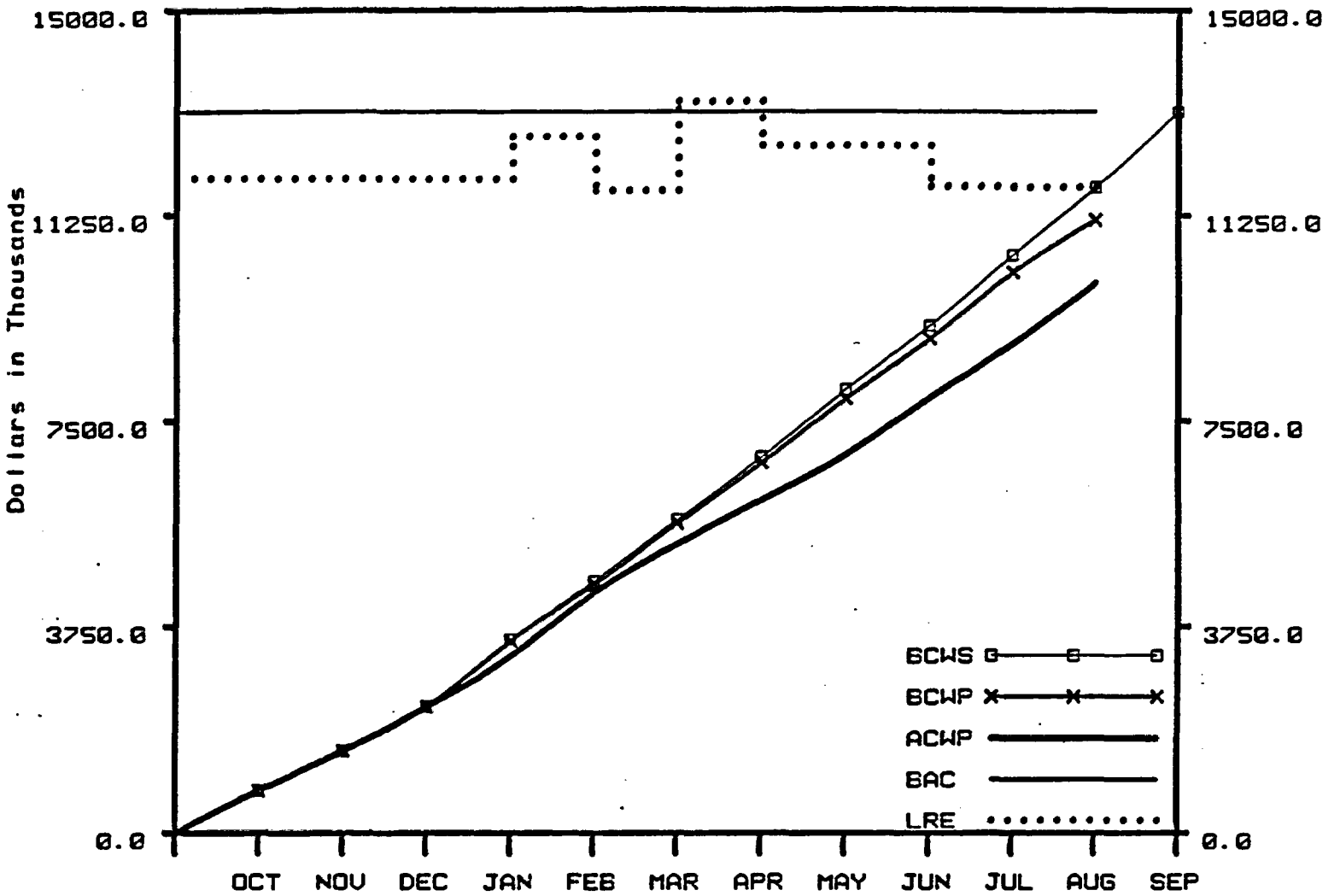
WBS NUMBER AND DESCRIPTION		CURRENT PERIOD					YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1211	Systems Management and Integration	15.000	15.000	1.000	-.000	14.000	164.000	164.029	82.000	.029	82.0
1212	Systems Engineering	230.639	230.639	145.232	-.000	85.406	2,088.837	2,088.185	1,682.372	.348	406.8
1213	Technical Data Base Management	89.000	50.670	76.000	-38.330	-25.330	1,034.000	885.036	879.000	-148.964	6.0
1214	Total Systems Performance Assessment	291.000	291.000	184.000	.000	107.000	2,762.000	2,762.081	2,496.000	.081	266.0
121	SYSTEMS	625.639	587.309	406.232	-38.330	181.076	6,048.837	5,900.322	5,139.372	-148.515	760.9
1221	Management and Integration	37.000	37.000	38.500	.000	-1.000	337.000	337.091	346.100	.091	-8.1
1222	Package Environment	84.000	128.000	110.600	44.000	17.400	756.000	857.000	936.000	101.000	-78.0
1223	Waste Form & Materials Testing	492.000	495.299	425.900	3.299	69.399	4,454.000	4,241.000	3,915.300	-213.000	325.7
1224	Design, Fabricate, and Prototype Testing	46.000	50.000	31.700	4.000	18.300	386.000	492.000	386.100	36.000	15.9
1225	Performance Assessment	48.000	48.000	67.200	.000	-19.200	456.000	456.000	471.500	.000	-15.5
122	WASTE PACKAGE	887.000	759.299	674.900	71.300	84.300	6,369.000	6,293.900	6,055.600	-76.000	238.3
1231	Management & Integration	288.424	288.424	213.732	-.000	74.691	2,490.815	2,490.523	2,088.929	-.292	493.5
1232	Geology	879.518	879.518	843.927	-.000	35.591	6,475.469	6,439.678	6,047.571	-36.792	392.1
1233	Hydrology	505.000	505.000	512.406	-.000	-6.806	4,890.912	4,861.965	4,728.333	-28.947	133.6
1234	Geochemistry	528.000	404.099	502.600	-124.501	-98.501	5,566.000	5,302.493	5,105.100	-264.407	197.3
1235	Drilling	1,309.000	1,309.001	247.377	.001	1,062.524	8,890.451	8,881.350	3,538.789	-9.101	5,142.5
1236	Environment	95.554	131.788	78.736	36.154	54.972	876.499	827.770	808.004	-48.729	21.7
1237	Socioeconomic	41.870	48.207	39.305	6.337	8.902	466.578	339.157	427.588	-121.413	-88.4
1238	Geochemical Modeling Code EQ3/6	90.000	159.000	154.000	69.000	4.400	788.000	1,007.000	888.200	219.000	126.8
1239	Deferred Site Close Out	.000	.000	.000	.000	.000	.000	.000	.000	.000	.0
123	SITE INVESTIGATIONS	3,839.466	3,526.457	2,390.784	-13.009	1,135.892	30,240.887	29,940.936	23,710.507	-299.671	6,239.4
1241	Management and Integration	490.458	490.457	470.813	-.001	19.645	4,427.283	4,427.178	4,079.418	-.113	347.7
1242	Development and Testing	583.500	418.786	421.400	-164.714	-2.614	4,473.000	3,389.316	3,296.500	-1,084.284	92.8
1243	Facilities	407.000	407.000	342.000	-.000	65.000	2,566.000	2,565.335	1,788.000	-.665	725.3
1244	Operations and Maintenance	51.000	51.000	54.000	-.000	-3.000	388.000	388.014	317.000	.014	71.0
1245	Decommissioning	7.000	7.000	.000	-.000	7.000	41.000	41.000	.000	.000	41.0
1246	Repository Performance Assessment	130.000	130.000	45.000	.000	85.000	1,069.000	1,068.912	687.000	-.088	381.9
124	REPOSITORY INVESTIGATIONS	1,668.958	1,504.243	1,333.213	-164.715	171.031	12,964.883	11,819.748	10,159.918	-1,085.135	1,659.8
1251	Management and Integration	81.944	81.944	85.626	-.000	-3.318	700.132	700.013	726.657	-.119	-26.6
1252	Licensing	470.511	435.734	523.831	-34.777	-88.098	5,306.327	4,820.984	5,174.490	-485.343	-253.5
1253	Environmental Compliance	68.052	51.900	66.719	-16.152	-14.820	1,328.056	1,267.552	1,188.646	-61.304	78.9
1254	Communication and Liaison	25.203	25.203	20.767	.000	4.527	266.645	266.646	234.195	.001	32.4
1255	Technology and Financial Assistance	685.500	685.498	376.856	-.002	308.642	3,964.153	3,964.139	1,783.609	-.014	2,260.4
125	REGULATORY AND INSTITUTIONAL INVESTIGATIONS	1,311.300	1,280.368	1,043.799	-50.932	216.569	11,646.113	11,119.333	9,027.677	-526.780	2,091.6
1261	Management and Integration	305.237	305.237	292.000	.000	13.237	2,766.117	2,765.940	2,561.979	-.177	203.9
1262	Site Preparation	1.865	1.865	1.125	.000	.850	109.475	109.475	124.075	-.000	-14.6
1263	Surface Facilities	1.960	1.960	.100	.000	1.850	19.200	19.200	14.100	.000	5.1
1264	First Shaft	10.780	10.780	10.864	.000	-.084	106.418	106.418	262.582	.000	-156.0
1265	Second Shaft	2.210	2.210	.168	.000	2.042	25.694	25.694	69.932	.000	-44.2
1266	Subsurface Excavations	36.208	36.208	11.184	.000	25.006	288.096	288.096	180.281	.000	107.8
1267	Underground Service Systems	19.550	19.550	22.524	.000	-2.974	236.850	236.850	266.709	-.000	-29.8
1268	Operations	.000	.000	.000	.000	.000	.000	.000	.000	.000	.0
1269	Testing	838.000	838.581	551.885	-177.499	108.616	7,350.400	6,931.300	5,694.182	-428.100	1,237.1
126	EXPLORATORY SHAFT INVESTIGATIONS	1,215.742	1,038.243	889.860	-177.499	148.383	10,911.250	10,482.973	9,173.680	-428.277	1,309.2
1271	Management and Integration	.000	.000	.000	.000	.000	.000	.000	.000	.000	.0
1272	Testing	88.491	88.491	37.600	-.000	50.891	971.300	971.300	869.199	-.001	102.1
1273	New Facility Acquisitions	.000	.000	.000	.000	.000	.000	.000	.000	.000	.0

COST PERFORMANCE REPORT - LEVEL 4
WORK BREAKDOWN STRUCTURE (FORMAT 1)
U.S. DEPARTMENT OF ENERGY

CONTRACTOR:	CONTRACT TYPE NO.:	PROJECT NAME/NUMBER:	REPORT YEAR AND MONTH:
NNWSI Project		NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS	AUG 1986
LOCATION: P.O. Box 14100 Las Vegas, NV 89114			

WBS NUMBER AND DESCRIPTION		CURRENT PERIOD					YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
127	TEST FACILITIES	88.491	88.491	37.600	-.000	50.891	971.309	971.308	869.199	-.001	102.10
128	LAND ACQUISITION	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00
1291	Management and Integration	1,037.445	1,037.446	748.788	.001	288.887	8,048.478	8,048.400	7,697.118	-.078	343.28
1292	Project Control	351.278	351.278	282.326	-.000	68.943	3,451.225	3,451.775	3,188.944	.550	262.83
1293	Quality Assurance	438.758	438.751	387.586	.001	51.164	4,330.718	4,331.067	3,832.588	.351	398.48
129	PROJECT MANAGEMENT	1,827.485	1,827.467	1,418.873	.002	410.794	15,822.419	15,823 242	14,798.661	.823	1,024.58
12	NNWSI - TOTAL	10,984.961	10,591.778	8,193.041	-373.183	2,398.737	94,915.318	92,360.762	78,934.614	-2,554.556	13,426.14

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.A

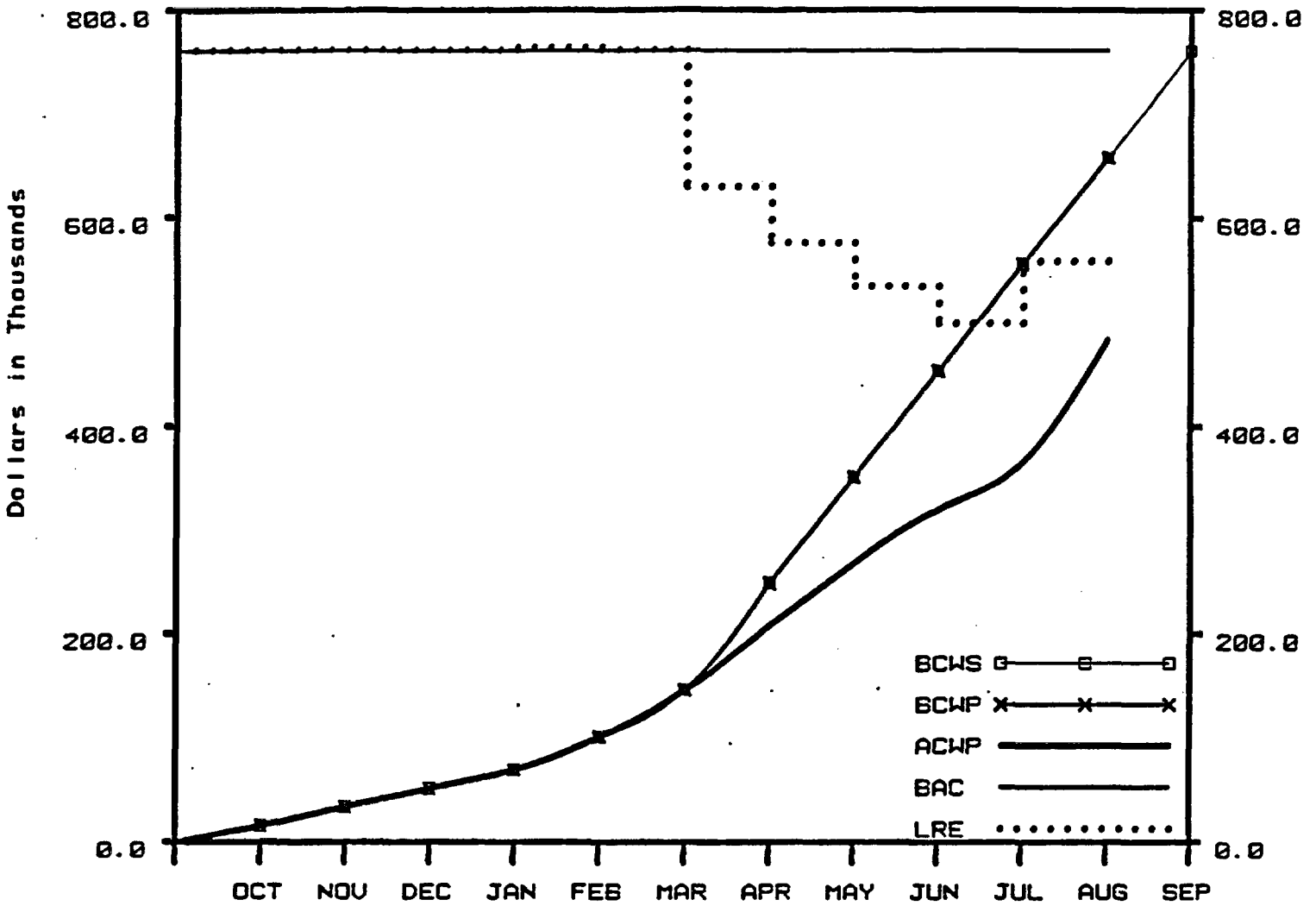


LOS ALAMOS - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1220.8	11756.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	943.8	11163.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1097.1	10013.7
D. BUDGET AT COMPLETION (BAC)		13149.0
E. LATEST REVISED ESTIMATE (LRE)		11758.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-593.5	-5.05
G. COST VARIANCE (B-C)	1149.4	10.30
H. AT COMPLETION VARIANCE (D-E)	1391.0	10.58

Remarks: Los Alamos: $1.1M underrun, 10.3 percent
- primarily due to contract billing lags and delays due to stop-work orders.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.B

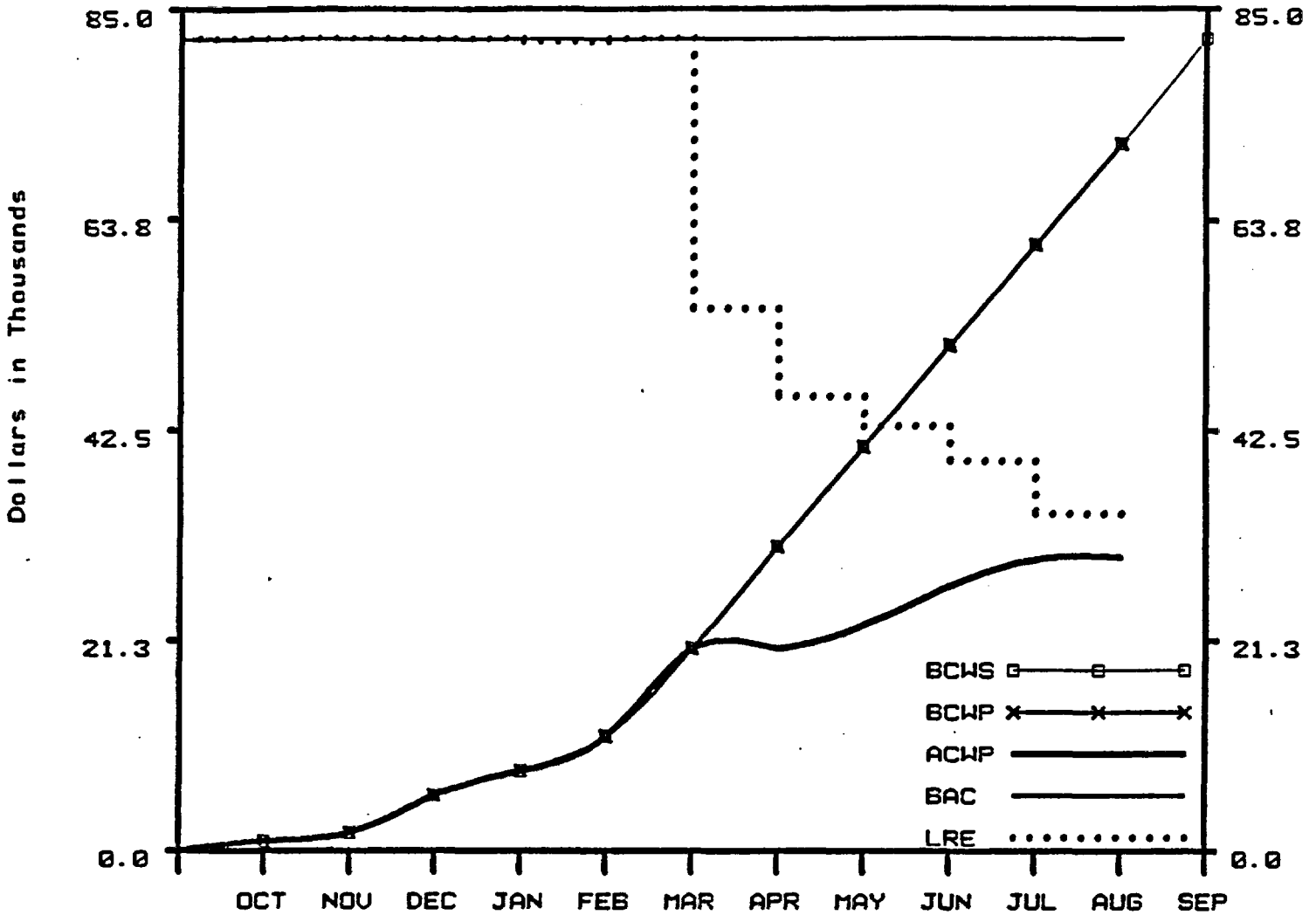


LBL - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	102.3	658.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	102.3	658.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	117.7	482.6
D. BUDGET AT COMPLETION (BAC)		761.0
E. LATEST REVISED ESTIMATE (LRE)		557.7

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-0.1	-0.01
G. COST VARIANCE (B-C)	175.4	26.66
H. AT COMPLETION VARIANCE (D-E)	203.3	26.72

Remarks: LBL 175.4K underrun, 26.6 percent

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.E

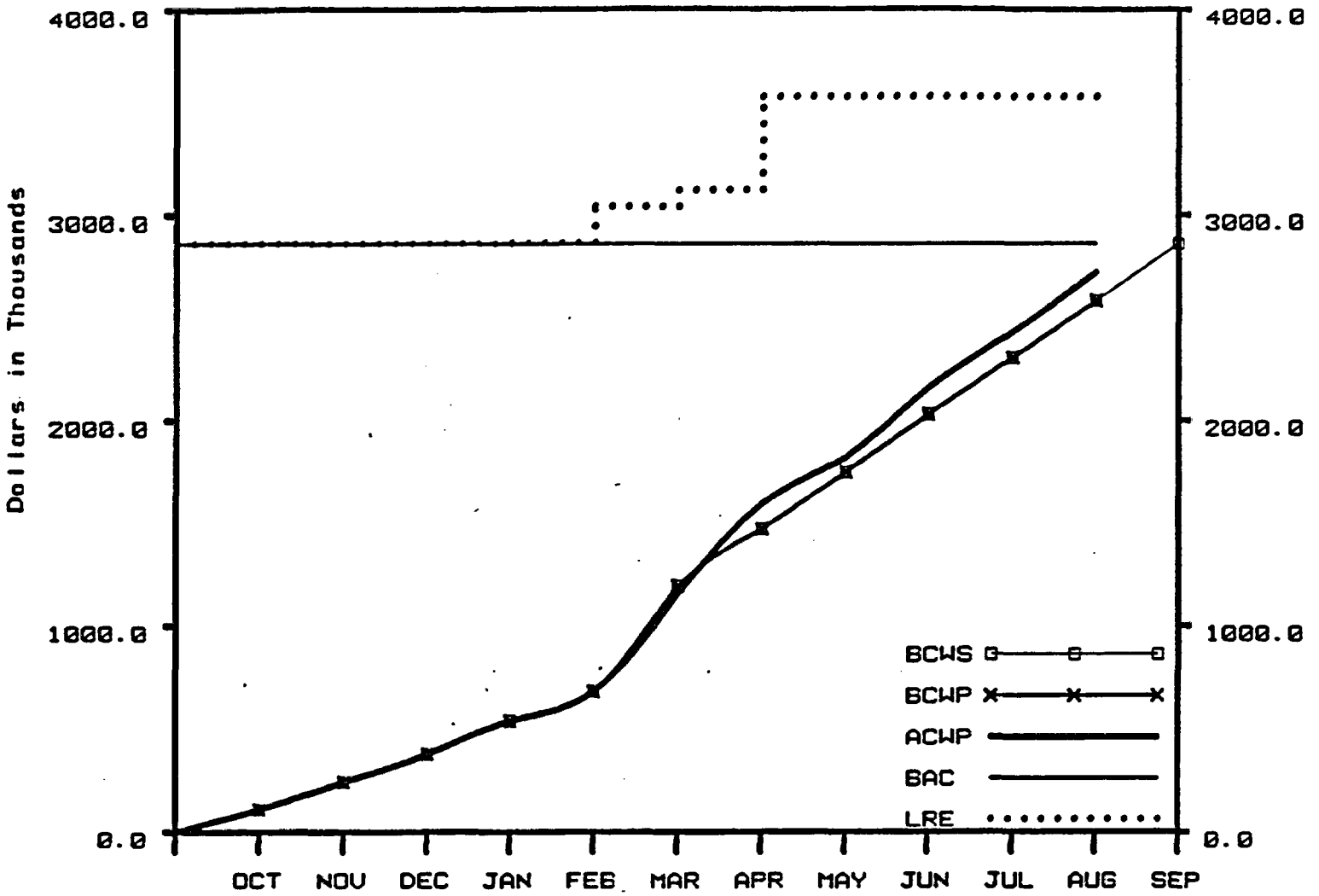


EG&G - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	10.2	71.5
B. BUDGETED COST OF WORK PERFORMED (BCWP)	10.2	71.5
C. ACTUAL COST OF WORK PERFORMED (ACWP)	0.2	29.6
D. BUDGET AT COMPLETION (BAC)		82.0
E. LATEST REVISED ESTIMATE (LRE)		34.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	41.8	58.53
H. AT COMPLETION VARIANCE (D-E)	48.0	58.53

Remarks: EG&G 41.8K underrun, 58.5 percent

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.F

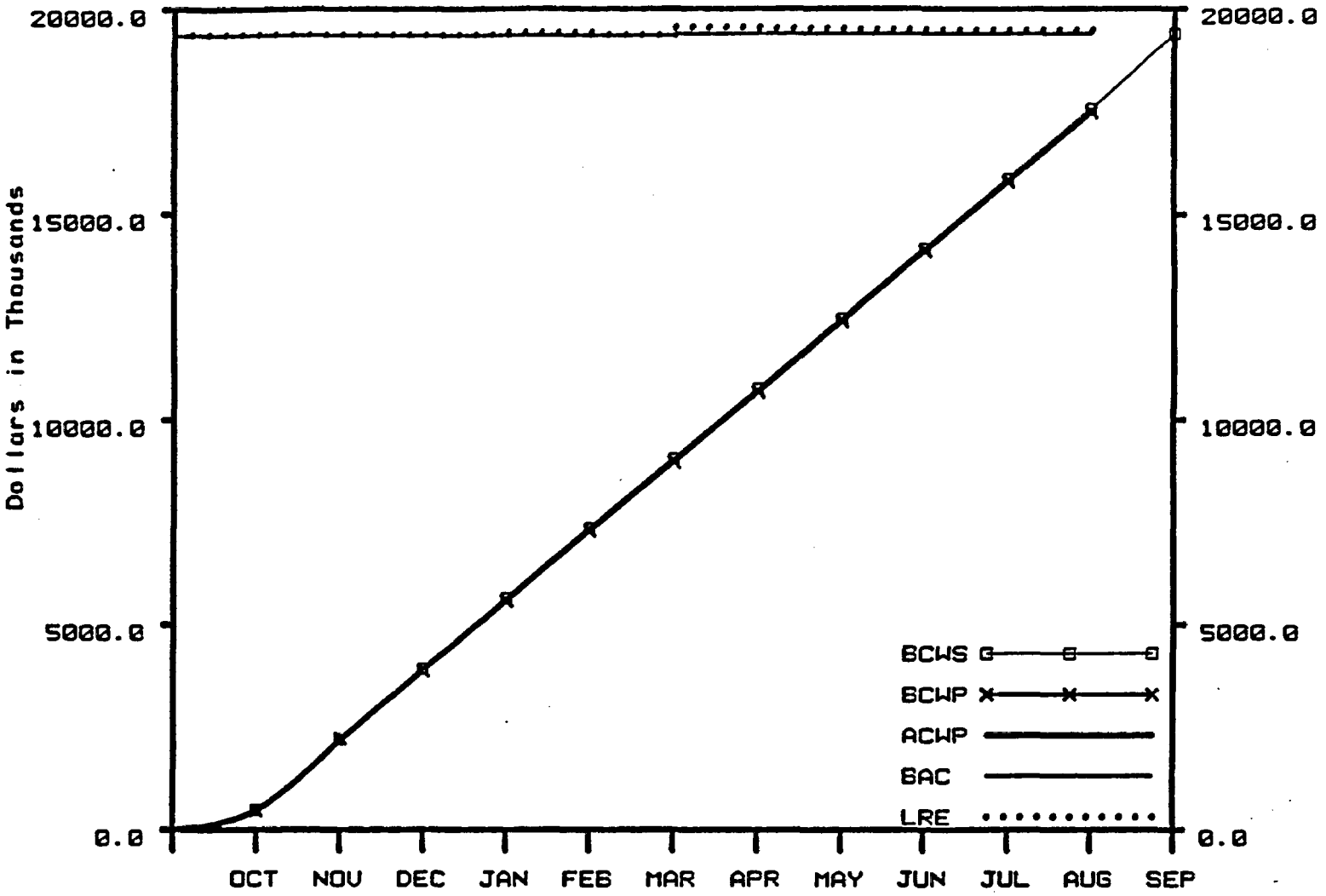


F&S - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	277.4	2581.8
B. BUDGETED COST OF WORK PERFORMED (BCWP)	277.4	2581.8
C. ACTUAL COST OF WORK PERFORMED (ACWP)	289.3	2718.5
D. BUDGET AT COMPLETION (BAC)		2860.2
E. LATEST REVISED ESTIMATE (LRE)		3573.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-136.7	-5.30
H. AT COMPLETION VARIANCE (D-E)	-712.8	-24.92

Remarks: F&S 136.7K underrun, 5.3 percent

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.6

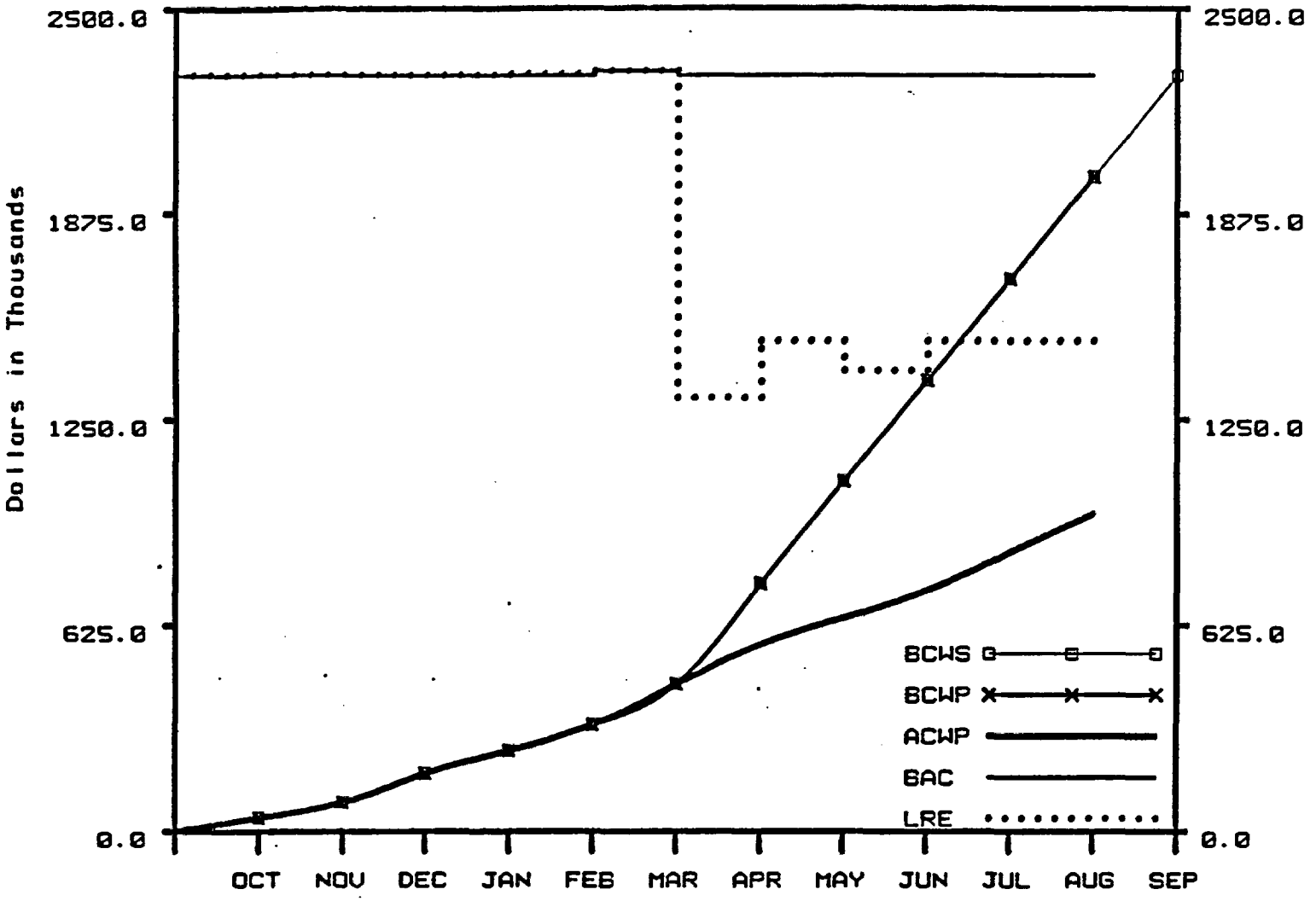


USGS - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1704.3	17564.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1704.3	17489.6
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1704.3	17537.4
D. BUDGET AT COMPLETION (BAC)		19391.9
E. LATEST REVISED ESTIMATE (LRE)		19462.2

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-74.5	-0.42
G. COST VARIANCE (B-C)	-47.8	-0.27
H. AT COMPLETION VARIANCE (D-E)	-70.3	-0.36

Remarks: USGS: $47.8K underrun, .2 percent
- USGS has submitted earned value cost data only once. Therefore BCWP = BCWS = ACWP. This distorts the status of the USGS work.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.H

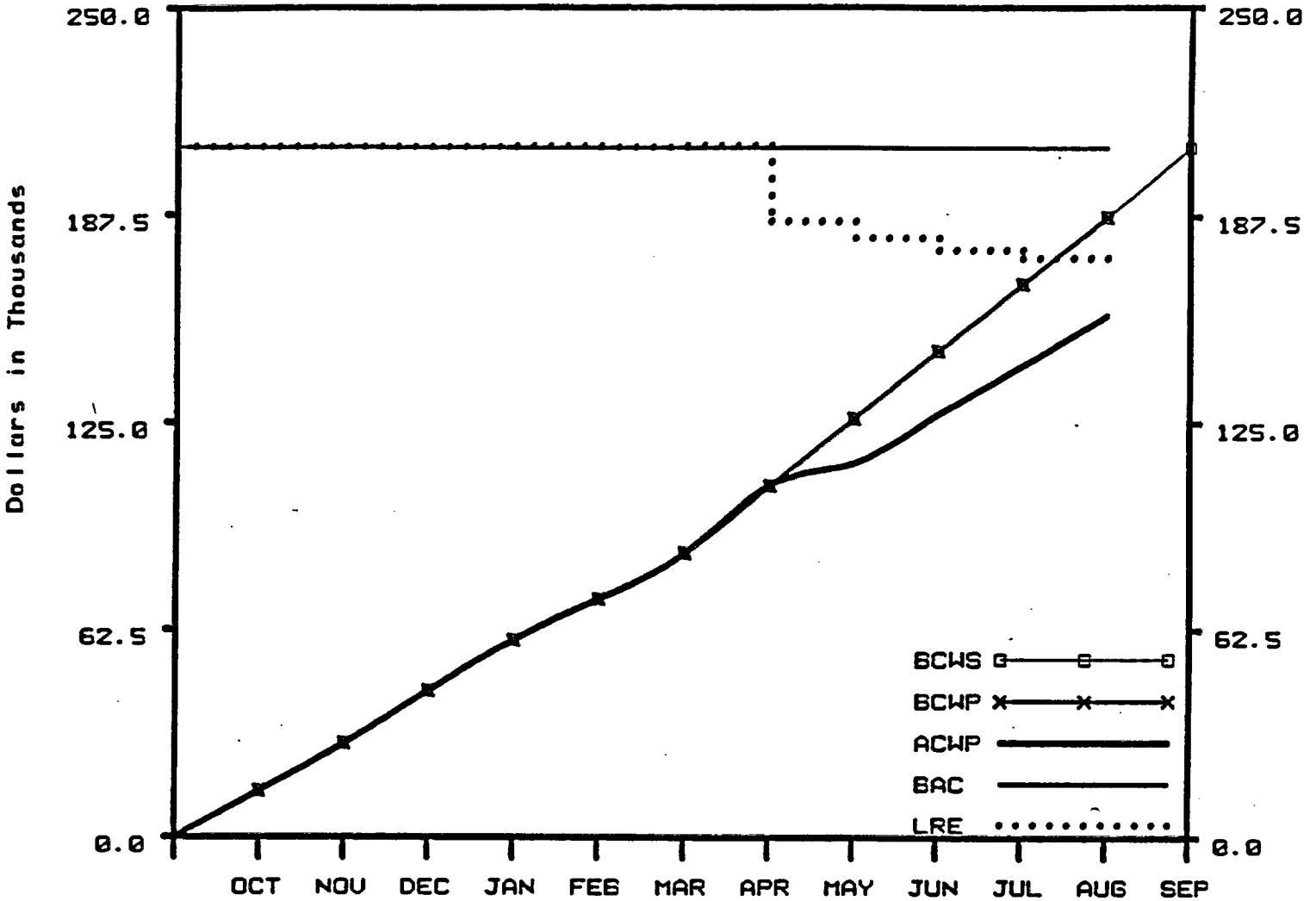


H&N - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	308.4	1987.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	308.4	1987.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	117.6	965.1
D. BUDGET AT COMPLETION (BAC)		2298.4
E. LATEST REVISED ESTIMATE (LRE)		1489.9

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	1022.3	51.44
H. AT COMPLETION VARIANCE (D-E)	808.5	35.18

Remarks: H&N 1.0M underrun, 51.4 percent

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.I



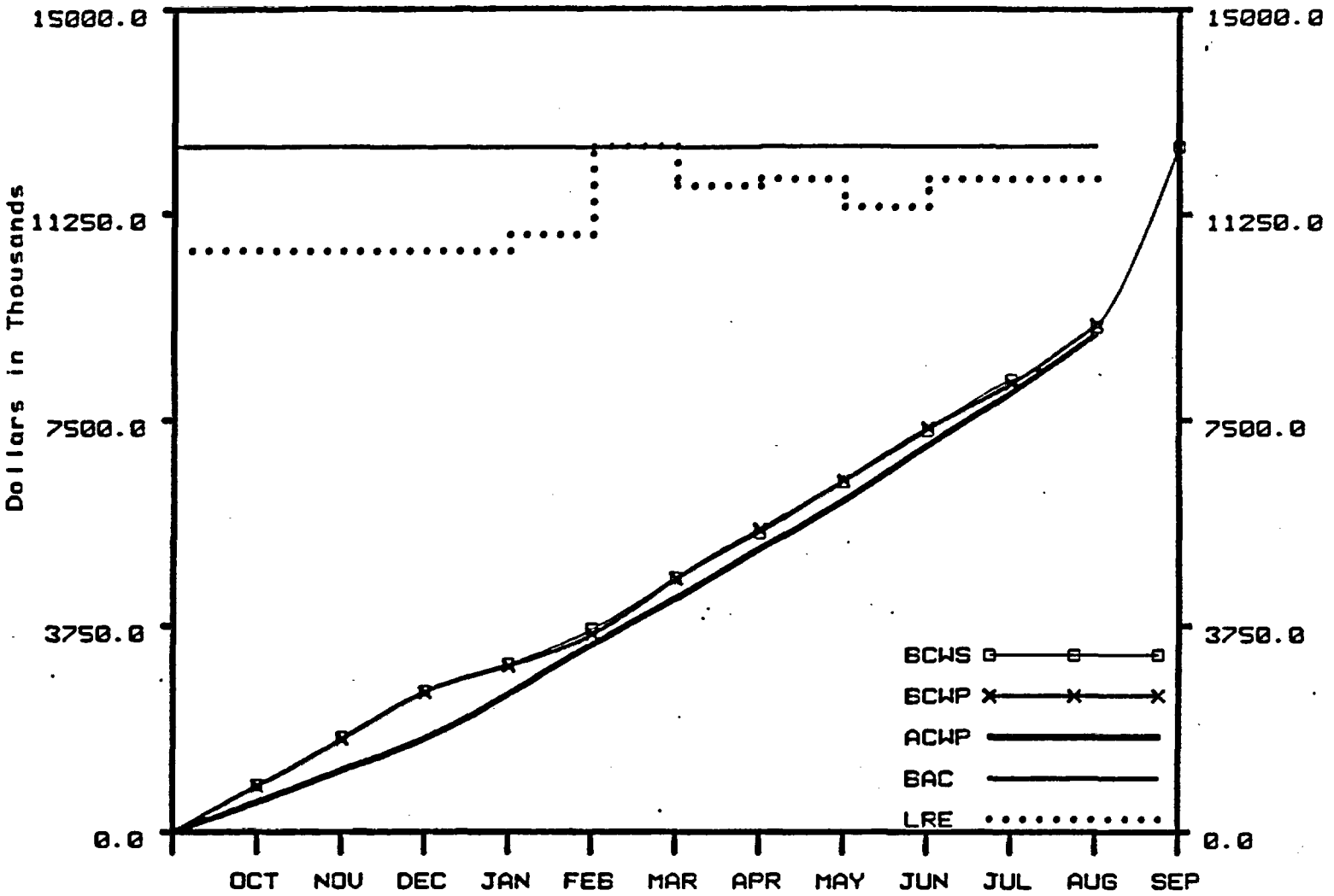
WSI - TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	20.3	187.3
B. BUDGETED COST OF WORK PERFORMED (BCWP)	20.3	187.3
C. ACTUAL COST OF WORK PERFORMED (ACWP)	15.2	157.4
D. BUDGET AT COMPLETION (BAC)		208.0
E. LATEST REVISED ESTIMATE (LRE)		174.8

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	29.9	15.96
H. AT COMPLETION VARIANCE (D-E)	33.2	15.96

Remarks: WSI 29.9K underrun, 15.9 percent

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.L

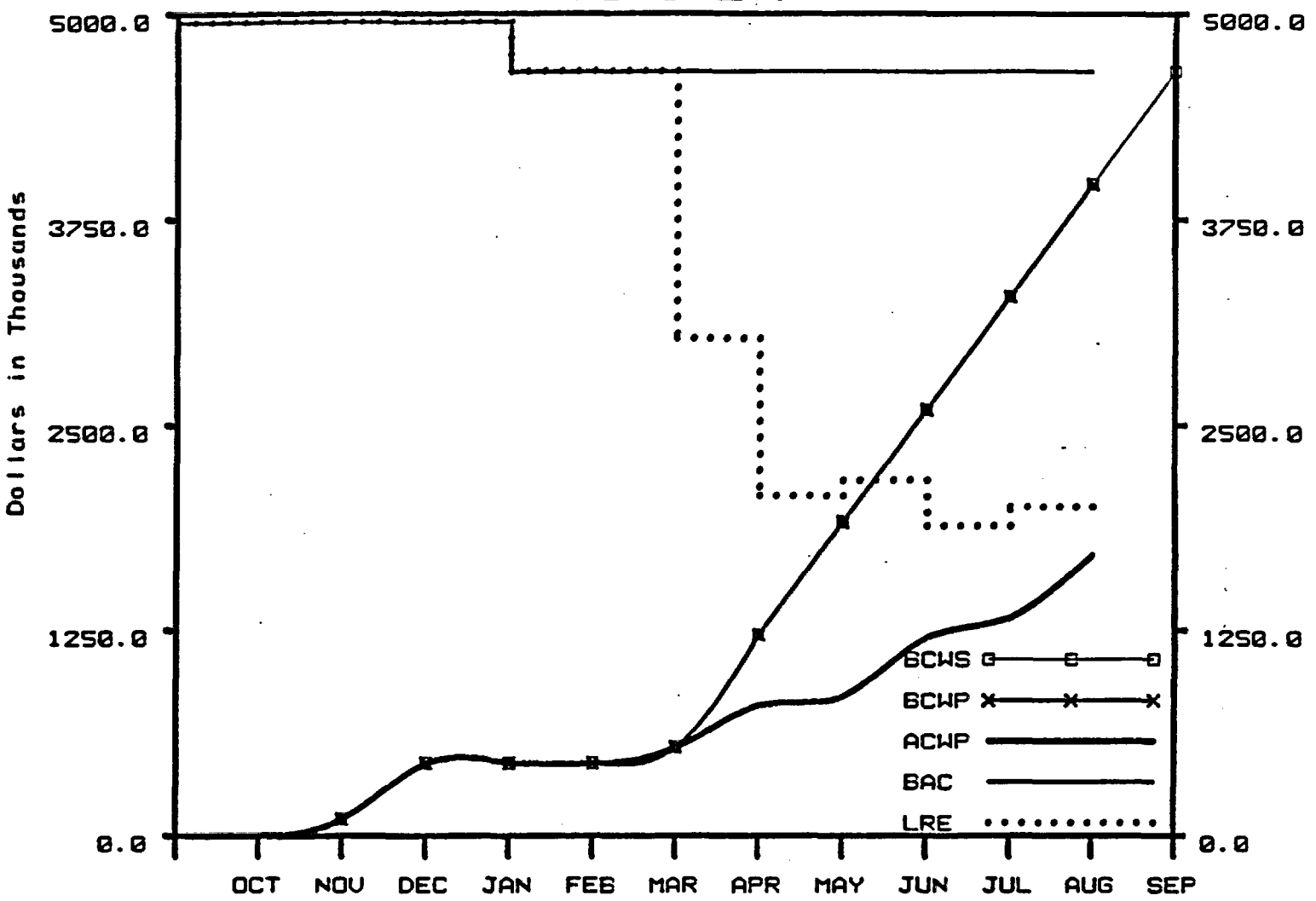


LLNL - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	956.0	9201.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1071.3	9244.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1057.6	9079.6
D. BUDGET AT COMPLETION (BAC)		12495.0
E. LATEST REVISED ESTIMATE (LRE)		11886.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	43.0	0.47
G. COST VARIANCE (B-C)	164.4	1.78
H. AT COMPLETION VARIANCE (D-E)	609.0	4.87

Remarks: Lawrence Livermore: $164.4K underrun, 1.7 percent
- within 10 percent threshold, no analysis required.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.N

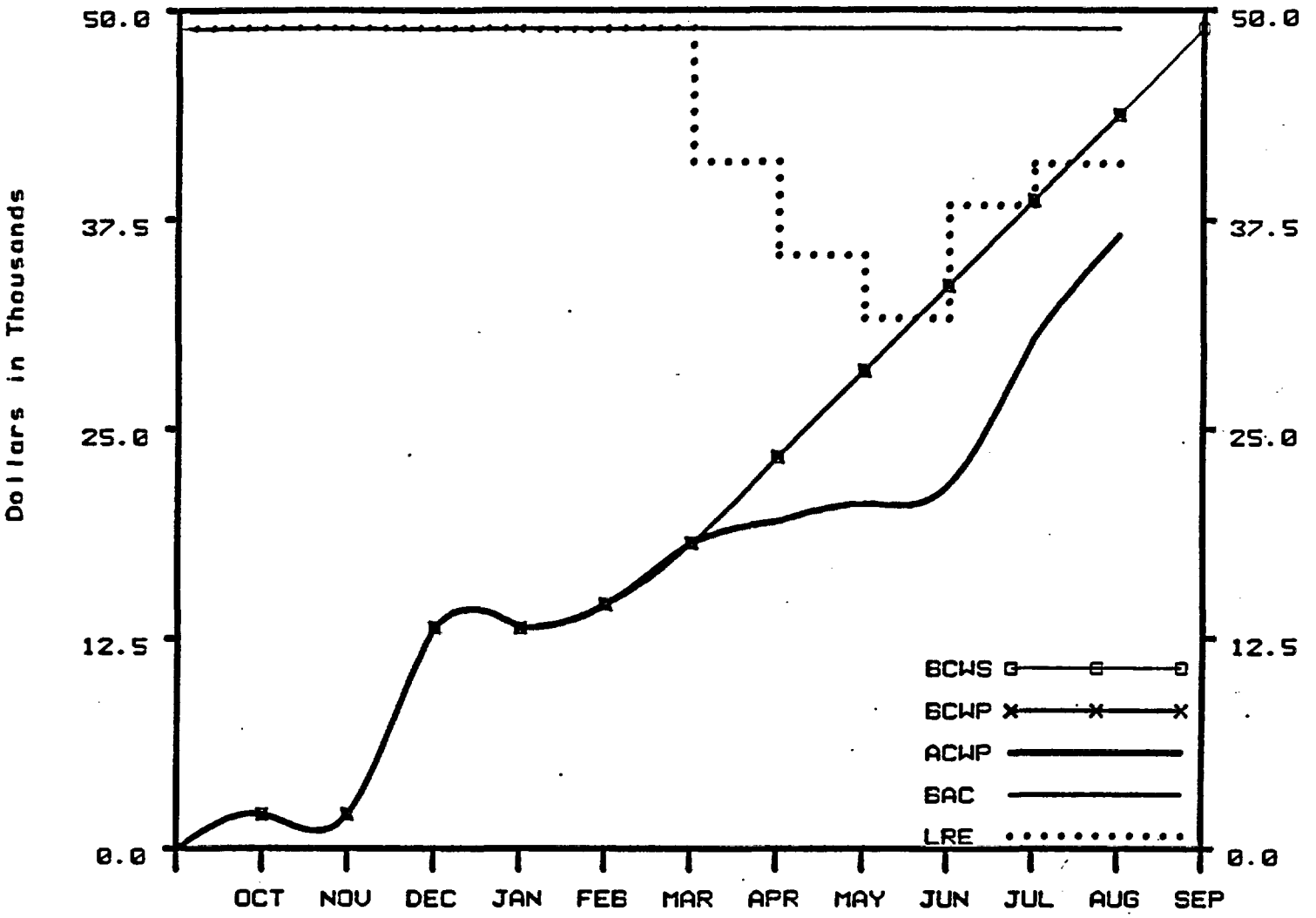


STATE - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	685.5	3964.2
B. BUDGETED COST OF WORK PERFORMED (BCWP)	685.5	3964.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	376.9	1703.7
D. BUDGET AT COMPLETION (BAC)		4650.0
E. LATEST REVISED ESTIMATE (LRE)		1998.5

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	2260.4	57.02
H. AT COMPLETION VARIANCE (D-E)	2651.5	57.02

Remarks: State of Nevada 2.3M underrun, 57.0 percent

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.P



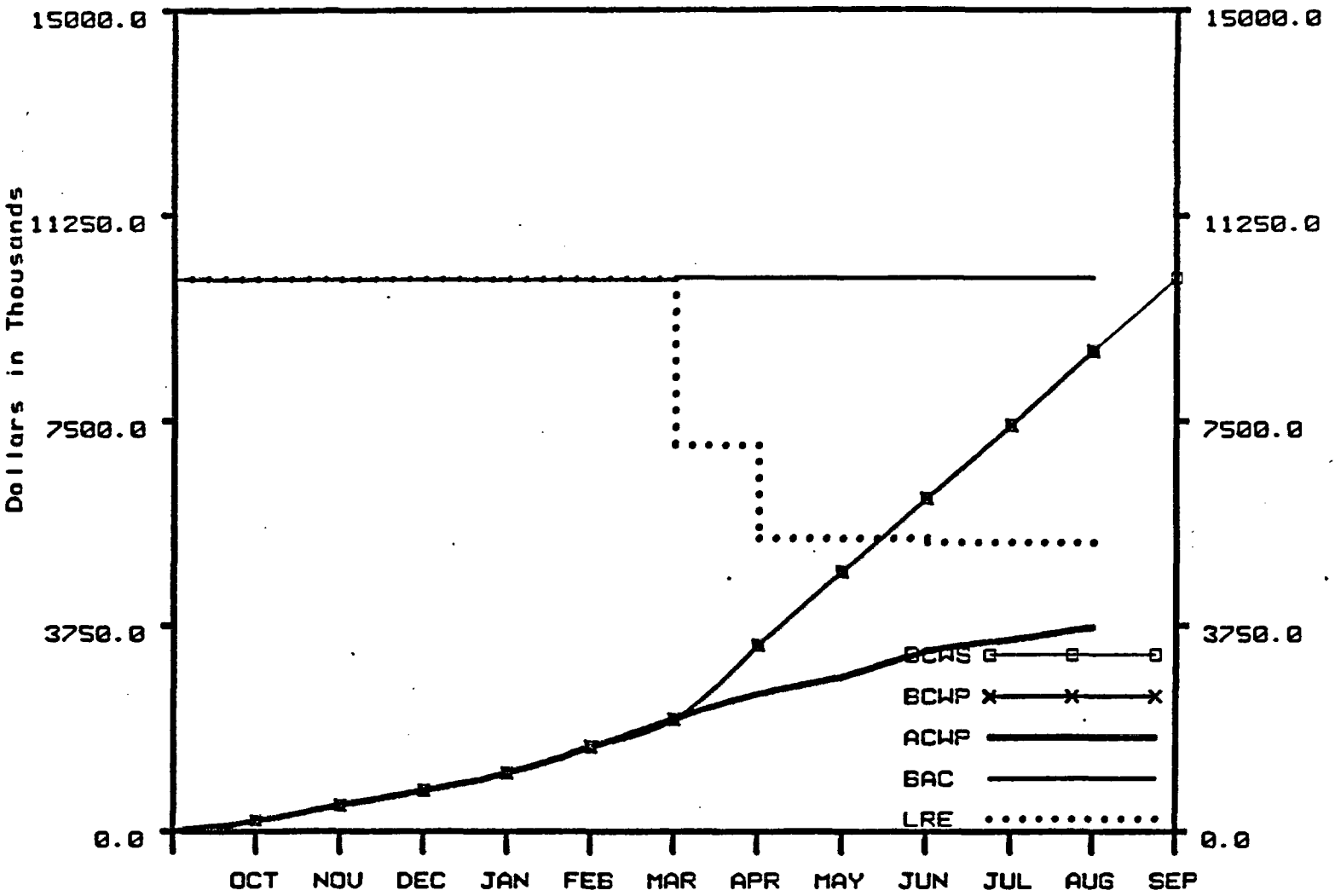
PAN AM - TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	5.1	43.8
B. BUDGETED COST OF WORK PERFORMED (BCWP)	5.1	43.8
C. ACTUAL COST OF WORK PERFORMED (ACWP)	6.2	36.5
D. BUDGET AT COMPLETION (BAC)		48.9
E. LATEST REVISED ESTIMATE (LRE)		40.8

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	7.2	16.57
H. AT COMPLETION VARIANCE (D-E)	8.1	16.57

Remarks: Pan Am 7.2K underrun, 16.5 percent

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.R



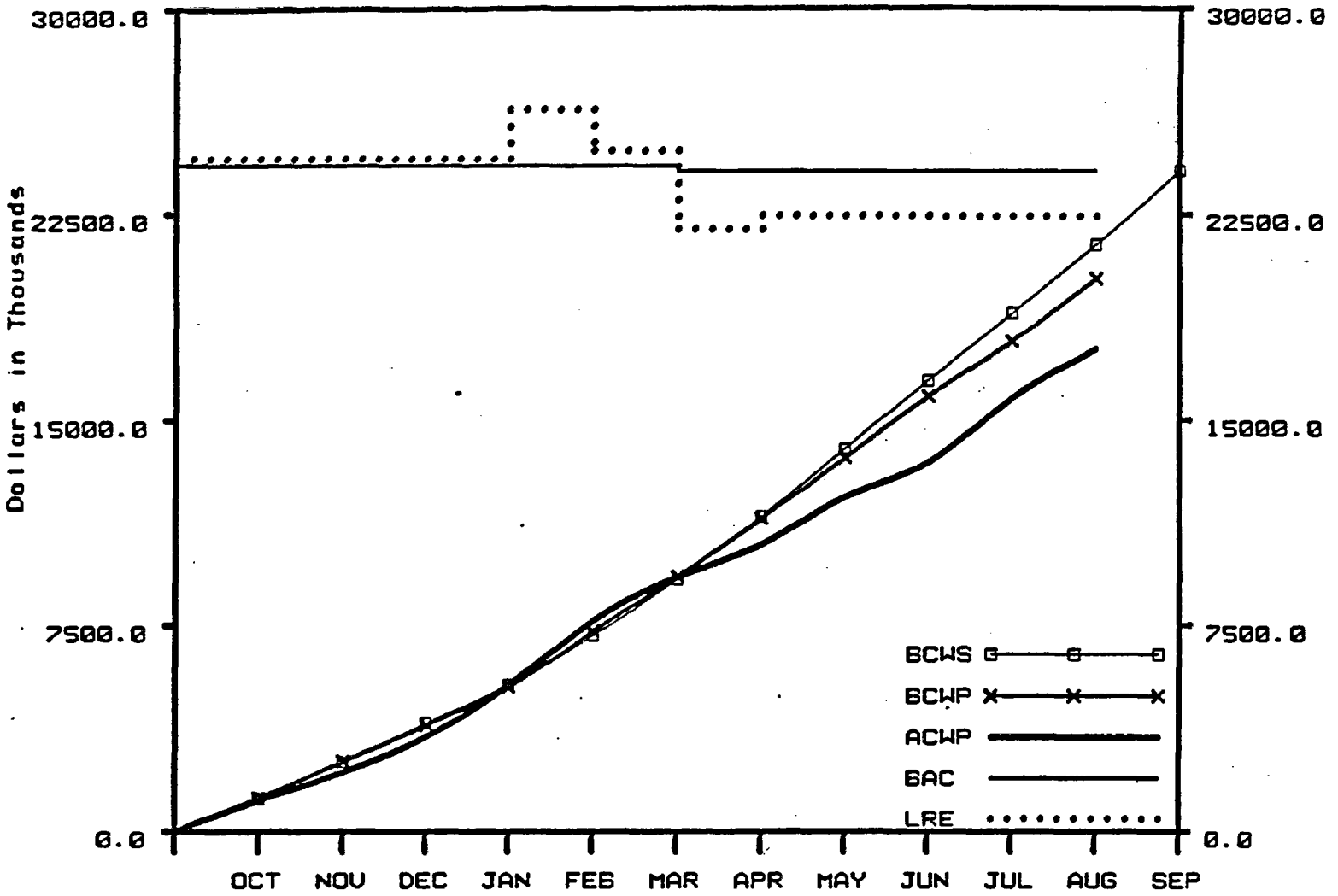
REECO - TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1342.7	8769.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1342.7	8769.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	230.3	3733.4
D. BUDGET AT COMPLETION (BAC)		10113.4
E. LATEST REVISED ESTIMATE (LRE)		5275.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	5035.6	57.43
H. AT COMPLETION VARIANCE (D-E)	4838.4	47.84

Remarks: REECo 5.0M underrun, 57.4 percent, includes work delay at site

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.S

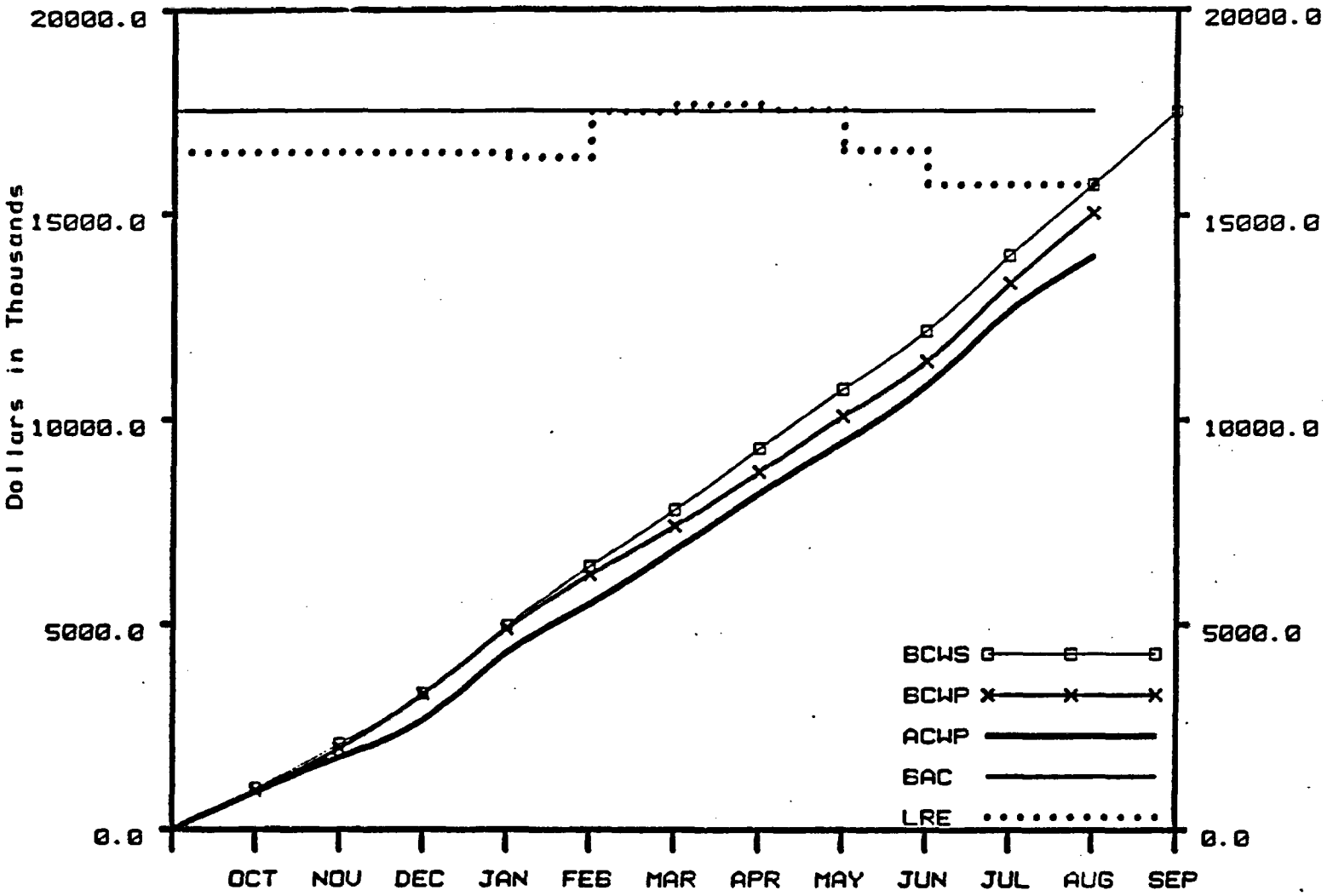


SNL - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	2500.0	21403.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	2297.0	20168.9
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1761.0	17568.0
D. BUDGET AT COMPLETION (BAC)		24084.0
E. LATEST REVISED ESTIMATE (LRE)		22433.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-1234.1	-5.77
G. COST VARIANCE (B-C)	2600.9	12.90
H. AT COMPLETION VARIANCE (D-E)	1651.0	6.86

Remarks: Sandia: $2.6M underrun, 12.9 percent
- primary reasons for the cost underrun are a delay in purchasing for subcontracts and a reduction in the cost of labor.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.T

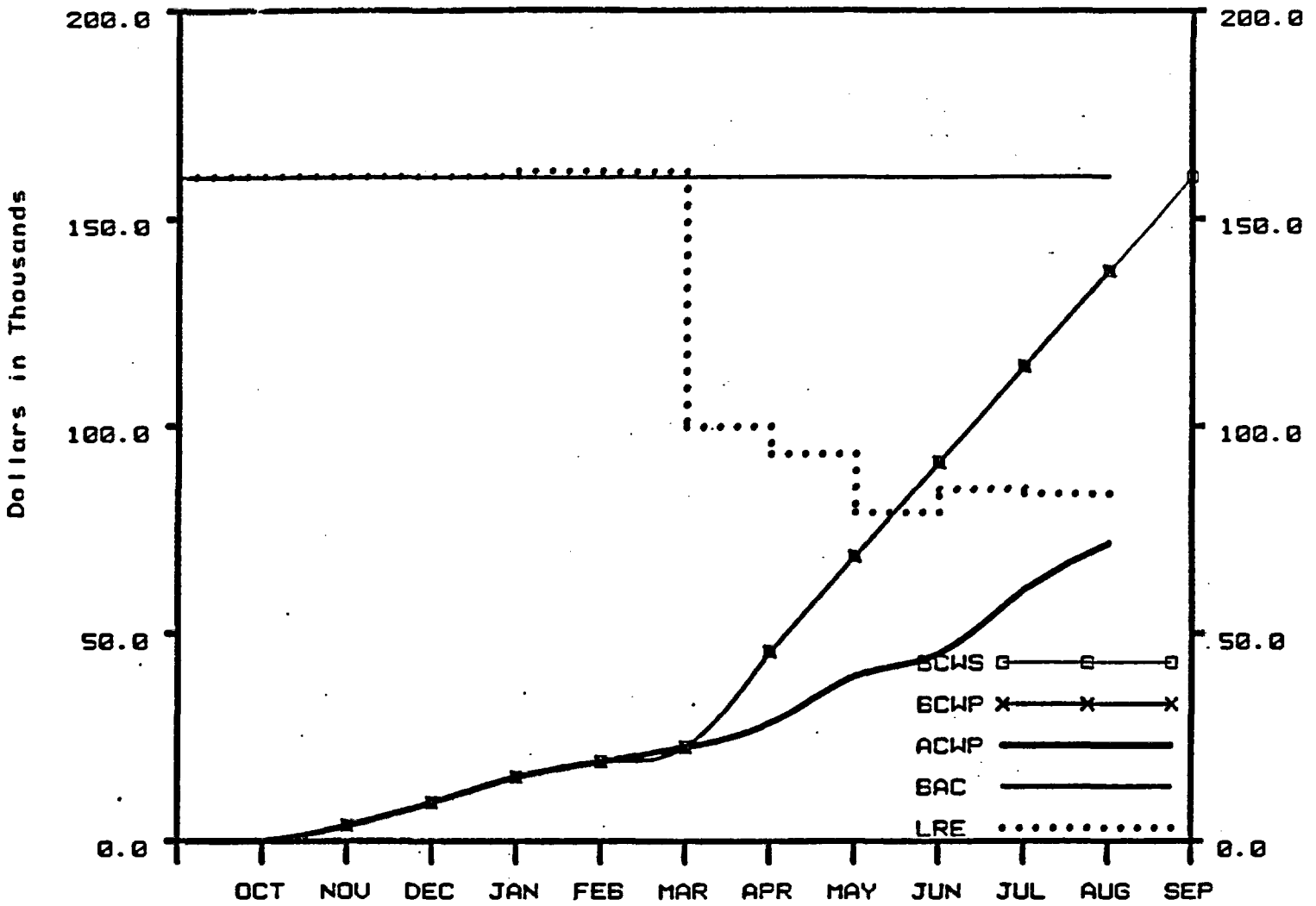


SAIC - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1731.6	15738.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1723.1	15042.6
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1331.0	13984.9
D. BUDGET AT COMPLETION (BAC)		17523.9
E. LATEST REVISED ESTIMATE (LRE)		15726.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-695.3	-4.42
G. COST VARIANCE (B-C)	1057.7	7.03
H. AT COMPLETION VARIANCE (D-E)	1797.9	10.26

Remarks: SAIC: $1.1M underrun, 7.0 percent
- variance within 10 percent threshold. Cost underrun due to staffing restraints and a reduction in the cost per delivered hour.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.U



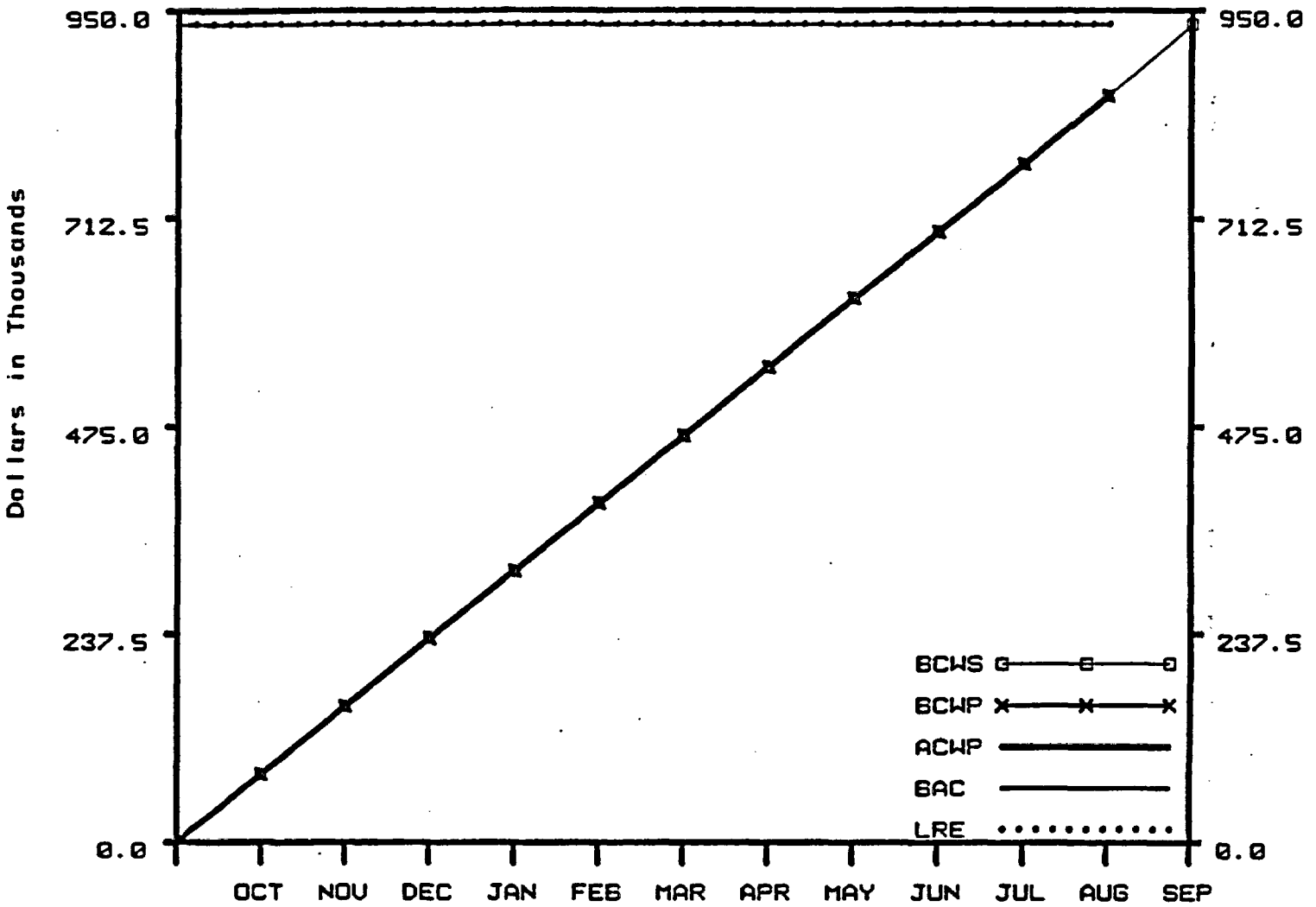
DRI - TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	22.9	137.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	22.9	137.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	11.2	71.6
D. BUDGET AT COMPLETION (BAC)		160.0
E. LATEST REVISED ESTIMATE (LRE)		83.6

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	65.5	47.77
H. AT COMPLETION VARIANCE (D-E)	76.4	47.77

Remarks: DRI 65.5K underrun, 47.7 percent

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR AUG 1986
WBS: 1.2.X



NTS - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	77.5	852.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	77.5	852.6
C. ACTUAL COST OF WORK PERFORMED (ACWP)	77.5	852.6
D. BUDGET AT COMPLETION (BAC)		934.3
E. LATEST REVISED ESTIMATE (LRE)		934.3

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	0.0	0.00
H. AT COMPLETION VARIANCE (D-E)	0.0	0.00

Remarks: NTS Allocation 0 cost variance, 0 percent, BCWP = BCWB = ACWP

August 1986

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
LEVEL 1 MILESTONES IN A TIME WINDOW OF 1 Oct 1985 TO 30 Sep 1987
Run Date: 2 September 1986

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL/ EXPECTED
Annual PASS Program Interaction - (Letter Report)	1.2.1.1.S	Robson	1	SNL	M870	B	30 Sep 86 15 Oct 86 E
Yucca Mountain Mined Geologic Disposal System (MGDS) Requirements	1.2.1.2.1.S	Robson	1	SNL	M120	B	30 Nov 85 30 Jan 87 E
Draft Yucca Mountain Site-Specific Mined Geologic Disposal System (MGDS) Description	1.2.1.2.1.S	Robson	1	SNL	M261	B	30 Sep 86 30 Nov 86 E
System Engineering Management Plan (SEMP)	1.2.1.2.4.S	Robson	1	SNL	M108	B	2 May 86 30 Nov 86 E
Input to DOE/HQ Report to Congress on Copper for Waste Packages	1.2.2.3.2.L	Valentine	1	LLNL	M222	B	1 Aug 85 24 Oct 85 A
Progress Report on the Results of Testing Advanced Conceptual Design Metal Barrier Materials Under Relevant Environmental Conditions for a Tuff Repository	1.2.2.3.2.L	Valentine	1	LLNL	M236	B	30 Apr 86 30 Oct 86 E
Final Report on Feasibility of Using Copper as a Waste Package Material	1.2.2.3.2.L	Valentine	1	LLNL	M247	B	30 Sep 86 E
Revised Draft Waste Package Subsystem Conceptual Design Requirements to DOE/HQ for Review	1.2.2.4.L	Valentine	1	LLNL	M013	B	30 May 86 15 Nov 86 E
Initiate Waste Package Advanced Conceptual Design	1.2.2.4.L	Valentine	1	LLNL	M233	B	31 Jan 86 30 Jan 87 E
Report on the System Model for Waste Package Performance Analysis	1.2.2.5.L	Valentine	1	LLNL	M276	B	30 Jun 86 30 Oct 86 E

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
LEVEL 1 MILESTONES IN A TIME WINDOW OF 1 Oct 1985 TO 30 Sep 1987
Run Date: 2 September 1986

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL/ EXPECTED
Report on Geochemistry Simulation of Yucca Mountain Using Best Available Data on Mineralogy, Water Chemistry, Flow Rates and Crack Statistics	1.2.3.4.1.7.A	Livingston	1	LANL	M325	B	27 Jun 86 31 Oct 86 E
Implementation of Meteorological Monitoring Plan	1.2.3.6.1.T	Blanchard	1	SAIC	M364	B	1 Jun 85 16 May 86 A
Final Radiological Monitoring Plan Complete	1.2.3.6.1.T	Jankus	1	SAIC	M897	B	28 Feb 86 28 Feb 87 E
Draft Socioeconomic Monitoring and Mitigation Plan	1.2.3.7.T	Dixon	1	SAIC	P029	B	30 Jun 86 31 Oct 86 E
Review of the Concepts Developed by HEDL for Remote/Automated Waste Handling Systems Initiated	1.2.4.1.1.S	Skousen	1	SNL	M802	B	30 Jul 86 6 Aug 86 A
Assistance to HEDL in Defining Remote/Automated Waste Handling Systems	1.2.4.1.1.S	Skousen	1	SNL	M806	B	31 Oct 85 30 Sep 86 E
Start Repository Advanced Conceptual Design	1.2.4.1.1.S	Skousen	1	SNL	N430	B	30 Jun 86 20 Nov 86 E
Initial Subsystem Design Requirement (SDR)	1.2.4.1.2.S	Skousen	1	SNL	N433	B	31 Jan 86 1 Oct 86 E
Repository Conceptual Design in Support of Site Characterization	1.2.4.1.3.S	Skousen	1	SNL	N432	B	3 Dec 86 E
Report on G-Tunnel Underground Facility (GTUF) Summary	1.2.4.2.1.2.S	Skousen	1	SNL	M455	B	30 Sep 86 26 Nov 86 E

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
LEVEL 1 MILESTONES IN A TIME WINDOW OF 1 Oct 1985 TO 30 Sep 1987
Run Date: 2 September 1986

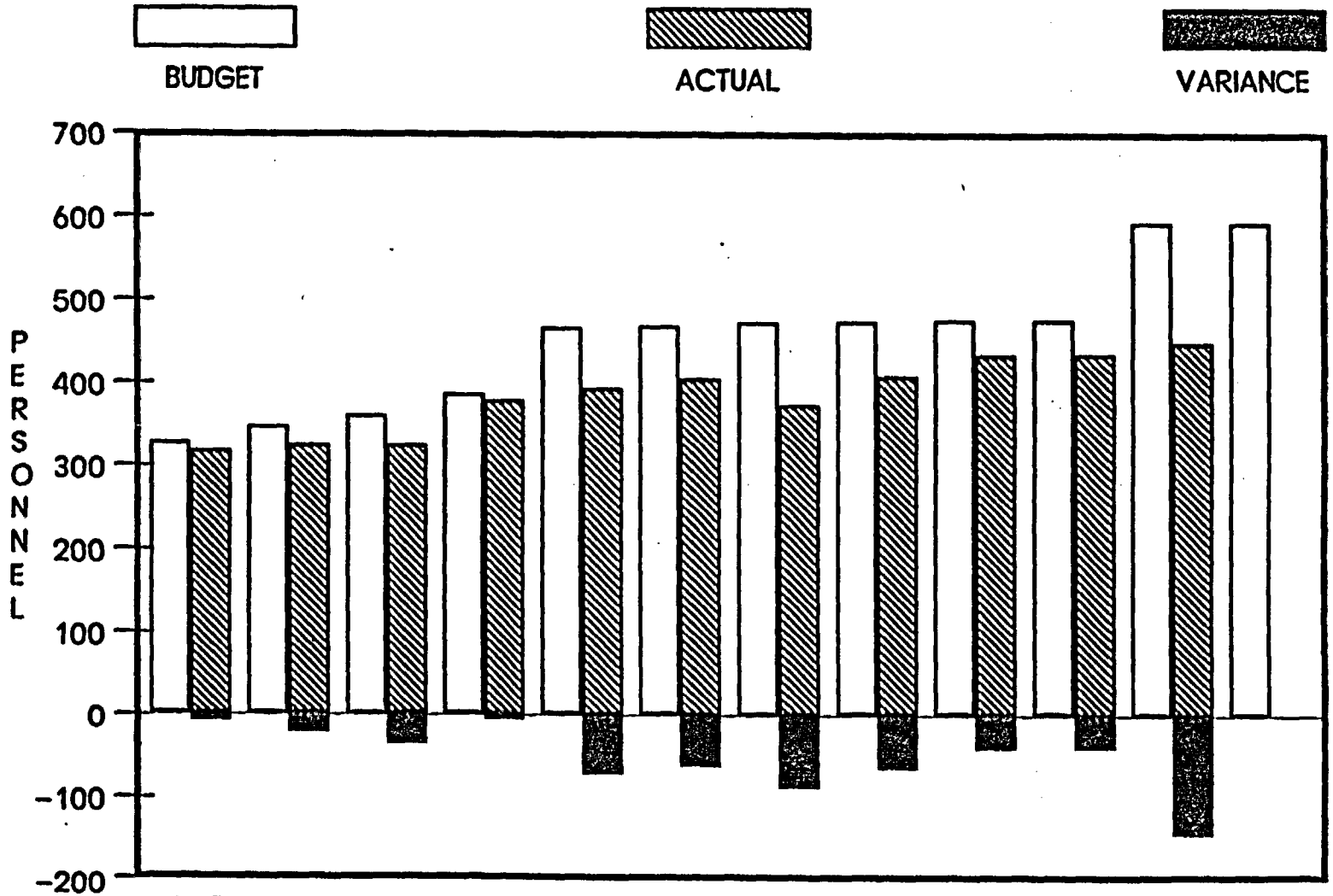
MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL/ EXPECTED
Feasibility Analysis of Horizontal Emplacement and Retrieval - Letter Report	1.2.4.2.2.1.S	Skousen	1	SNL	M295	B	31 Oct 85 14 Nov 86 E
Horizontal Waste Emplacement Equipment Development Plan	1.2.4.2.2.1.S	Skousen	1	SNL	N406	B	30 Apr 86 31 Oct 86 E
Prepare Design Requirements and Materials Recommendation Report	1.2.4.2.3.1.S	Skousen	1	SNL	P404	B	30 Jul 86 30 Sep 86 E
Preliminary Study of the Effects of Uncertain Geologic Data on Design of the Underground Facility	1.2.4.6.2.S	Skousen	1	SNL	N457	B	30 Aug 86 27 Feb 87 E
Issue IMS Requirement Study to WMPO/NV for Review and Comment	1.2.5.2.1.T	Szymanski	1	SAIC	M855	B	30 Sep 86 30 Dec 86 E
Draft Site Characterization Plan (SCP)	1.2.5.2.2.T	Clanton	1	SAIC	M521	B	15 Aug 86 30 Oct 86 E
Site Characterization Plan (SCP)	1.2.5.2.2.T	Clanton	1	SAIC	M522	B	24 Nov 86 31 Dec 86 E
Camera Ready Environmental Assessment/Comment Response Appendix (EA/CRA) to DOE/HQ	1.2.5.3.1.T	Blanchard	1	SAIC	M504	B	24 Jan 86 24 Jan 86 A
Revised Camera-Ready Environmental Assessment/Comment Response Appendix (EA/CRA)	1.2.5.3.1.T	Blanchard	1	SAIC	P054	B	9 Apr 86 9 Apr 86 A
ESF Shaft and Mining Subcontract Awarded	1.2.6.1.1.A	Irby	1	LANL	M022	B	21 Mar 86 1 Aug 87 E

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
LEVEL 1 MILESTONES IN A TIME WINDOW OF 1 Oct 1985 TO 30 Sep 1987
Run Date: 2 September 1986

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL/ EXPECTED
Complete Exploratory Shaft Readiness Review	1.2.6.1.1.A	Irby	1	LANL	M243	B	24 Feb 86 1 Aug 87 E
Start First Shaft (ES-1) Construction	1.2.6.1.1.A	Irby	1	LANL	M652	B	28 Aug 86 25 May 88 E
Start ESF Site Preparation	1.2.6.2	Irby	1	LANL	M645	B	1 Dec 86 1 Dec 87 E
Begin ESF Testing	1.2.6.9.2	Irby	1	LANL	M612	B	31 May 87 25 May 88 E
Final Report on the SFT-C	1.2.7.2.1.L	Zavoda	1	LLNL	M708	B	28 Feb 86 30 Nov 86 E
Completion of Mining for G-Tunnel Welded Tuff Mining Evaluations	1.2.7.2.3.S	Skousen	1	SNL	M279	B	30 May 86 2 Jun 86 A
Submit FY 1988 Budget to DOE/HQ	1.2.9.1.2.X	Dixon	1	WMPO	M719	B	21 Apr 86 15 May 86 A
Implementation of Phase I of Earned Value System (80 percent level of effort)	1.2.9.2.T	Dixon	1	SAIC	M720	B	30 Nov 85 13 Nov 85 A
FY 86 Project Budget Baseline Approved	1.2.9.2.T	Dixon	1	SAIC	M722	B	31 Oct 85 24 Apr 86 A
List of Project Office Controlled Milestones Complete	1.2.9.2.T	Dixon	1	SAIC	M893	B	31 Dec 85 30 Nov 86 E

NO. MILESTONES IN THIS REPORT: 40

NNWSI PROJECT STAFFING*
FISCAL YEAR 1986



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
B	327	347	361	386	466	468	473	474	476	476	593	593
A	317	324	324	379	393	405	374	408	434	435	449	
V	-10	-23	-37	-7	-73	-63	-99	-66	-42	-41	-144	

*These budgeted and actual amounts reflect input from six project participants: F&S, Los Alamos, LLNL, REECo, SAIC, and SNL.

PLANNED NNWSI PROJECT FIELD ACTIVITIES

FOR OCTOBER

Participant	Activity	Location	Planned	
			Day	Time
LLNL	No scheduled activities			
Los Alamos	No scheduled activities			
SAIC	Meteorological monitoring	Yucca Mountain	Field site technician will maintain stations weekly, 3 days per week.	
USGS	No scheduled activities			