encl. to note of Monthly Rpt. dated 7/8/86 from Vieth to Purcell 10 2 Pocket 12

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT

MONTHLY REPORT

MAY 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 Office of Geologic Repositories of the DOE Office of Civilian Radioactive Waste Management.

UNITED STATES DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE

U.S. DEPARTMENT OF ENERGY

OCRWM

OGR

NNWSI Nevada Nuclear Waste Storage Investigations PROJECT

YUCCA MOUNTAIN

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT

MONTHLY REPORT

MAY 1986

UNITED STATES DEPARTMENT OF ENERGY

NEVADA OPERATIONS OFFICE

TABLE OF CONTENTS

ABSTRACT

Key Activities

WBS 1.2.1 Systems

At a workshop on the Systems Engineering Management Plan, participants agreed to revisions of the first three chapters. The draft Configuration Management Plan and the Implementation Action Plan were submitted to the WMPO for review. The EA support document, "Preliminary Estimates of Ground-water Travel Time and Radionuclide Transport at Yucca Mountain Repository Site," has also been submitted for review.

WBS 1.2.2 Waste Package

A short-term experiment with vitric tuff that began in March was completed in May. Additional specific definitions of container acceptance or rejection criteria, based on loading conditions, were outlined. Project participants have submitted a paper on the hydration of waste glasses for presentation at the Materials Research Society fall 1986 meeting. A series of weld tests were devised to provide information on weldability for candidate waste package materials. A series of experiments will also develop standards for calibrating ultrasonic testing procedures for welds in candidate alloys.

WBS 1.2.3 Site Investigations

The USGS stop work order remained in effect through May. Almost all site characterization activities were suspended throughout the month. A paper entitled "Evidence of Rotation About a Vertical Axis During Extension at Yucca Mountain, Southern Nevada," and two abstracts, "Colloid Transport" and "A Strategy for the Evaluation and Comparison of Ground-Water Flow and Transport Models," were presented at the Baltimore American Geophysical Union meeting. The Probable Maximum Flood Report was approved by WMPO for publication. A number of sorption and desorption experiments were completed.

Participants in a meeting to discuss mineral stability and the definition of the disturbed zone for performance allocation decided more work is needed on reactions in the temperature range near and just above 100 ^{o}C. The draft Nevada routing study was submitted to the WMPO for review.

WBS 1.2.4 Repository Investigations

All required instrumentation is installed at the second station in the demonstration drift of G-tunnel and mining has resumed. Activities of Project participants were concentrated on preparation of the Site Characterization Plan.

WBS 1.2.5 Regulatory and Institutional Investigations

The draft Regulatory Documents Manual contains all NRC and EPA regulations and guidance specifically applicable to the high-level waste repository, as well as pertinent legislation. The draft NNWSI Project Information Management System Concepts Evaluation Report was submitted to WMPO for review. A meeting between

DOE/HQ and NRC representatives resulted in a number of agreements that could affect the SCP schedule. The final EA was released to the public on May 28 along with the Candidate Site Recommendation Report.

WBS 1.2.6 Exploratory Shaft Investigations

The fiscal year 1988 Work Package Proposal Authorization System was presented to OGR. Prototype testing of exploratory shaft fracture-mapping techniques was conducted in excavated pits on Yucca Mountain.

WBS 1.2.7 Test Facilities

The report "Spent Fuel Test-Climax: Technical Measurements Data Management System Description and Data Presentation" is ready for publication. The demonstration drift in welded tuff in the G-Tunnel underground facility was completed. The E-MAD facility began summer operation. The demonstration canisters and fuel models were crated.

WBS 1.2.9 Project Management

The WMPO Records Administrator visited each of the Project Participants to review existing Project information systems. At a quality assurance workshop participants discussed a QA alert system, minimum requirements for certification, and participation by States and Indian tribes in audits. Participant QA manuals were revised and updated for review. A Repository Design Control Board was established. A paper entitled "Control of Research Oriented Software Development" was presented at the 40th Annual Quality Congress in Anaheim, California.

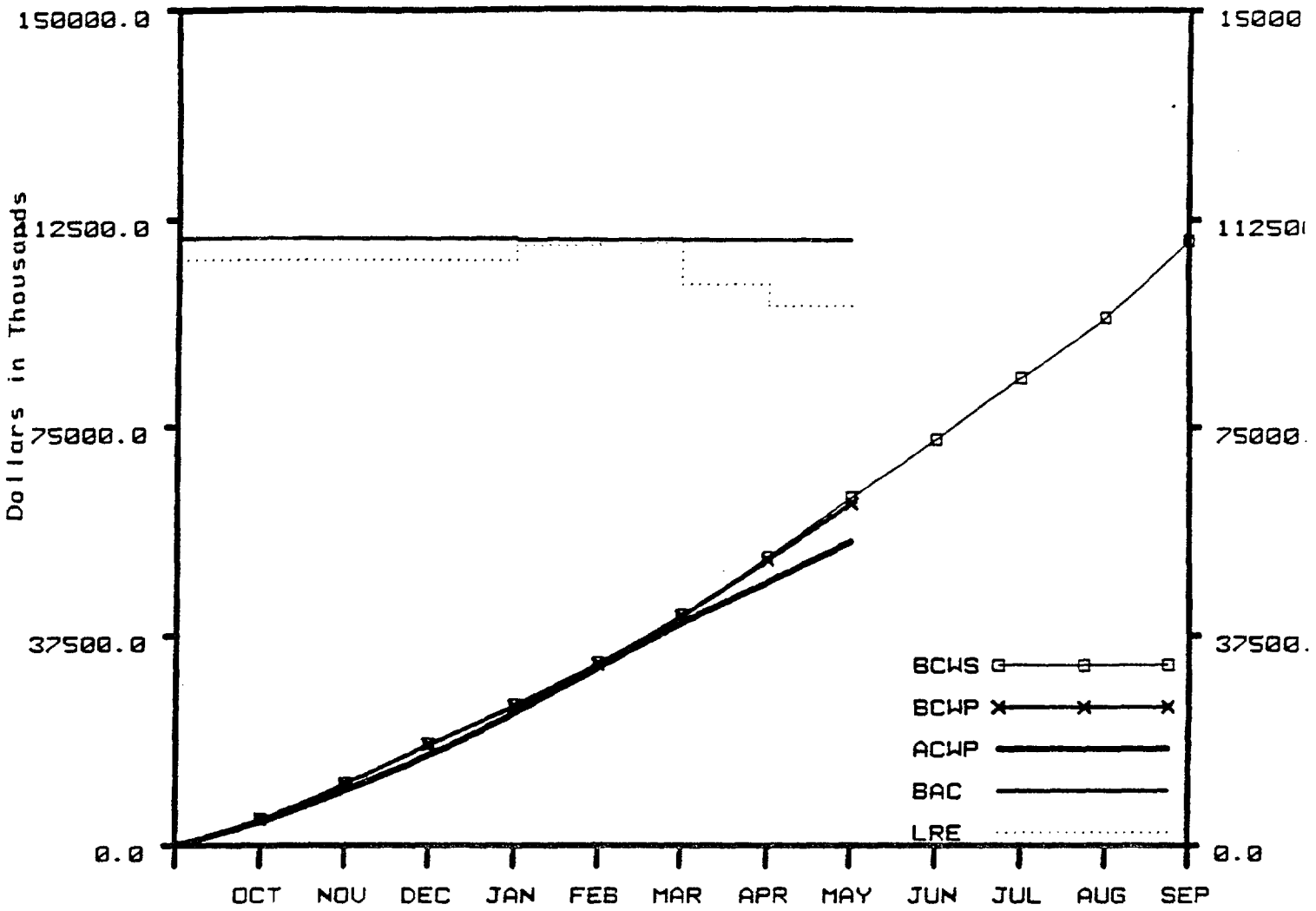
Funding Overview

The month-end estimated costs were $7,248,706 against a plan of $10,648,370 resulting in a cost underrun of $3,399,664.

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

		Plan	Cost ($000)	Variance	% Variance
1.2.1	Systems	$ 4,208	$ 3,742	$ 466	11
1.2.2	Waste Package	4,343	4,068	275	6
1.2.3	Site	19,478	16,688	2,790	14
1.2.4	Repository Investigations	7,983	6,724	1,259	16
1.2.5	Regulatory and Institutional Investigations	7,441	5,914	1,527	21
1.2.6	Exploratory Shaft Investigations	7,237	6,458	779	11
1.2.7	Test Facilities	706	716	(10)	(1)
1.2.9	Project Management	10,908	10,143	765	7
1.2	NNWSI Project	$ 62,304	$ 54,453	$ 7,851	13%

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR MAY 1986
WBS: 1.2



NNWSI - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	10648.4	62303.7
B. BUDGETED COST OF WORK PERFORMED (BCWP)	10161.1	61249.3
C. ACTUAL COST OF WORK PERFORMED (ACWP)	7248.7	54453.1
D. BUDGET AT COMPLETION (BAC)		108760.0
E. LATEST REVISED ESTIMATE (LRE)		96966.8

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-1054.4	-1.69
G. COST VARIANCE (B-C)	6796.2	11.10
H. AT COMPLETION VARIANCE (D-E)	11793.2	10.84

Remarks:

Cost variances are due to the Stop Work Order and billing lag from the State of Nevada. The Project has requested the Participants to forecast the LRE. A decision to formally replan the Project will be made pending the evaluation of the LRE and the redefinition of work to complete this fiscal year.

NNWSI PROJECT BUDGET BASELINE

MAY 1986

CONTRACTORS	($000) FY 86 FUNDING	($000) REVISED ESTIMATE	($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

* Revised estimate is the New Baseline Budget.

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

Sandia National Laboratories (SNL) personnel participated in the NNWSI Project Site Characterization Plan (SCP) workshops during May 1986. The latter part of May 1986 was devoted to writing the parts of SCP Chapter 8 dealing with the resolution of issues in the Issues Hierarchy.

WBS 1.2.1.2 SYSTEMS ENGINEERING

WBS 1.2.1.2.1 System Description

SNL staff completed draft descriptions for the preclosure Mined Geologic Disposal System sections of the system description document that deal with shafts and ramps, underground facilities, and surface facilities.

WBS 1.2.1.2.3 Cost Schedule

The revised cost guidelines were reviewed and debated by the cost estimators for the tuff, basalt, and salt projects on May 1-2, 1986, at Kaiser Engineers of Oakland, CA. A final cost guideline will be issued in late May and will provide guidance for the cost estimating at each of the design phases from the Repository Conceptual Design in Support of Site Characterization (RCD/SC) through construction, plus any special studies.

SNL suspended cost-estimating activities pertaining to the RCD/SC and the fuel-consolidation study pending the finalization of the cost guidelines.

The two-stage repository report ("Two-Stage Repository Development at Yucca Mountain: An Engineering Feasibility Study" (SAND84-1351, Revision 1)) was revised to clarify some articles referenced in the Environmental Assessment report. Article 6, Cost Estimates, was revised, and Appendix A, Repository Workers was added.

On May 15, 1986, the repository cost estimates, dated February 1986, for tuff, basalt, salt, and crystalline rock geologies were presented by DOE/HQ-Weston to representatives from SNL, Bechtel National, Inc., Parsons Brinckerhoff Quade & Douglas, and Science Applications International Corporation at the Bechtel offices in San Francisco, CA. The presentation initiated a "field review" by the respective projects and subsequent endorsement. These total-system, life-cycle cost data will be used to support the Office of Civilian Radioactive Waste Management (OCRWM) fee adequacy report for 1987. SNL has been requested to complete the review within two months.

WBS 1.2.1.2.4 Systems Engineering Integration

SNL held a workshop on May 28-29, 1986, to receive and discuss the review comments of the Systems Engineering Management Plan (SEMP) authors. The workshop was attended by representatives of the Waste Management Project Office (WMPO), Los Alamos National Laboratories, Lawrence Livermore National Laboratories (LLNL), Science Applications International Corporation (SAIC), and the United States Geological Survey (USGS). Revisions to the first three chapters were agreed upon. Meetings in early June will define the content of Sections 4 and 5, and the revision schedule and writing assignments will be developed. The authors intend to prepare a revised draft for SNL management review by the end of June 1986.

During May the USGS held two meetings of the Systems Engineering Integration Group to develop an annotated outline for the SEMP and to establish writing assignments. Work began on sections of the Plan for which the USGS is responsible, organizational responsibilities, and integration of siting activities. As a result of two Systems Engineering Integration Group meetings the SEMP will be rewritten based on input from the WMPO, SAIC, USGS, and LLNL, with SNL coordinating document preparation.

Project participants met with representatives from the DOE/HQ in Las Vegas for reviews of SCP sections 8.4, Site Preparation, and 8.7, Decontamination and Decommissioning. Both sections will be revised to reflect the consolidated comments. SAIC staff members submitted information for inclusion in SCP Section 8.1.3, Application of Systems Engineering to Site Characterization Activities.

SAIC personnel attended and participated in two remote system/handling technology reviews at Fluor in Irvine, CA, and at Bechtel in San Francisco. Both meetings focused on work being performed by Westinghouse HEDL for the participants.

WBS 1.2.1.2.5 Configuration Management and Change Control

A draft NNWSI Project Configuration Management Plan (CMP), SAIC Milestone R049, was forwarded to WMPO for review and comment on May 29. Also included was an Implementation Action Plan, which provides a set of suggested milestones and activities that would lead to full implementation of the CMP. These activities would provide the necessary plans and procedures (new or revised), training, a Baseline Review Board, and an expanded data base application to support the configuration management process.

During May SAIC personnel distributed the NNWSI Project Baseline Milestones, NNWSI Project Baseline Documents, NNWSI Project WBS Dictionary (revisions to the subject document), NNWSI Project Plan - Revision 0, and NNWSI Project QAP, NVO-196-17 - Revision 4 (interim changes), for both T&MSS and WMPO.

WBS 1.2.1.3 TECHNICAL DATA BASE MANAGEMENT

WBS 1.2.1.3.1 Tuff Data Base

SNL personnel completed an outline for the second draft of a proposed standard operating procedure for the authorization and release of test data for input into the technical data base. It will describe the origination and flow of site, design, and performance assessment data into the tuff data base and the reference information base.

SNL staff members are making a detailed search of the NNWSI Project bibliography to identify and organize scientific and engineering data that have been collected since the inception of the Project. The objectives of this activity are to abstract the types of data that have been collected for ready search and retrieval and to use the categories of data that already have been gathered as a guide for the systems requirements.

SNL data-base staff members participated in a briefing for WMPO and SAIC personnel on the SNL Records Management System, and specifically on the purpose, scope, and content of the tuff data base and reference information base.

WBS 1.2.1.3.2 Computer Graphics

SNL personnel completed a draft of a quality-assurance procedure for the NNWSI Project Technical Data Base and it is in peer review.

SNL staff members gave a demonstration of the Interactive Graphics Information System (IGIS), including discussion of current and proposed quality-assurance procedures, to personnel from the WMPO and SAIC. They also have identified a large set of geophysical logs acquired by the USGS from the Yucca Mountain region as data for possible inclusion in the Tuff Data Base. Efforts are underway to obtain these data in digital form.

WBS 1.2.1.3.3 Reference Information Base

During May 1986 SNL activities related to the Reference Information Base closely paralleled those of the Tuff Data Base. Preparation of the outline for the second draft of a proposed standard operating procedure describing the flow of site and engineering properties data, design information, and performance-assessment results into the technical data base occupied most of May.

WBS 1.2.1.4 TOTAL SYSTEMS PERFORMANCE ASSESSMENT

WBS 1.2.1.4.1 Flow and Radionuclide Transport

An SNL report entitled "Preliminary Estimates of Groundwater Travel Time and Radionuclide Transport at Yucca Mountain Repository Site" (SAND85-2701), was sent to the WMPO for policy review. This report, which will satisfy Milestone R082, presents the assumptions, methods, and data used in a probabilistic approach to the calculation of ground-water travel times and total radionuclide releases into the water table below Yucca Mountain. The studies provide some of the information needed in support of requirements for the NNWSI Project statutory EA.

At SNL a contractor report from Lawrence Berkeley Laboratory entitled "Hydrologic Mechanisms Governing Partially Saturated Fluid Flow in Fractured Welded Units and Porous Nonwelded Units at Yucca Mountain" (SAND85-7114) is in final line review. This report, which will satisfy Milestone N117, uses a discrete-fracture porous-matrix model and a composite-medium model to study the hydrological responses to cycles of pulse infiltration.

SNL personnel completed a draft version of SCP Section 8.3.5.7, Plans Assessment Site Subsystem Performance, which has been submitted for review.

WBS 1.2.1.4.2 Radionuclide Source Term

The principal SNL investigator devoted May efforts to preparing the text for Chapter 6 and a major portion of Chapter 8 of the SCP.

WBS 1.2.1.4.4 Radionuclide Releases from Total System

A journal article on the composite porosity model (SAND86-0517J) completed peer and editorial review and was revised and returned to reviewers for concurrence.

The SNL paper entitled "Calculation of Hydrologic Properties for Tuffs from Yucca Mountain, Nevada, Using Mercury Porosimetry Results" (SAND86-0268J), completed peer and editorial review. It was revised and returned to reviewers for concurrence.

SNL staff members participated in the preparation of the SCP during May. The staff is responsible for writing three issues, reviewing four, and reviewing SCP Chapter 3.

PLANNED WORK

SCP issues resolution will continue at SNL during the early part of June 1986.

SNL personnel will coordinate a review of the February 1986 repository cost estimates for tuff, basalt, salt, and crystalline rock repositories with the RCD/SC and other tasks.

Preliminary work by SNL indicates that a recently completed inverse-distance-squared interpolation program can provide useful contour maps showing porosity or other rock parameters for various stratigraphic units throughout the site. Additional modeling using this technique is planned.

The Reference Information Base and accompanying outline will be reviewed in June by Project participants.

At SNL work during June and July 1986 on the flow and radionuclide transport task will focus on reviews and revision of Issue 1.6 on pre-waste-emplacement ground-water travel time in the SCP.

SNL staff members plan to finish the graphics routines, write part of the TOSPAC Volume 1 transport section, and submit the transport section for review in June.

PROBLEM AREAS

The revision of the NNWSI Project Systems Engineering Management Plan (SEMP) will probably lead to a delay in the completion of the system description document (SNL Milestone M261) and revision of the system requirements document (SNL Milestone M120).

Efforts by SNL staff members devoted to writing quality-assurance plans and procedures are currently preventing completion and documentation of all but the most urgent graphics products.

Writing of the SCP, among other problems, has prevented meetings of the working groups for stratigraphy. Revision of the three-dimensional geologic model (SNL Milestone R078) cannot progress without Project concurrence on the stratigraphy to be used.

Because two SNL authors of the TOSPAC document were involved in SCP work during May, the delivery of the TOSPAC document (Milestone M102) may be delayed.

MILESTONE PROGRESS

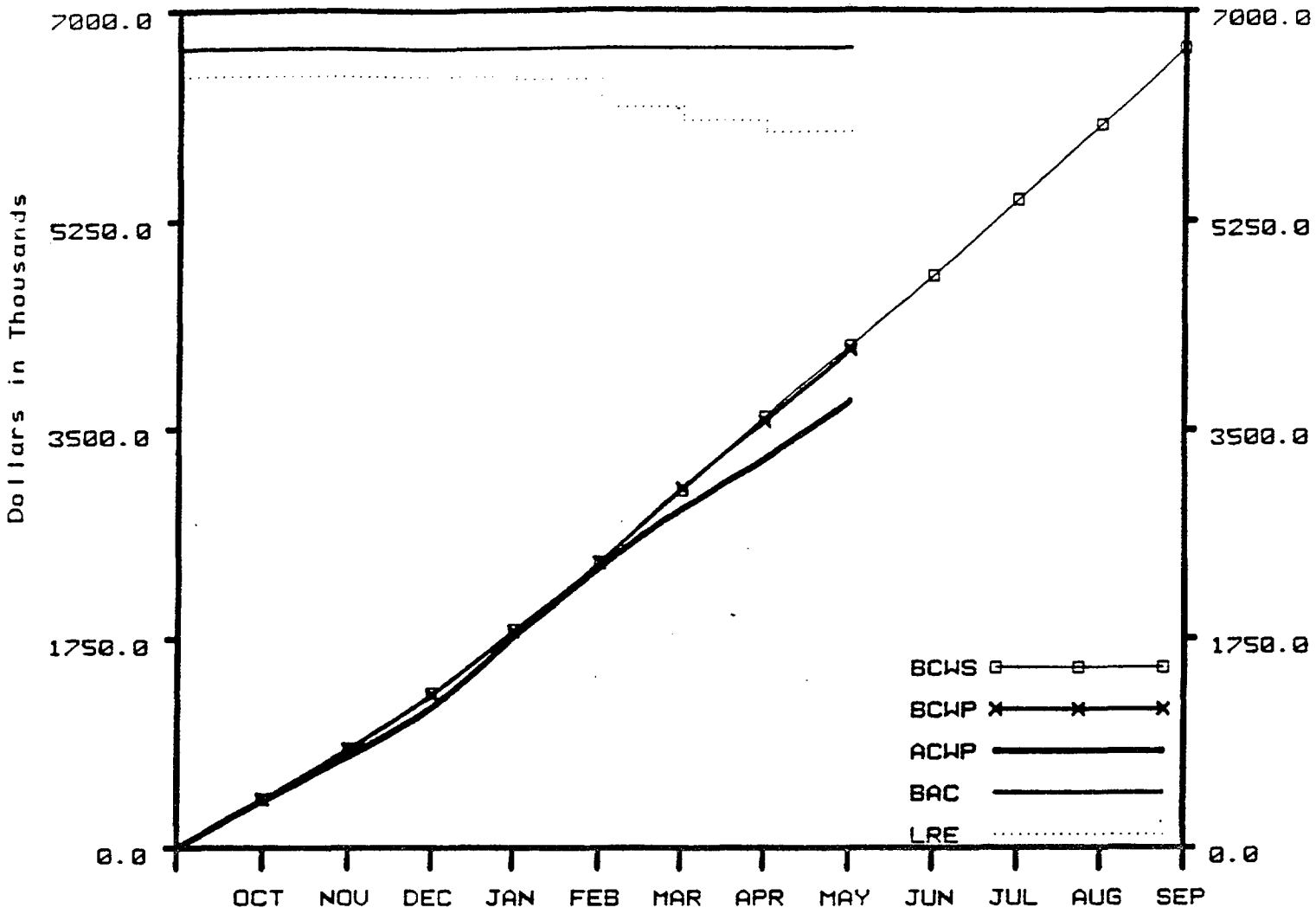
SNL Milestone R058, a cost estimate of the Yucca Mountain repository based on design information developed for the RCD/SC, is delayed until July 1, 1986.

SNL Milestone R077, plans and procedures for the SNL technical data-base operations, is delayed; the estimated date of completion is June 1986.

The following Milestones have been delayed so that efforts could be directed to the SCP: SNL Milestone R078, the revised three-dimensional reference model of the NNWSI Project repository site; Milestone R079, technique for subterranean surface modeling for the NNWSI Project repository: software documentation; and Milestone M142, SNL modifications to the TRACR3D code.

SNL Milestone R082, the support document for calculating ground-water travel times and radionuclide releases for the revised EA, was completed on May 9, 1986.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR MAY 1986
WBS: 1.2.1



SYSTEMS	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	602.2	4207.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	604.9	4171.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	487.3	3742.1
D. BUDGET AT COMPLETION (BAC)		6688.0
E. LATEST REVISED ESTIMATE (LRE)		5989.9

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-36.5	-0.87
G. COST VARIANCE (B-C)	429.0	10.28
H. AT COMPLETION VARIANCE (D-E)	698.1	10.44

Remarks:

Cost underruns are due to staffing levels less than current budget, delay in starting consultant and redirection of resources.

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

For: MAY 1986

Date: June 20, 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	118.000	118.020	78.000	.020	40.020
1212	Systems Engineering	1,438.557	1,438.905	1,209.056	.348	229.849
1213	Technical Data Base Management	743.000	706.002	647.000	-36.998	59.002
1214	Total Systems Performance Assessment	1,908.000	1,908.082	1,808.000	.082	100.082
121	SYSTEMS	4,207.557	4,171.009	3,742.056	-36.548	428.952

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)												△
M120	SNL	1.2.1.2	Yucca Mountain Mined Geologic Disposal System (MGSD) Requirements △ 7/85								◇			◇	
M108	SNL	1.2.1.2	Systems Engineering Management Plan (SEMP) △ 8/85									◇		◇	
M261	SNL	1.2.1.2	Draft Yucca Mountain Site - Specific Mined Geologic Disposal System (MGDS) Description										◇		△

△ 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

LLNL's short-term experiment with vitric tuff started in early March and was completed in early May. This cooperative research effort with Los Alamos will complement previous field studies to evaluate the susceptibility of vitrophyre to thermal alteration by emplacement of high-level waste.

The electron microprobe at LLNL has been repaired and is being used for routine analyses. The loss of technician support is still affecting the rate of solid phase analyses.

The sample for the thermal gradient experiment has been instrumented, jacketed, and installed in the high pressure system by LLNL staff. As soon as difficulties with the grounding of instrumentation external to the pressure vessel are solved, the experiment will begin.

LLNL personnel presented results from the last experiment on water flow in Topopah Spring tuff at the American Geophysical Union (AGU) meeting in Baltimore.

WBS 1.2.2.3 WASTE FORM AND MATERIALS TESTING

WBS 1.2.2.3.1 Waste Form Testing

At LLNL the Series 2, Cycle 4, bare fuel tests at 25 ^{o}C in fused quartz vessels and the Series 3, Cycle 1, tests at 85 ^{o}C in sealed stainless steel vessels are progressing on schedule. An abstract on the results to date of the Series 3 tests was prepared for submission to the Fall 1986 Materials Research Society Meeting in Boston.

LLNL staff prepared cladding specimens that were etched in parallel with the cladding specimens used for C-14 for examination by scanning electron microscope. These specimens should provide evidence that will help explain the difference between specimens with "thick" and "thin" oxide coats.

LLNL staff members moved thermogravimetric analysis equipment from the 308 to the 325 building. The system is being checked out and should be ready for oxidation testing shortly.

Cold testing of the dry bath oven oxidation system has resumed. Installation of all the equipment has been completed and preliminary procedures, as yet unapproved, are being evaluated to improve performance in the subsequent actual testing process.

Sample preparation of archive Turkey Point spent fuel for STEM examination was completed at LLNL. Examination will start in June.

LLNL personnel working on glass hydration studies this month obtained the spectrum of a 40-micrometer-thick hydrated layer formed by vapor phase alteration at 200 ^{o}C. The layer was found to contain primarily molecular water, with minor hydroxyl which contrasts with the expected result of mostly hydroxyl replacing sodium leached from the layer. They were also able to show that the diffuse reflectance technique could be applied to hydration analysis. The preliminary results of these studies indicate that the hydration of nuclear waste glass proceeds by a mechanism similar to that observed in the high-pressure (equilibrium) hydration of silicate glasses. LLNL personnel have submitted a paper on the hydration of waste glasses for presentation at the Materials Research Society fall 1986 meeting.

WBS 1.2.2.3.2 Metal Barrier Testing

Polaroids of the two-month copper and zircaloy interaction experiment bundle were sent from Hanford Engineering Development Laboratory (HEDL) to LLNL for examination. The first set of Polaroids are of the bundle of cladding sections showing three views at 0^{o}, 120^{o}, and 240^{o} and the top and the bottom. The next set of Polaroids documents the appearance of the copper wrap after it was unwrapped from the bundle of spent fuel sections. The last set of Polaroids documents the individual spent fuel sections. The bundle is currently being disassembled, and specimens are being taken and prepared for scanning electron microscope, electron probe, Auger/ion milling, and metallographic evaluation. HEDL is also preparing a written summary, including written observations, data tables, and tentative conclusions, to be incorporated into the Copper Feasibility Report. This information is expected at LLNL on or about June 1.

During May Stanford Research Institute (SRI) International prepared a summary of theoretical findings for LLNL. They also listed all available information for the various parameters used in their models. LLNL has been requested to provide any additional information on theoretical or experimental values needed for the parameters in the SRI models. A meeting to discuss the available information, as well as for LLNL to provide firm guidance on the design basis for the modeling effort, is scheduled for June at SRI.

The corrosion rate of copper in 20X J-13 water compositions and up to 90 ^{o}C has been measured electrochemically for dose rates from 10^{3} to 10^{5} rads per hour. These results are currently being analyzed in detail for incorporation in June into the NNWSI Project Copper Feasibility Report. The experimental results obtained to date for copper alloy corrosion under gamma irradiation at Hanford Engineering Development Laboratory (HEDL) are also being analyzed for incorporation into the Copper Feasibility Report.

LLNL metal barriers and design subtask staff members worked to prepare final request-for-proposal packages that were sent to candidate contractors by the LLNL Purchasing Department. Also prepared was a set of evaluation criteria for assessing and rating the resulting proposals.

During the past month at LLNL, a series of weld tests was devised and begun that will provide information on weldability for the candidate materials. The first alloy undergoing testing is Incoloy 825. In addition to the weldability evaluation, the study included information and statistics on the history, applications, market, metallurgical characteristics, and relative prices of Incoloy 825.

A series of welding experiments has been devised at LLNL to use in developing standards, in the form of actual welded panels, for calibrating ultrasonic testing (UT) procedures for welds in candidate alloys. Experiments just about to get underway will help determine the practicality of creating artificial crack-like linear weld defects in a range of desired sizes, shapes, orientations, and locations using various weld joint edge preparations. If these experiments are successful, future refinements may incorporate wafer implants of radiographically opaque metals to facilitate mapping of these indications.

Work at Ohio State University under an LLNL subcontract involves development of quantitative models to predict long-term sensitization in stainless steels and high-nickel stainless alloys. Thus far, the model development has centered around 304-types of materials with low and high carbon contents and with and without intentional nitrogen additions. The model is now being extended to the 316-types of materials and will then be further extended to the high-nickel 825 material. An LLNL staff member visited with the principal investigators at Ohio State on May 16 to discuss details of the modeling activities. The discussion centered around which diffusion mechanism will prevail (volumetric diffusion in austenite or diffusion along grain boundaries and dislocation pipes) and considerations on the carbide composition which will influence the chromium activity. They discussed what further analysis and experimental work will be needed to resolve these complications.

An LLNL staff member visited Argonne National Laboratory on May 15 to view their facilities and capabilities and to discuss the possibilities of performing different kinds of stress corrosion and localized corrosion tests in the Argonne facility.

WBS 1.2.2.3.4 Integrated Testing

A new tuff core sample was prepared by LLNL staff and jacketed with Hathlane in a modified core holder. The core was placed in the flow-through apparatus and is being washed with J-13 water in preparation for a tracer flow experiment with tritium, technetium, uranium, and neptunium.

LLNL is conducting interviews to select a postdoctoral candidate to assist with the radionuclide speciation and transport experiments.

WBS 1.2.2.4 DESIGN, FABRICATE, AND PROTOTYPE TESTING

Assignments for SCP chapter 7 and 8 are being rewritten at LLNL by the waste package staff to incorporate review input and to update the information. As a result of the Waste Package Design Interface meeting of April 16, additional specific definitions of container acceptance or rejection criteria based on loading conditions have been outlined.

LLNL personnel established a rating criteria to be applied to the evaluation of responses to the container fabrication and weld development Request-for-Proposals (RFPs).

LLNL personnel attended a meeting at PNL on May 12-13 to discuss the application of the Synthetic Aperture Focusing Technique. This technique has been used on light water reactor piping welds that are similar to the final closure weld of the waste package container. The method can be used for more accurate flaw sizing and locating.

LLNL structural analysis subtask personnel met with UC Davis Mechanical Engineering Professor A. Mukherjee on May 13 to discuss interpretation of large plastic deformations in computer-generated waste package container models as they relate to true stress versus strain material behavior.

WBS 1.2.2.5 PERFORMANCE ASSESSMENT

LLNL staff resumed hydrothermal calculations to estimate the environmental conditions in the host rock surrounding a waste package this month using WAFE. Effort has centered on familiarizing new staff with both the program and the calculational problem by implementing a new version of WAFE supplied by Los Alamos.

SCP-related activities at LLNL in May included review of Chapter 3, Hydrology; initiation of work on the Performance Assessment portion of Chapter 7, Waste Package; and a Performance Allocation meeting on Issue 1.5.

PLANNED WORK

The LLNL report on the functions of packing material in the unsaturated zone will be revised. It will include documentation of the recommendation to eliminate packing material from further consideration for NNWSI Project design.

LLNL's SCP-related activities will require significant effort during the next few months. These efforts will include contributions to Chapter 7 and review of Chapter 3.

Review and technical editing by LLNL personnel of the "NNWSI Project Waste Package System Model" description report (Milestone M276) will be completed in June.

PROBLEM AREAS

The ion microprobe at HEDL used for $^{18}O/^{16}O$ measurements on oxidized spent fuel was damaged in a flood and is under repair; the instrument is still not operational.

LLNL's testing of West Valley glass will be delayed because of delays in receipt of the glass from the Materials Characterization Center. The projected completion of fabrication is the end of June; no schedule for the characterization of the glass has been established. The start of testing is scheduled for September in anticipation of the time required to analyze and characterize the glass once it is produced.

Requested participation of the LLNL metal barriers subtask personnel at the BNL review meeting and the upcoming Materials Review Board meeting, plus deadlines for the copper report, have precluded work on the strategy document and the related chapters of the SCP.

Input is needed from SNL on proposed grout and seal materials before work on the other materials subtask can proceed. LLNL will need to identify new staff members necessary to accomplish the planned activities for this subtask.

Equipment difficulties reported in previous months have put LLNL behind schedule on analyses of actinide profiles in rock samples used in glass leaching experiments. Researchers have also decided to examine the tuff disks used in the gamma radiation experiments before attempting the more difficult geometry of the rock reaction vessel samples. Consequently, Milestone M224, report on actinide distribution in rock reaction vessels, has been rescheduled to December 1986. A new milestone, scheduled for completion prior to work on M224, is a report on the actinide distribution in tuff disks that have been part of glass waste form testing and has an estimated delivery date of October 1986.

MILESTONE PROGRESS

Activities related to the SCP are delaying review of LLNL Milestone M276.

LLNL Milestone M254, reference waste package environment report, is under review by the WMPO.

LLNL Milestone M232, a report on the release rate testing of spent fuel in J-13 water at ambient temperature, is being revised at WHC.

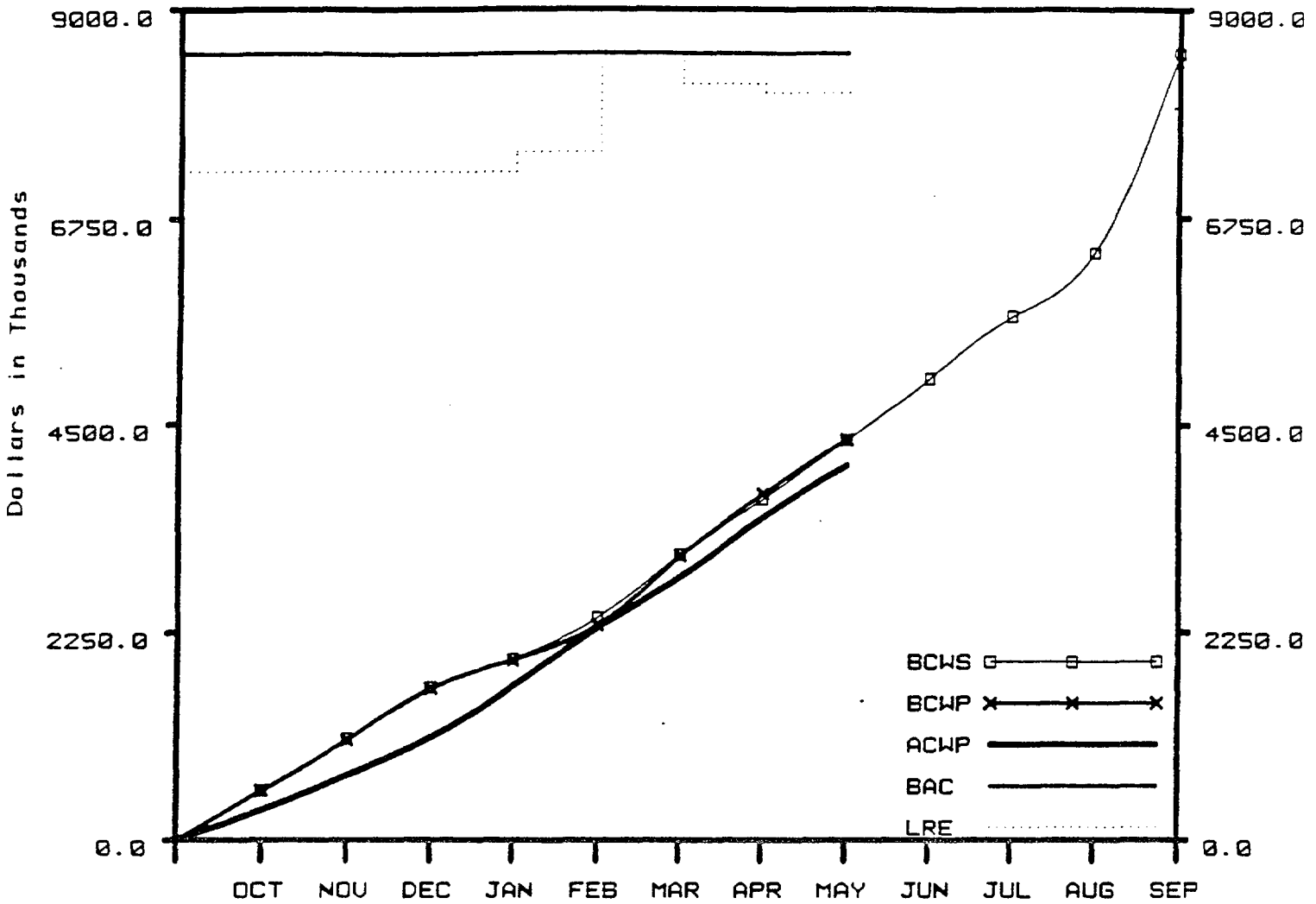
Transmittal of LLNL's report on estimates of release rate of radionuclides from spent fuel and commercial high-level waste (Milestone M225) was completed and sent to the WMPO on May 8.

LLNL Milestone M220, a preliminary report on testing of actinide doped PNL 76-68 glass in J-13 water using tuff reaction vessels, was sent to the WMPO on May 30.

LLNL Milestone M236, the stainless steel report, is scheduled for completion on July 31.

Work on LLNL Milestone M249, a report on the development of the unsaturated flow/transport submodel for the performance assessment system model, has resumed after delays due to staffing.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR MAY 1986
WBS: 1.2.2



WASTE PACKAGE	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	652.9	4343.2
B. BUDGETED COST OF WORK PERFORMED (BCWP)	599.9	4347.2
C. ACTUAL COST OF WORK PERFORMED (ACWP)	572.7	4068.4
D. BUDGET AT COMPLETION (BAC)		8529.8
E. LATEST REVISED ESTIMATE (LRE)		8102.1

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	4.0	0.09
G. COST VARIANCE (B-C)	278.8	6.41
H. AT COMPLETION VARIANCE (D-E)	427.7	5.01

Remarks:

Variances within threshold. No analysis required.

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

For: MAY 1986 Date: June 20, 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	224.200	224.201	225.900	.001	-1.699
1222	Package Environment	576.000	570.000	649.500	-6.000	-79.500
1223	Waste Form & Materials Testing	2,979.000	2,989.000	2,638.000	10.000	351.000
1224	Design, Fabricate, and Prototype Testing	252.000	252.000	275.506	-.000	-23.500
1225	Performance Assessment	312.000	312.000	279.500	.000	32.500
122	WASTE PACKAGE	4,343.200	4,347.201	4,068.400	4.001	278.801

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									◇			◇
M276	LLNL	1.2.2.5	Report on the System Model for Waste Package Performance Analysis △ 9/85									◇			
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							△			◇		
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						△		◇		◇		

△ 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 Standard Operating Procedure and cost report for the core sample management facility is scheduled for release by SAIC the second week of June 1986.

The stop-work order for USGS remained in effect through May, and almost all site- characterization technical activities were suspended during the entire month.

WBS 1.2.3.2 GEOLOGY

WBS 1.2.3.2.1 Geologic Investigations

SNL notified Golder Associates that it was selected to perform trenching and mapping at the surface-facility site and that a contract will be negotiated with the company.

SNL drafted a modified work plan and quality-assurance-level assignment document and will submit it to WMPO for approval of quality-assurance levels.

USGS personnel spent the entire month on preparation of Chapters 1 and 8 of the Site Characterization Plan, work on the Exploratory Shaft Test Plan, and preparation of quality assurance procedures.

A USGS paper entitled "Evidence of Rotation About a Vertical Axis During Extension at Yucca Mountain, Southern Nevada," was presented at the Baltimore American Geophysical Union (AGU) meeting the week of May 19.

USGS personnel completed digitizing two topographic maps in the Yucca Mountain area and continued digital processing of data for four additional maps.

WBS 1.2.3.2.2 Geophysical Investigations

USGS staff members have begun modeling the new ground-level data on aeromagnetic anomaly 10 near Lathrop Wells, just south of Yucca Mountain, Nevada. These data will be used to help predict future volcanism in this area.

An annotated bibliography of all publications reporting on NNWSI Project funded geophysical activities of the nuclear waste program was compiled by USGS personnel.

The mercury porosimeter at USGS has been upgraded to be a completely automated and computer-controlled operation. The retrofitted instrument was calibrated by a factory-certified representative on May 20.

WBS 1.2.3.2.3 Site Stability

USGS personnel completed a technical review of a bulletin on the results of the Great Basin tectonics workshop held in Denver last year. A report on the Rock Valley fault studies has received the USGS Director's approval for publication and was sent to the WMPO for approval.

USGS personnel continued work on Chapters 1 and 8 of the SCP.

The seismic network for recording natural seismic events in southern Nevada continued in operation during May.

Los Alamos staff members collected basalt samples from eight basalt centers in the Yucca Mountain region. These samples will be processed by the USGS for potassium-argon age determinations. Samples collected for potassium-argon age determinations were processed following quality assurance procedures for petrographic studies and determination of major element composition by x-ray fluorescence.

Los Alamos personnel completed information needs for volcanism and sent them to the USGS and Sandia National Laboratories (SNL) for incorporation in appropriate sections of the SCP.

Los Alamos and Science Applications International Corporation staff members met at Los Alamos to discuss the volcanism sections of the seismic/tectonic position paper.

WBS 1.2.3.3 HYDROLOGY

WBS 1.2.3.3.1 Stream Flow

Verbal notification was received by USBR that the Probable Maximum Flood report has been reviewed by WMPO and is approved for distribution.

Work by USBR personnel on preparation of the first draft of the Inundation Map (including a reconnaissance visit to Yucca Mountain) continued.

WBS 1.2.3.3.3 Saturated Zone Hydrology

USGS saturated zone hydrology personnel spent the entire month on preparation of Chapters 3 and 8 of the SCP and Quality Assurance procedures.

WBS 1.2.3.3.4 Unsaturated Zone Hydrology

USGS laboratory work for the shallow unsaturated zone hydrology project has been delayed temporarily while safety issues concerning the air compressor system are resolved with REECo.

Neutron access hole logging by USGS staff has been delayed by bad weather.

WBS 1.2.3.3.5 Future Hydrologic Conditions

USGS personnel worked on scientific investigation plans and paleohydrology sections of Chapter 8 of the SCP.

WBS 1.2.3.4 GEOCHEMISTRY

WBS 1.2.3.4.1.1 Groundwater Chemistry

Los Alamos personnel attended the performance allocation meeting in Denver on radiological releases to the accessible environment.

Los Alamos staff members worked on the information needs sections of Chapter 8.3 of the SCP. Final revisions were made to the water chemistry sections of Chapter 4 after considering review comments by DOE/HQ.

Staff members at Los Alamos performed modeling calculations for the proposed tracer experiments in the C-Wells.

WBS 1.2.3.4.1.3 Hydrothermal Geochemistry

The natural analog work by Los Alamos has proceeded with the evaluation of techniques for estimating the thermodynamic parameters for zeolite and clay minerals. These techniques provide crude estimates that can be used in interim modeling efforts.

WBS 1.2.3.4.1.4 Solubility Determination

The solubility measurements being performed for Los Alamos at Lawrence Berkeley Laboratory (LBL) are starting on neptunium and plutonium in Well J-13 water at 60 ^{o}C and pH of 6, 7, and 8.5. The shipment of americium-243 from Oak Ridge National Laboratory has been received at LBL. The calibration of the Y-counting equipment is complete for neptunium solutions; calibration for plutonium solutions is under way. A draft procedure describing operation of the pH-monitoring system has been received for comment by quality assurance.

Los Alamos staff completed contributions to the solubility sections of Chapter 8 of the SCP. Comments on the solubility sections of Chapter 4 of the SCP have also been addressed.

WBS 1.2.3.4.1.5 Sorption and Precipitation

Los Alamos staff completed desorption experiments on tin with spiked Well J-13 ground water. These experiments are part of the effort to characterize the effects of ground-water composition on sorption. Sorption measurements were also completed on tin with spiked Well J-13 ground water. Desorption measurements were completed for strontium, cesium, barium, and europium using spiked ground water. Short-term neptunium sorption measurements have also been completed.

Los Alamos personnel revised Chapter 4 of the SCP.

A limited isotherm series has begun at Los Alamos with neptunium, both in and out of the CO_2 box, on tuff from core sample GU3-1203.

At Los Alamos a series of experiments began that are designed to determine the effects of bacteria (due to their colloidal nature) on the agglomeration rates of colloids. These experiments are important because of the role that colloids may play in the transport of actinides through tuff.

Los Alamos staff continues working on Chapter 8.3 of the SCP.

The first in a series of experiments was completed at Los Alamos investigating the behavior of plutonium in the presence of bacterial products, in this case siderophores.

WBS 1.2.3.4.1.6 Dynamic Transport Process

Syringe pumps were received at Los Alamos and set up for solid tuff core flow experiments. Steady state flow was established and tritium tests are in progress.

WBS 1.2.3.4.1.7 Retardation Sensitivity Analysis

Two Los Alamos abstracts, "Colloid Transport" and "A Strategy for the Evaluation and Comparison of Ground-Water Flow and Transport Models" were presented at the American Geophysical Union Spring Meeting in Baltimore, Maryland, on May 19-23.

Two Los Alamos abstracts, "Microbial Transport on Clay Colloids" and "The Transport of Uranium and Technetium Through the Unsaturated Tuffs, Yucca Mountain, Nevada" are in policy review and will be submitted to the Materials Research Society Symposium: Scientific Basis for Nuclear Waste Management in Boston, to be held December 1-5, 1986.

Los Alamos staff continued verification of the stress solutions in the FEHMS code. Several block and beam problems were tested. This work produced a change in the code to handle multiple boundary conditions.

Los Alamos staff members began writing the information needs section for Chapter 8 of the SCP. The sections concerning the unsaturated zone, in Chapter 3 of the SCP, were reviewed.

A Los Alamos report on kriging with cross-validated model selection was revised for presentation at the American Statistical Association meeting in Chicago in August. The report is in policy review. Implementation of the kriging method was discussed at a meeting at SNL on May 30.

WBS 1.2.3.4.2 Mineralogy and Petrology

Los Alamos representatives presented three tests on mineralogy and petrology at the ESTP meeting in Albuqerque in May. These tests cover work on stratigraphy and variability of the devitrified Topopah Spring Member, on the alteration history and mineralogy of past transport through the basal Topopah and upper Calico Hills, and on the mineralogy of fractures and faults.

Plans for further work by Los Alamos in mineralogy and petrology of calcite-silica deposits are being compiled at the USGS.

On May 9, a meeting was held between Los Alamos, SNL, and the University of New Mexico to discuss mineral stability and the definition of the disturbed zone for performance allocation. It was decided that more work is needed on reactions in the temperature range near and just above 100 ^{o}C particularly in regard to the stability of glasses at the site.

The Los Alamos report titled "Fran Ridge Horizontal Coring Summary Report, Hole UE-25h#1, Yucca Mountain Area, Nye County, Nevada," was technically reviewed and is in policy review.

WBS 1.2.3.5 DRILLING

WBS 1.2.3.5.2 Drilling, Construction, Engineering

H&N personnel completed bulk density, grain density, and porosity tests on 145 samples from neutron holes H-10, H-24, N-46, and N-98 and issued a final report. They also completed bulk and grain density tests and calculations on 62 samples from USW-UZ36 hole.

At a meeting between H&N and USGS on May 5, USGS indicated that all current and future FY 86 work will be under the research and development program. All work coming into H&N MTL/Survey is to come through the WMPO and DOE Nevada Test Site Office. H&N also received a new schedule from USGS, Denver, for drilling, calibration, and stemming, as well as the depth of all UZ holes planned through FY 88.

The WMPO requested H&N to begin work on a portfolio of NNWSI Project activities and authorization for surveys. These are to be shown on topographic base maps and updated as required.

WBS 1.2.3.6 ENVIRONMENT

WBS 1.2.3.6.1 Environmental Surveys

The meteorological monitoring stations are operating and there are no significant problems to report. An Operations Review will be held on June 12, 1986. The draft Procedures Manual, reviewed by SAIC quality assurance and technical editing staff, was distributed this month as a control document.

WBS 1.2.3.6.2 Transportation

SAIC staff completed a technical review of the proposals to develop a plan for designation and construction of a rail access route. The two proposals are now in SAIC financial review.

The draft of SAIC Milestone M419, the Nevada routing study, was completed and transmitted to WMPO in May. The report documents shipments described in the EA as a function of time and route to Yucca Mountain.

SAIC staff members completed internal reports on U.S. Air Force flight data and event frequency analysis methods and prepared comments. These documents will be combined in a draft report to WMPO on overflight hazards at the end of July 1986.

SAIC personnel began work on a topical report on the approach and data used to calculate population densities along Nevada routes defined in the EA. Population density as used in the EA was used to modify national transportation information to estimate regional impacts. The method is based on 1980 U.S. Census information, ZIP code information, and Nevada state maps.

WBS 1.2.3.7 SOCIOECONOMICS

SAIC personnel completed the Tourism Report in May and will transmit it to WMPO in June.

WBS 1.2.3.8 PERFORMANCE ASSESSMENT

LLNL personnel have added to DATA0 and MDA the ability to use mineral formulae and mineral names for the species they import from the SUPCRT data files. A bug involving calculation of ionic strength in the writing of the pickup file by EQ3 has been identified and fixed. George Flowers of Tulane University visited the LLNL EQ3/6 Group and discussed various topics of mutual interest including the future plans for SUPCRT.

PLANNED WORK

The suggestion by the State of Nevada in a newsletter article that the hazards of silicic volcanism should not be "routinely dismissed" may need attention.

Los Alamos staff has planned further EQ3/6 modeling and development for an approach to nucleation kinetics control of mineral formation.

Los Alamos staff members still plan to review existing procedures for identifying oxidation states of dilute solutions of plutonium.

New core from Yucca Mountain will be crushed and sieved into several different particle size fractions by Los Alamos personnel. These fractions will be used in parallel sorption experiments to provide further evidence that particle size is not a significant factor in sorption experiments on tuff.

Los Alamos staff will continue work on the COVE2A benchmarking activities and the verification and documentation of the FEHMS code.

Los Alamos personnel will place emphasis on revising and updating quality assurance technical procedures for mineralogy and petrology.

SNL may begin trenching and mapping in July 1986, pending development and approval of quality-assurance and work plans. Aerial photography of the reference conceptual site is being procured in advance of the field-mapping effort.

PROBLEM AREAS

LLNL personnel incorporated the continued fraction algorithm into EQ6 and tested it. A problem still remains for test cases that are initially far from equilibrium, such as the glass dissolution problems. This problem is currently being resolved.

Until the LLNL staff rewrites the data processing code, MDAP, to conform to the new MDA format, it is not easy to add new data to the data base. It will take at least a month to finish this task.

Los Alamos Milestone R320 has been delayed in technical review; the problem is to integrate adequate reviews of both the petrologic and statistical parts of the report. This problem will be resolved during June.

At SNL timely completion and approval of quality-assurance levels are inhibiting other pacing efforts (i.e., test plans, contractor work plans, and Nevada Test Site contract support). As a result, Milestone N448 will probably be delayed by at least two months.

MILESTONE PROGRESS

Los Alamos Milestone R201, drilling program for Los Alamos volcanism test holes USW V-1 and V-2, was submitted to the WMPO on May 19 for policy review.

The first draft of the report for Los Alamos Milestone M303, modeling of the chemical composition of ground water in the Yucca Mountain area, is nearly complete. Sections of the report are in internal review.

The literature search for Los Alamos Milestone R305 is nearly complete. A report to satisfy this milestone is scheduled to be issued September 30.

Los Alamos Milestone R354, report on the thermodynamics of albite, was completed this month and is in review.

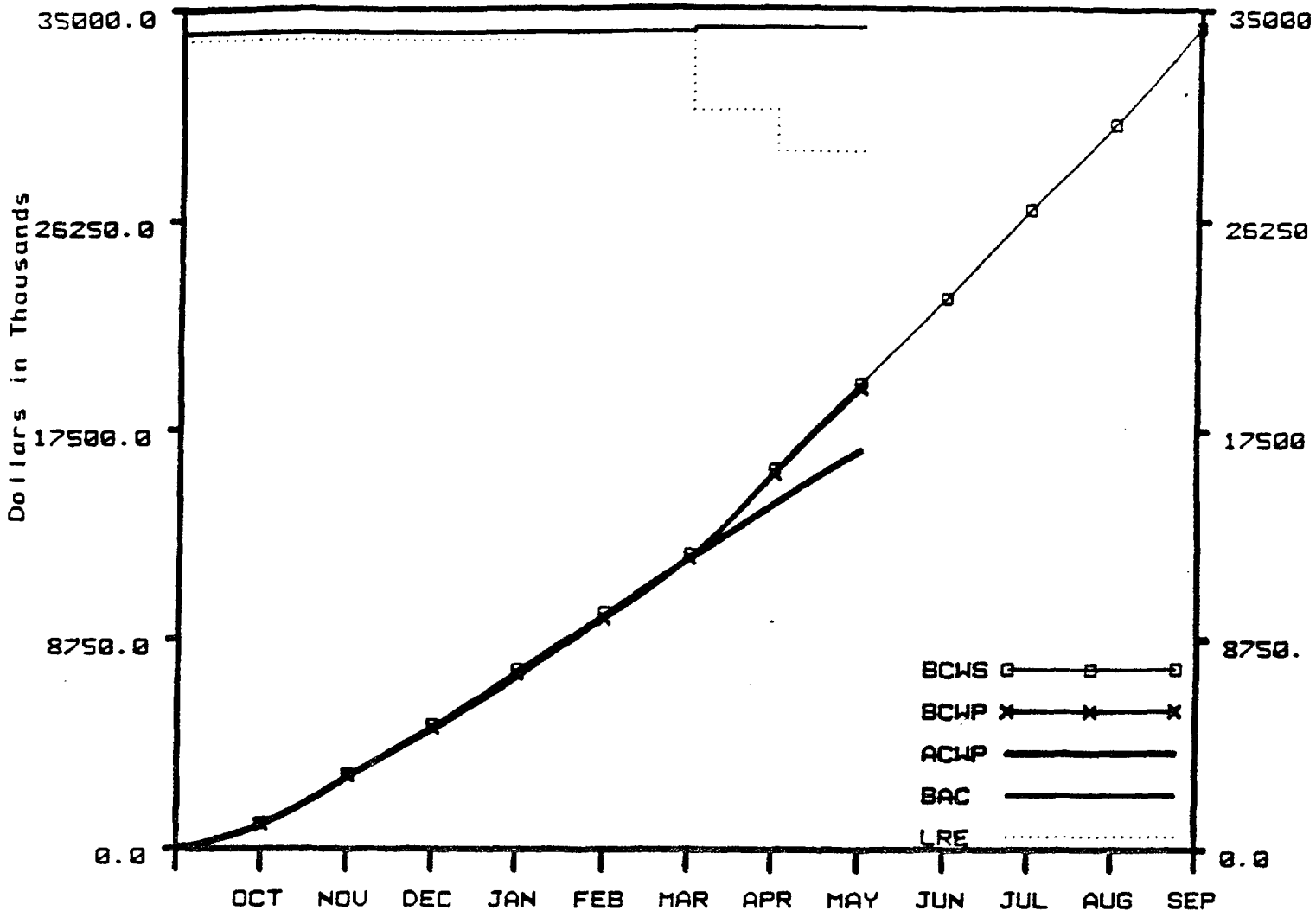
Los Alamos Milestone R307, determination of the solubility and complexation of waste radionuclides pertinent to geologic disposal at the Nevada tuff site, is in policy review.

Los Alamos Milestone R310, survey of carbon-14 literature relevant to a geologic nuclear waste repository, was revised in response to comments from Lawrence Livermore National Laboratory.

Los Alamos Milestone R318, "Population Balance Model for Colloid Transport," was completed and is in policy review. It will be submitted to the refereed journal, Water Resources Research.

Los Alamos Milestone R324, chemistry of diagenetically altered tuffs at a potential nuclear waste repository, Yucca Mountain, Nye County, Nevada, and M332, mineralogy of drill holes J-13, UE-25A#1, and USW G-1 at Yucca Mountain, Nevada, are in policy review at WMPO.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR MAY 1986
WBS: 1.2.3



SITE INVESTIGATIONS	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	3603.0	19477.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	3575.3	19241.7
C. ACTUAL COST OF WORK PERFORMED (ACWP)	2231.9	16688.2
D. BUDGET AT COMPLETION (BAC)		34224.8
E. LATEST REVISED ESTIMATE (LRE)		29124.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-235.9	-1.21
G. COST VARIANCE (B-C)	2553.5	13.27
H. AT COMPLETION VARIANCE (D-E)	5100.8	14.90

Remarks:

The cost underrun is a result of the USGS Stop Work Order which impacts the drilling and core sampling activities at the site and all other technical activities. These activities are presently on hold pending resolution of the requirements to lift the Stop Work Order. The USGS and site contractors are working on QA documentation, defining QLAS requirements and preparing site investigation plans.

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

For: MAY 1986 Date: June 20, 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	1,569.329	1,568.957	1,422.308	-.372	146.649
1232	Geology	4,433.406	4,396.624	4,184.066	-36.782	212.558
1233	Hydrology	3,373.112	3,344.166	3,287.613	-28.946	56.553
1234	Geochemistry	3,930.500	3,971.987	3,692.200	41.487	279.787
1235	Drilling	4,760.751	4,751.648	2,799.710	-9.103	1,951.938
1236	Environment	582.507	497.619	520.069	-84.888	-22.450
1237	Socioeconomic	334.960	172.690	282.541	-162.270	-109.852
1238	Geochemical Modeling Code EQ3/6	493.000	538.000	499.700	45.000	38.300
1239	Deferred Site Close Out	.000	.000	.000	.000	.000
123	SITE INVESTIGATIONS	19,477.565	19,241.691	16,688.207	-235.874	2,553.484

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										△		

△ 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

SAIC staff members completed the Draft Exploratory Shaft Facility (ESF) Subsystem Design Requirements document and issued the document for internal review.

SAIC personnel provided a review of the following documents in May: G-Tunnel Test Requirements; the ESF Safety Plan; Two-Stage Repository Development at Yucca Mountain: An Engineering Feasibility Study; NNWSI Project Exploratory Shaft Site and Construction Method Recommendation Report, SAND84-1003; Unit Evaluation at Yucca Mountain, Nevada Test Site: Summary Report and Recommendation, SAND83-0372; Rock-Mass Classification of Candidate Repository Units at Yucca Mountain, Nye County Nevada, SAND82-2034; and the Safety and Health Requirements Manual, U.S. Army Corps of Engineers.

WBS 1.2.4.1.1 Management

SNL efforts in May were devoted to preparing the text for Chapter 6 and a major portion of Chapter 8 of the SCP. The principal investigator for the Management task devoted the month of May to the SCP, and hence was not able to work on items covered under the repository task.

WBS 1.2.4.1.2 Basis for Design

The seismic-hazard prediction for ground motion and surface rupture and the associated parametric studies at the proposed NNWSI Project repository facilities are currently being performed by URS/John A. Blume. The proposed methodology for these studies was discussed during the NNWSI Project seismic/tectonic working group meeting on April 29-30, 1986, in Las Vegas, Nevada. An SNL draft report on the methodology and the parametric studies was reviewed during this meeting. URS/John A. Blume in the meantime has been performing some parameter studies to determine their effects on the proposed methodology and the design basis inputs.

SNL's newly established quality assurance procedure (QAP III-6) for NNWSI Project Repository Design Changes will be used to implement all changes to the Subsystem Design Requirements document.

WBS 1.2.4.1.4 Engineering Design Support: Special Studies

The contractor's report by Bechtel National, Inc., 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) is in peer review. Completion of the review is expected by June 13, 1986. The document will then enter management review.

WBS 1.2.4.2 DEVELOPMENT AND TESTING

WBS 1.2.4.2.1.1 Rock Mass Analysis

The SNL Applied Mechanics Division staff has begun work on the problem-definition memo for Thermodynamics Analysis #14 entitled "Analysis of In Situ Stress at Yucca Mountain Using a Compliant Joint Model." This work supports Milestone M444.

WBS 1.2.4.2.1.2 Field Testing

SNL personnel installed all required instrumentation at the second station within the demonstration drift of the G-Tunnel underground facility, and mining has resumed.

SNL personnel have completed cutting a 1-meter-square slot, 1 meter deep, in the G-Tunnel underground facility using a diamond-tipped chain saw. Work has started on measuring the in situ normal stress that was applied to the slot prior to cutting. The flatjack cancellation method is being used.

SNL staff members conducted tours of the G-Tunnel underground facility for representatives of the NRC during May.

WBS 1.2.4.2.1.4 Water Migration Analysis

SNL personnel are designing and preparing a new heater jacket for the pressure vessel used in determining stress and temperature effects on fracture permeability. The previous arrangement of band heaters is suspected of causing areas of locally higher temperatures.

SNL staff is continuing to calibrate the thermocouple psychrometer and develop test procedures for measuring thermal effects on water-retention characteristics of Topopah Spring tuff using the psychrometer.

WBS 1.2.4.2.2 Equipment and Instrumentation Development

SNL staff negotiated the contract to fabricate and design a prototype horizontal drill with Robbins Co. of Seattle, Washington. This contract (Milestone N427) is currently in final processing by SNL purchasing.

SNL held an initial meeting with Kiruna Truck Manufacturing Co. at the company's Denver, Colorado, plant to discuss the feasibility of adopting a standard vehicle for use as a waste transporter.

WBS 1.2.4.2.3 Sealing

WBS 1.2.4.2.3.2 Seal Materials Evaluation

Studies at Los Alamos during this period have addressed the physical and mechanical properties of cementitious sealing materials. Of particular concern is the stability of the cementitious phase tobermorite.

The report "Reactivity of a Tuff-Bearing Concrete: C140 Con-14" has cleared internal review at Pennsylvania State University and has been received for review at Los Alamos. A paper based on the hydrothermal stability studies from Pennsylvania State University is also under review at Los Alamos.

The staff of Waterways Experiment Station submitted a response to the findings of a recent quality-assurance audit conducted by SNL. A revision to the letter of criteria for the testing of crushed tuff has been prepared. Consolidation and hydraulic-conductivity testing of crushed tuff should resume in June.

During May, studies performed for SNL at Pennsylvania State University addressed the physical and mechanical properties of cementitious sealing materials.

WBS 1.2.4.3 FACILITIES

WBS 1.2.4.3.2 Surface Facilities

The staff of Bechtel National, Inc., has submitted a cost quotation to SNL for the revised scope of work under the existing contract to perform conceptual design special studies and develop a reference configuration design for initiating License Application Design. Bechtel's cost quotation is currently being evaluated. Initial evaluation indicates Bechtel's total cost to perform all of the tasks is greater than that estimated by SNL.

WBS 1.2.4.4 OPERATIONS AND MAINTENANCE

SNL staff met with BNI and Parsons Brinckerhoff Ouade & Douglas personnel to review progress on the preliminary repository operations plan. Initial work included the preparation of an outline of the operations plan report, which was submitted for review.

Revision of the SNL NNWSI Project Fuel-Consolidation Report (SAND85-1694), to reflect the comments of the coauthors and peer reviewers, is proceeding more slowly than had been anticipated. The revised report should be ready for management review by mid-June.

SNL has finalized the ground rules for the new Office of Geologic Repositories consolidation study, and design work is proceeding. Shipping cask receival rates and disposal container emplacement rates have been defined for the four cases to be considered.

Results of the SNL NNWSI Project consolidation study were discussed at the May 22, 1986, technical project officers meeting in Las Vegas, Nevada, and will be presented in an invited paper at the American Nuclear Society Annual Meeting at Reno, Nevada, in mid-June.

WBS 1.2.4.5 DECOMMISSIONING

No action was conducted at SNL for this WBS task in May because of the work priority placed on the completion of the two-stage repository report. This report, an EA reference, is entitled "Two-Stage Repository Development at Yucca Mountain: An Engineering Feasibility Study" (SAND84-1351, Rev. 1). The work priority given the SCP also adversely impacted planned work for this task.

WBS 1.2.4.6 REPOSITORY PERFORMANCE ASSESSMENT

WBS 1.2.4.6.1 Repository Performance Code Development and Certification

SNL staff reviewed a draft letter report summarizing the work on Thermo-mechanical Analysis #12, "JEM Verification Calculations--Phase I" and returned it to RE/SPEC. A final letter report was revised in May and will be submitted in June.

WBS 1.2.4.6.2 Design Analysis

SNL staff completed the performance allocation of Issue 1.12 (design engineered barriers in compliance with 10 CFR 60.133 and to support performance assessment); the text of the SCP Section 8.3.2.6 describing the resolution of this Issue has also been finished. Preliminary Information Need writeups for this Issue were prepared based on last year's text and will have to be revised.

SNL personnel have revised the text for SCP Section 8.3.2.4 (Design Optimization Activities and Tests) for submission to Chapter 8.

An initial SNL draft of a report on Milestone N457, Preliminary Study of the Effects of Uncertain Geologic Data on Design of the Underground Facility, is complete.

The revised SNL draft of the document entitled "Reference Analysis of the Design of Drifts for Vertical and Horizontal Emplacement of Nuclear Waste in a Repository in Tuff" (SAND86-7006), has entered line review.

WBS 1.2.4.6.3 Preclosure Safety Analysis

SNL personnel completed an evaluation of public radiation exposures and frequencies of occurrence for bounding accident scenarios (initiated by both internal and seismic events). Reference accident scenarios were identified by SNL staff.

PLANNED WORK

An SNL problem-definition memo will be written to define an analysis of the G-Tunnel Slot Experiment. An experiment of this type was analyzed previously in support of the planned Exploratory Shaft experiment. This analysis will be specific to the geology and structure at the experiment location in G-Tunnel.

The SNL draft copy of the study on the usability of electric wheel motors on waste-transport vehicles is scheduled for delivery on June 1.

In June, work at SNL will include refinement of the preliminary repository operations plan annotated outline and the initiation of related technical activities.

During June, SNL staff will develop the SCP Chapter 6.4 writeup of Issue 1.12.

SNL staff will review and comment on the draft engineering memo for the Preclosure Radiological Safety Analysis study and return it to Bechtel. Bechtel staff will incorporate the comments and issue the final memo.

SNL will initiate work on a study to make a preliminary determination of systems, structures, and components important to safety to be placed on the Yucca Mountain repository Q-List.

PROBLEM AREAS

All schedules for SNL rock mass analysis, sealing program, and repository performance code development and certification tasks are expected to be delayed due to commitments to the SCP Chapters 6 and 8. SNL work efforts on the SCP have superseded all other water migration analysis work for the month of May. It is estimated that the SCP priority work will continue through part of June.

Completion of Design Analysis milestones by SNL staff is also being delayed because of commitments to other Project work, such as the SCP and RCD/SC.

The due date for SNL Milestone M444, the update on rock mass properties for the conceptual design, has been changed to July 31, 1986.

MILESTONE PROGRESS

CCB action is in progress to consider a date change for SNL Milestone N430, the start of the Repository Advanced Conceptual Design, and to change the date for SNL Milestone R064, advanced conceptual design review meeting, to December 1, 1986.

The estimated date of completion for SNL Milestone N434, the Repository Design Plan, is December 5, 1986.

SNL Milestone N444, the G-Tunnel small-diameter heater experiments, is delayed; estimated date of completion is June 30, 1986.

SNL Milestone N403, recommended matrix properties of the Topopah Spring Member, has been delayed. The new completion date is July 31, 1986.

The preparation of the design requirements and materials recommendation report, SNL Milestone P404, is delayed; the estimated date for completion is July 29, 1986.

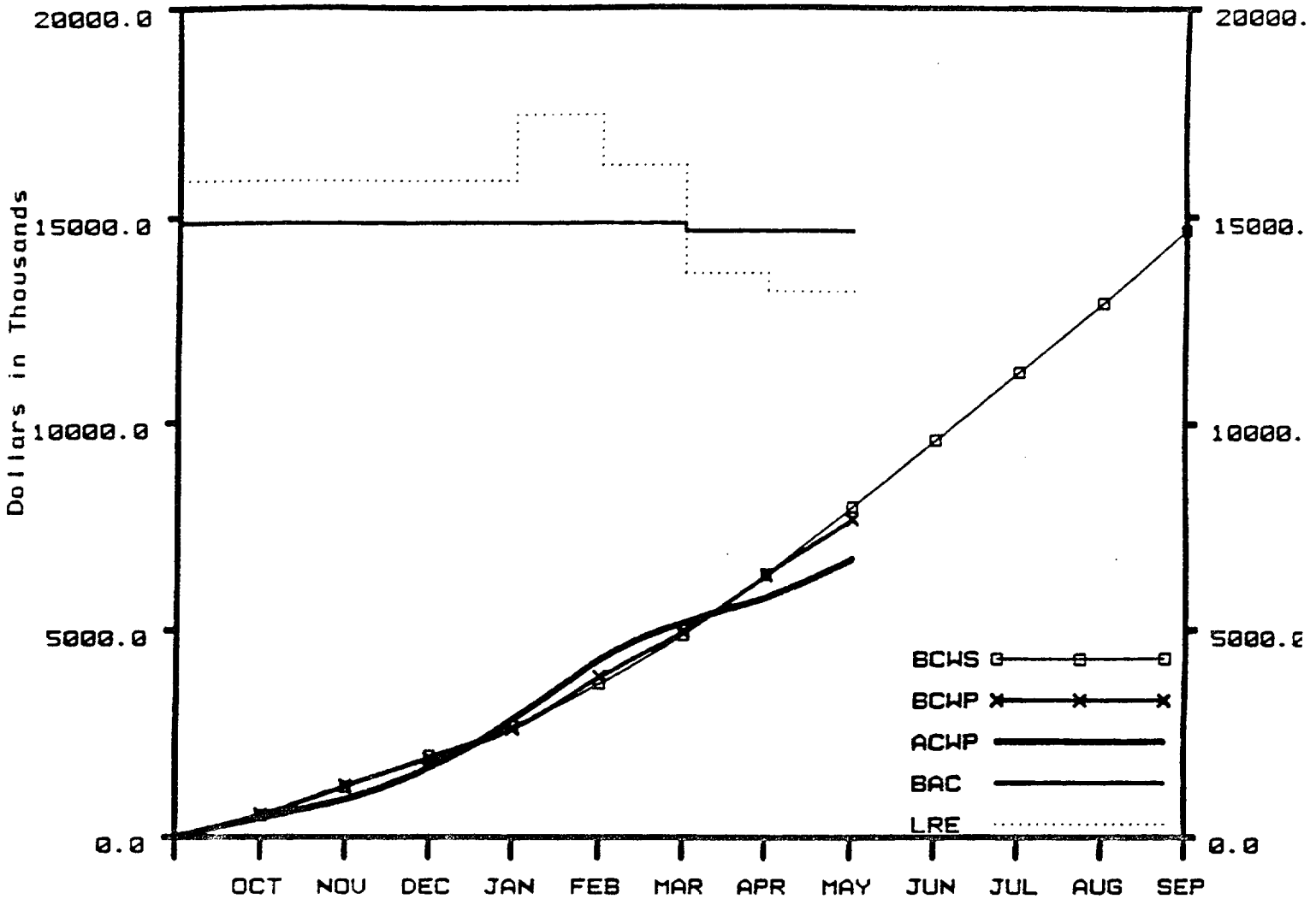
SNL Milestones R062, mechanical compatibility between select cementitious material and Topopah Spring Member Tuff, and R063, development and application of a computer program for prediction of thermal loading due to the hydration of cement (SAND84-7117), are delayed in peer review due to SCP preparation.

SNL Milestone R766, Phase I reference configuration complete, has been submitted to the CCB for addition.

CCB action is in process to add SNL Milestones P129, a report on the welded tuff mining demonstration performed at the G-Tunnel facility on the Nevada Test Site, and P130, a report on the effect of horizontal borehole length on the underground emplacement costs.

Two other SNL milestones will be delayed; the completion dates are now estimated to be September 30, 1986, for the draft report on spent fuel rod consolidation (Milestone R266) and October 30 for the final report (Milestone R267).

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR MAY 1986
WBS: 1.2.4



REPOSITORY INVESTIGATIONS	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1627.7	7983.3
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1340.8	7681.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	908.7	6723.8
D. BUDGET AT COMPLETION (BAC)		14664.6
E. LATEST REVISED ESTIMATE (LRE)		13190.9

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-301.9	-3.78
G. COST VARIANCE (B-C)	957.6	12.47
H. AT COMPLETION VARIANCE (D-E)	1473.7	10.05

Remarks:

The cost underrun is a result of the delay in the repository ACD, which affects subcontractor effort, and redirection of resources to the SCP.

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

For: MAY 1986 Date: June 20, 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	2,922.970	2,922.859	2,837.809	-.111	85.051
1242	Development and Testing	2,777.300	2,476.270	2,248.000	-301.030	228.270
1243	Facilities	1,321.000	1,320.334	986.000	-.666	334.334
1244	Operations and Maintenance	235.000	235.014	186.000	.014	49.014
1245	Decommisioning	21.000	21.000	.000	.000	21.000
1246	Repository Performance Assessment	706.000	705.912	466.000	-.088	239.912
124	REPOSITORY INVESTIGATIONS	7,983.270	7,681.391	6,723.809	-301.879	957.582

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											△	
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.f	Start Repository Advanced Conceptual Design △ 9/85									◇			
N432	SNL	1.2.4.1	Repository Conceptual Design in Support of Site Characterization △ 9/85										◇		
N433	SNL	1.2.4.1	Initial Subsystem Design Requirement (SDR)	△									◇		
M295	SNL	1.2.4.2	Feasibility Analysis o Horizontal Emplacement & Retrieval - Letter Report	△									◇		
N406	SNL	1.2.4.2	Horizontal Waste Emplacement Equipment Development Plan △ 8/85										◇		
M455	SNL	1.2.4.2	Report on G-Tunnel Underground Facility (G-TUFF) Summary												△

△ 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

At SNL, DRMS records were sorted and entered from the following sources: 1) Seal Materials Evaluation records pertaining to tests performed by Pennsylvania State University for the years 1982 to 1984, inclusive; (2) mechanical compressive test size-effects data pertaining to two data sets; (3) weapons test seismic records, including design review comments; and (4) G-Tunnel heated block records.

SAIC Licensing Branch representatives participated in the planning and development of SCP Chapter 8.1 with respect to site characterization data used for the resolution of issues. In addition, the licensing staff participated in a review of the draft Systems Engineering Management Plan (SEMP) and developed proposed revisions to portions of Chapters 4 and 5 that addressed licensing and regulatory needs and interactions. The SEMP Task Group was briefed on licensing issue resolution strategies and the licensing process in general.

SAIC personnel prepared a detailed analysis of the open and action items remaining from the August 1985 NNWSI Project/NRC Exploratory Shaft Design and Construction meeting. The analysis was forwarded to the NRC. The status report will be used in the future to track the status of open and action items.

SAIC staff members provided support to the WMPO to prepare for the Program-wide exploratory shaft licensability meeting to be held at the DOE/HQ in June and reviewed the NNWSI Project exploratory shaft subsystem design requirements.

At SAIC comments were prepared and consolidated with input from other Project participants on three draft regulatory definitions (anticipated/unanticipated, disturbed zone, and engineered barrier system) developed by the DOE/HQ. At the end of the report period the comments were undergoing final editing prior to transmittal to the WMPO.

NNWSI Project comments on six NRC generic technical positions were prepared at SAIC for transmittal to the DOE/HQ.

SAIC personnel compiled the draft Regulatory Documents Manual, Milestone P302. The manual, to be updated in a controlled manner, will contain all NRC and EPA regulations and guidance specifically applicable to the high-level waste repository, as well as pertinent legislation. The manual will be transmitted to the WMPO for review early in June 1986.

SAIC staff members prepared proposed revisions to the draft administrative procedures for implementation of the NRC/DOE site-specific agreement and discussed them with the WMPO. The majority of the procedures were then transmitted to the TPOs for comment. However, three procedures were withheld pending additional revision.

SAIC personnel issued the Draft NNWSI Project Information Management System (IMS) Concepts Evaluation Report (Milestone M789) to the WMPO for review. A presentation on the report and a request for an IMS Bridge Program will be made to the WMPO on June 6.

WBS 1.2.5.2.2 Site Characterization Plan

Staff members at SAIC completed the performance allocation for the planned site characterization activities. One last performance allocation workshop was held on May 13 in Denver at the USGS. This meeting completed discussion of Issue 1.1 (formerly Issues 1.16). The results of performance allocation, in particular the required parameters and the issue resolution strategies, will be presented in Chapter 8 of the SCP. The writing of Chapter 8, especially sections 8.1, 8.2, and 8.3, was delayed pending the completion of performance allocation, baselining of the OGR common issues hierarchy, and revisions to the SCP Annotated Outline (AO). Writing of these sections is now proceeding, based upon NNWSI Project assumptions about the final AO content, toward completion dates in June or early July 1986.

A number of SCP milestones were completed at SAIC this month. Internal review meetings were held for Chapter 5 (May 1-2), Chapter 1 (May 27-30), and Chapter 3 (May 29-30). Although sections of these chapters will require extensive revisions, the remainder of the material was satisfactory. However, the review of Chapter 3 could not be completed in the allotted time, and the reviewers will reconvene on June 4-5. In addition to the internal reviews, a DOE/HQ review of Sections 8.4 and 8.7 was held in Las Vegas May 28.

The status of the SCP chapters and sections for May is outlined below:

Chapter 1 - Internal Review Committee (IRC) revisions complete by July 7, 1986; chapter returned to SAIC September 1986.

Chapter 2 - Completed all reviews; link to Chapter 7 will be revised.

Chapter 3 - IRC revisions complete mid-July 1986.

Chapter 4 - In last phase of responding to unofficial DOE/HQ comments; official DOE/HQ review June 26-27, 1986.

Chapter 5 - Responses to IRC comments completed; DOE/HQ review June 24-25, 1986.

Chapter 6 - Will be completed, with IRC revisions, July 3, 1986; DOE/HQ review August 13-15, 1986.

Chapter 7 - Majority will be completed, with IRC revisions, by June 30, 1986.

Section 8.1 - Draft input complete June 20, 1986.

Section 8.2 - Draft input complete July 20, 1986.

Section 8.3 - Draft input from labs and USGS; expected dates:

SNL	June 9, 1986
Los Alamos	June 23, 1986
USGS	June 16, 1986
LLNL	July 15 for majority; late August 1986 for metal barriers section.

Sections 8.4 and 8.7 - In revision per DOE/HQ review (HQ guidance needed).

Section 8.6 - Completed through DOE/HQ review (HQ guidance needed).

The DOE/HQ staff met with the NRC on May 7-8 to discuss, among other things, the level of detail that the NRC would like to see in the SCP. The meeting resulted in a number of agreements between DOE and NRC and between DOE and the States. The agreements could have a profound effect on the ability to produce the SCP by the scheduled date of December 22, 1986. The most significant of these agreements is that the project offices will submit their detailed study plans for site characterization activities with the SCP. This has the effect of increasing the volume of the SCP and support documents to about 6,000 pages, a figure that DOE/HQ agreed last January was unacceptable if a December 1986 delivery date was to be met.

Several USGS NNWSI Project personnel worked throughout the month on revisions to Chapters 1 (Geology), 3 (Hydrology), and Section 5.2 (Paleoclimatology) as well as preparing Section 8.3 (Planned Activities) of the SCP.

All sections of Chapter 3 (Hydrology) of the SCP for which the USGS is responsible, except parts of the introduction and summary, were completed and transmitted to SAIC in Las Vegas on May 10.

Preparation of SCP Section 8.3.1, Site Program Plan, continued at SAIC/Golden during May. A submittal to WMPO of the final (draft) SCP 8.3.1 input is expected by June 16.

Chapters 1 and 3 of the SCP were reviewed by Los Alamos personnel. Chapter 4 revision is on schedule. All technical responses have been made to the review comments. The chapter is in production at SAIC in Las Vegas. Section 8.3 of the SCP is now being drafted.

Writing of all SNL sections of the SCP Chapter 8 is in progress using the results of the performance-allocation/issue-resolution-strategy workshops conducted during March, April, and May. The draft of SCP Chapter 8 is expected to be delivered to SAIC on June 6, 1986.

WBS 1.2.5.3 ENVIRONMENTAL COMPLIANCE

WBS 1.2.5.3.1. Environmental Assessment

The final EA was released to the public on May 28, 1986, along with the Candidate Site Recommendation Report. The Yucca Mountain, Nevada; Hanford, Washington; and Deaf Smith, Texas sites were selected for site characterizations.

WBS 1.2.5.3.2 Environmental Impact Statement

SAIC staff members attended the Environmental Coordinating Group (ECG) meeting on May 6-9, 1986, in Washington, to begin planning EIS efforts. The EIS scoping will be delayed until August 1987.

WBS 1.2.5.3.3 Environmental Regulatory Interactions

The draft Environmental Permit Plan was reviewed by the WMPO and revised by SAIC staff in May. The revised plan will be ready for review in June 1986. Preparation of the permit applications continued in May.

Staff members from SAIC attended the Environmental Coordinating Group meeting to discuss the Environmental Monitoring and Mitigation Plan (EMMP) in Washington on May 6-9, 1986, with representatives from the DOE/HQ, States, and Indian Tribes. EMMP preparation continued in May.

A revised draft of the Issues Hierarchy Key Issue 3 was prepared by SAIC staff and sent to the WMPO and the NNWSI Project Issues Hiearchy Working Group for review. Work has begun on preparing the Environmental Program Plan that will explain how key issues will be resolved.

SAIC staff members finalized a question-and-answer paper reflecting State concerns about the EA for the DOE/HQ. They also began drafting a facility-specific NNWSI Project Outreach and Public Participation Plan, as required by the OCRWM Mission Plan, and initiated the compilation of background material for Consulation and Cooperation.

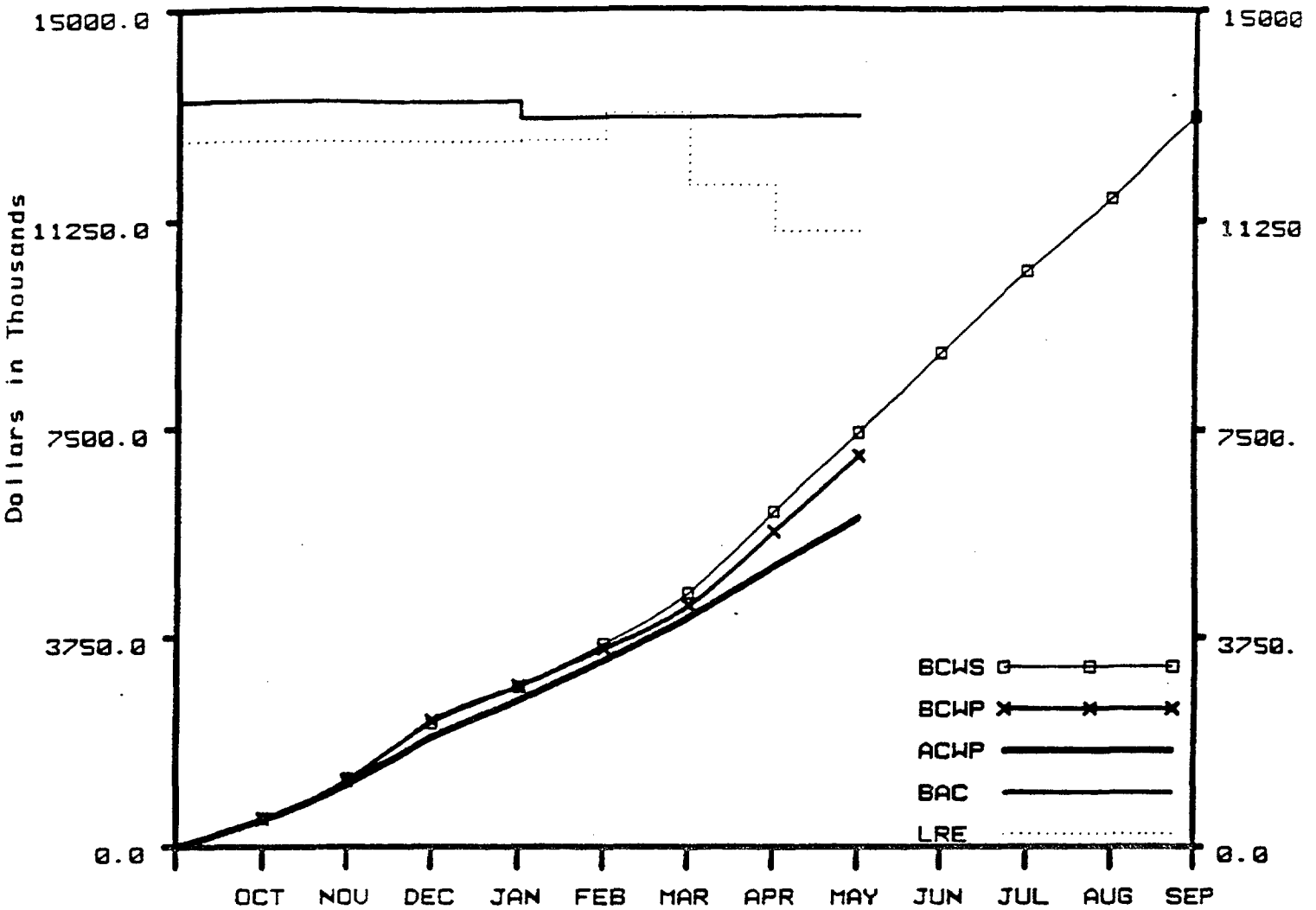
Project representatives attended the Commission on Nuclear Projects meeting on May 15 at the Las Vegas City Council Chambers. The Nevada Commission on Nuclear Projects heard status reports on the high-level nuclear waste program from DOE, NRC, and State representatives.

Project participants also attended a May 28 meeting of the Nevada Legislative Committee on High-Level Radioactive Waste in Las Vegas where a DOE/NV representative announced that the final Environmental Assessment (EA) was being officially released that day, recommending Yucca Mountain, Nevada, Deaf Smith County, Texas, and Hanford, Washington, as suitable for site characterization. Nevada Governor Richard Bryan was informed of the EA release via telephone.

MILESTONE PROGRESS

The delivery date for SNL milestones N125 (SCP Chapter 8) and R210 (the draft of SCP Section 8.3.2) is estimated to be June 6, 1986.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR MAY 1986
WBS: 1.2.5



REGULATORY AND INSTITUTIONAL INVESTIGATIONS	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1422.4	7441.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1365.9	7028.5
C. ACTUAL COST OF WORK PERFORMED (ACWP)	879.2	5913.6
D. BUDGET AT COMPLETION (BAC)		13103.0
E. LATEST REVISED ESTIMATE (LRE)		11048.2

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-412.5	-5.54
G. COST VARIANCE (B-C)	1114.9	15.86
H. AT COMPLETION VARIANCE (D-E)	2054.8	15.68

Remarks:

Cost underrun is due to billing lag from State of Nevada.

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

For: MAY 1986

Date: June 20, 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	494.430	494.311	586.247	-.119	-91.936
1252	Licensing	3,723.462	3,343.979	3,342.508	-379.483	1.471
1253	Environmental Compliance	1,124.700	1,091.845	985.328	-32.855	106.517
1254	Communication and Liaison	190.766	190.767	150.577	.001	40.190
1255	Technology and Financial Assistance	1,907.653	1,907.644	848.971	-.009	1,058.673
125	REGULATORY AND INSTITUTIONAL INVESTIGATIONS	7,441.011	7,028.545	5,913.631	-412.466	1,114.914

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											◇	
M522	SAIC	1.2.5.2	Site Characterization Plan △ 5/85												
M504	SAIC	1.2.5.3	Final Environmental Assessment				▲								

◇ 12/86

△ 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

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

The NNWSI Project Review was held at the OGR on May 14 in Washington, D.C. On the following day, the FY 88 WPAS for the exploratory shaft facilities (ESF) was presented to the DOE Office of Management and Administration. This was part of the budget validation process.

Stearns-Catalytic in Denver has been engaged by Los Alamos to assist with production of the ESF Design Requirements Document. The amount of effort required for this task is still uncertain. Most of the work will be accomplished in Denver because of the availability there of clerical services and additional experienced mining personnel.

A Los Alamos review is being of the ESF Safety Plan written by REECo is in progress.

F&S management met with the WMPO on May 20, 1986, to discuss ESF design requirements and interface between the WMPO and F&S design effort.

The F&S project manager and drilling engineer met with Los Alamos representatives in Las Vegas on May 28, 1986, to discuss the air-core drilling program to be conducted in the ESF. Representatives from F&S, WMPO, REECo, and SAIC met on May 29, 1986, for an overview of the ESF.

WBS 1.2.6.1.2 Safety and Quality Assurance

F&S staff reviewed a draft of the ESF Sub-systems Design Requirements document prepared by SAIC.

WBS 1.2.6.2 SITE PREPARATION

H&N personnel delivered copies of the latest topography maps of the ESF site and copies of alluvium and rock interface to WMPO.

H&N staff completed mounting of six-by-eight-foot topographic maps of Yucca Mountain.

WBS 1.2.6.3 SURFACE FACILITIES

REECo personnel continued to develop a coherent outline for construction and operating work orders to flange with the WBS dictionary.

Comments were received by REECo on the ESF Safety Plan draft from SAIC, F&S, LLNL, and Los Alamos. The remainder of the responses are needed to incorporate and resolve concerns.

H&N staff submitted summary estimates with back-up for capital equipment required for construction of the ESF, as requested by WMPO.

An H&N staff member attended the ESTP Committee meeting in Albuquerque on May 1. H&N had one outstanding action item to provide minimum requirements for any trailer to be brought on site. This information will be completed the first week in June.

WBS 1.2.6.9 TESTING

WBS 1.2.6.9.1 Exploratory Shaft Test Plan

Los Alamos personnel are developing detailed (official) cost estimates for prototype air coring.

USGS staff members conducted prototype testing of exploratory shaft fracture-mapping techniques in excavated pits on Yucca Mountain.

Personnel at USGS evaluated computerized techniques of stereophotogrammetric mapping of the planned underground workings of the exploratory shaft. A presentation was given on the underground mapping plan at the May Exploratory Shaft Test Plan (ESTP) meeting in Albuquerque on May 1.

Design and construction requirements for an exploratory shaft geologic mapping platform were developed by USBR and a criteria letter detailing these requirements was prepared and forwarded to Los Alamos. Equipment requirements for instrumentation of a strike rail goniometer for electronic data acquisition were also developed by USBR. The goniometer will be used for fracture mapping in both the shaft and drifts.

LLNL exploratory shaft (ES) staff provided technical review comments at the request of the WMPO on an NRC generic technical position on shaft and borehole testing. The draft ES safety plan developed by REECo was reviewed for its implications for LLNL ES work; comments were provided to REECo and to the WMPO. LLNL staff members also reviewed draft objectives for meetings between the DOE and the NRC on ES facilities and testing; comments were provided in a letter to the WMPO. Five new Level IV deliverables have been identified for ES test planning. The deliverables involve hydrothermal calculations that address specific operational aspects of the waste package environment tests.

SNL staff members attended the ESTP Committee meeting on May 1 in Albuquerque, New Mexico.

WBS 1.2.6.9.2 Exploratory Shaft Testing

REECo personnel drilled and blasted one 10-foot full face round, three 9-foot full face rounds, began drilling on the fourth 9-foot full face round, and completed installing load cells and cabling in channels. They also drilled four conversion pins from 18-inches to 24-inches deep and drilled and blasted one 6-foot full face round and one 8-foot slab round.

WBS 1.2.6.9.2.1 Geologic Testing

USBR personnel developed design and construction requirements for an exploratory shaft geologic mapping platform. A criteria letter detailing these requirements was prepared and forwarded to Los Alamos. Equipment requirements for electronic data acquisition instrumentation of a strike rail goniometer were developed. The goniometer will be used for fracture mapping in both the shaft and drifts.

A photogrammetric investigation was carried out in G-Tunnel to assess the possibility of using a hardware/software system developed by VEXEL Corp. of Boulder, Colorado, to rapidly produce maps of tunnel walls. The evaluation is continuing.

WBS 1.2.6.9.2.2 Hydrologic Testing

USBR staff continued preparing prototype test plans for the nine hydrologic tests and met in a series of coordinating meetings with USGS personnel.

WBS 1.2.6.9.2.3 Geomechanical Testing

SNL staff members representing the exploratory shaft geomechanics and thermomechanical testing areas participated in the SCP write-in during May.

WBS 1.2.6.9.2.4 Geochemical Testing

Results of the TRACR3D modeling performed by Los Alamos staff this month showed that a fracture near the site of a diffusion test in Topopah Spring tuff will produce data significantly different from that of a test under the same conditions in Calico Hills tuff.

An F&S drilling engineer is developing planned and budget cost estimates for the prototype air-core/drilling test program to be conducted at G-tunnel.

WBS 1.2.6.9.2.5 Engineered Barrier Design Testing

The neutron probe and the network analyzer being used by LLNL for the electromagnetic measurements failed during this period. A spare network analyzer was immediately available; it was found that data measured by the first unit could be reproduced by the second unit with a precision of approximately 5 percent. There was no spare neutron probe immediately available after the original probe failed and, thus, it was not possible to measure the repeatability of the data.

LLNL staff conducted discussions with well-logging experts to define the appropriate hardware, calibration method, and interpretation techniques for water content determinations using neutron probes; these discussions will continue for the next few months.

F&S personnel in Tulsa began assembling facilities and a Project team in May. They also began Project planning, control procedures, a management plan, and the basis of design document.

WBS 1.2.6.9.3 Integrated Data System

Completion of the Integrated Data System Requirements document by Los Alamos was delayed because more work than anticipated is required to complete the document. It should be ready for review in June.

PLANNED WORK

LLNL staff members will continue the G-Tunnel tomography experiment. The heater will be turned off and the rock will be monitored during the cool-down episode. Work will proceed with other instrument evaluations as resources permit, and scientific investigation plans will be developed in keeping with Project guidance.

Los Alamos will evaluate the impact of recent DOE/HQ guidance regarding the Exploratory Shaft Test Plan, and then the work by the Principal Investigators will be redirected as required.

Los Alamos study plans for the prototype testing in G-Tunnel will be submitted by July 1. This testing is necessary to develop an engineering test plan for the Exploratory Shaft Diffusion Test.

PROBLEM AREAS

A shortage of manpower at LLNL continues to affect the ES work. The shortage is caused in part by conflicts between this work and other work of higher priority within the NNWSI Project.

Problem areas for Los Alamos include the approval process for quality level assignments, and the direction that future work of the ESTP Committee should take.

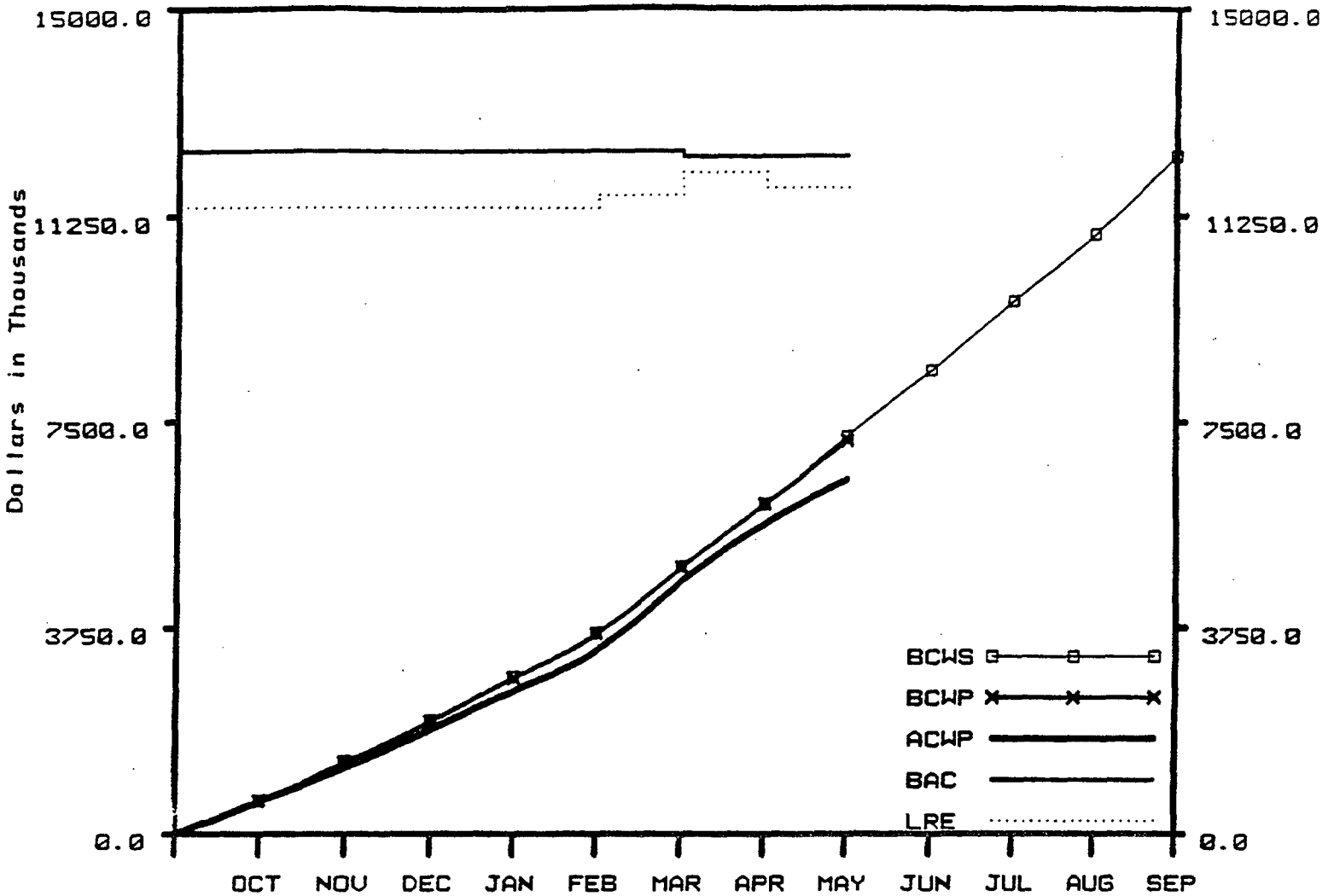
The quality assurance (QA) level assignments for test plan items and activities could not be approved because the ESTP is not approved.

The delay in completion of the IDS Requirements Document will probably cause equivalent slippage in the schedule for the Title II document being prepared by Los Alamos.

MILESTONE PROGRESS

SNL Milestone N419, the NRC workshop for the exploratory shaft test plan, has been deleted.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR MAY 1986
WBS: 1.2.6



EXPLORATORY SHAFT INVESTIGATIONS	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1231.9	7237.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1165.9	7164.6
C. ACTUAL COST OF WORK PERFORMED (ACWP)	811.4	6457.8
D. BUDGET AT COMPLETION (BAC)		12341.7
E. LATEST REVISED ESTIMATE (LRE)		11757.1

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-72.6	-1.00
G. COST VARIANCE (B-C)	706.7	9.86
H. AT COMPLETION VARIANCE (D-E)	584.6	4.74

Remarks:

Variances within threshold. No analysis required.

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

For: MAY 1986 Date: June 20, 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
1261	Management and Integration	1,845.406	1,845.192	1,509.971	-.214	335.221
1262	Site Preparation	104.060	104.060	117.400	-.000	-13.340
1263	Surface Facilities	13.320	13.320	13.300	.000	.020
1264	First Shaft	74.078	74.078	235.046	.000	-160.968
1265	Second Shaft	19.064	19.064	108.272	.000	-89.208
1266	Subsurface Excavations	179.496	179.496	210.162	.000	-30.666
1267	Underground Service Systems	178.200	178.200	289.853	-.000	-111.653
1268	Operations	.000	.000	.000	.000	.000
1269	Testing	4,823.500	4,751.152	3,973.824	-72.348	777.328
126	EXPLORATORY SHAFT INVESTIGATIONS	7,237.124	7,164.562	6,457.828	-72.562	706.734

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						△							◇ 3/87
M243	LANL	1.2.6.1	Complete Exploratory Shaft Readiness Review					△								◇ 11/86
M652	LANL	1.2.6.1	Start First Shaft (ES-1) Construction							△						◇ 5/87
M645	LANL	1.2.6.2	Start ESF Site Preparation						△							◇ 12/86

△ 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

Internal LLNL technical review of the final report entitled "Spent Fuel Test--Climax: An Evaluation of the Technical Feasibility of Geologic Storage of Spent Nuclear Fuel in Granite" was completed this month. Revisions will be made in June in preparation for publication.

The report "Spent Fuel Test--Climax: Technical Measurements Data Management System Description and Data Presentation" was submitted to LLNL publication services.

SNL staff continued work on the mining of the demonstration drift in welded tuff in the G-Tunnel underground facility. The last 12 meters of the 30-meter drift were mined and stabilized during May.

LLNL staff members continued the heater test with the monitoring of the electromagnetic field in the Small-Diameter Heater Alcove #1.

WBS 1.2.7.2.2 E-MAD

Westinghouse personnel initiated summer operation of the E-MAD facility. Energy conservation measures will permit operation of the small chiller by isolating unoccupied areas. Lighting loads have also been reduced throughout the facility.

The fuel assemblies at E-MAD were stored in the hot bay lag storage pit. With exhaust fans off, the highest lag storage pit exhaust temperature was 32.7 ^{o}C. All canisterized fuel assemblies located in the lag storage pit are in a safe configuration. The maximum recorded canister temperatures are well below the canister design limits.

Westinghouse personnel loaded and shipped the first TN-8L shipping cask to Idaho National Engineering Laboratory on May 31, 1986.

At the E-MAD facilities, Westinghouse personnel crated the BWR demonstration canisters and fuel models with lifting fixture. It is now ready for shipment to INEL/EG&G Idaho. The second and third floor operating galleries utility

systems have been shutdown except for areas required during fuel handling operations. The drywell storage area and surface storage containers were checked for contamination and terminal condition. The covers were weather sealed and are labeled for terminal storage.

Technical operations procedures and consolidated procedures for all 17 of the fuel assemblies were verified and are being indexed prior to shipment to the records library. Verification of the fuel assembly data books, technical instructions, and operations procedures are currently in process.

WBS 1.2.7.2.3 G-Tunnel

H&N received a tentative schedule from SNL and F&S for survey support on ODEX air coring proposal in G-tunnel.

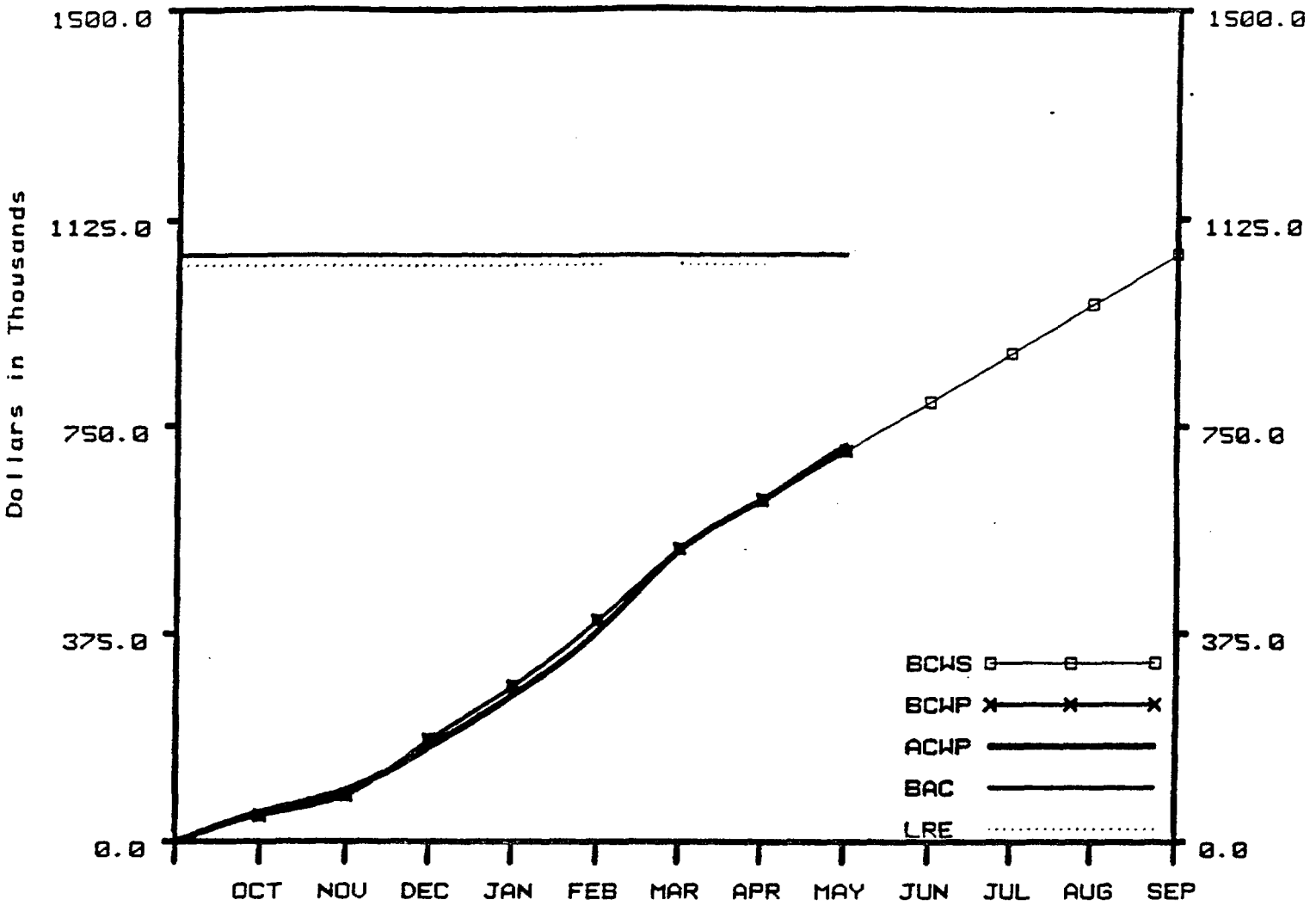
PLANNED WORK

SNL will install hydraulic pressure cells in the ribs of the demonstration drift.

MILESTONE PROGRESS

SNL Milestone M279, completion of mining for G-Tunnel welded tuff mining evaluations was completed on May 29.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR MAY 1986
WBS: 1.2.7



TEST FACILITIES	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	88.5	705.8
B. BUDGETED COST OF WORK PERFORMED (BCWP)	88.5	705.8
C. ACTUAL COST OF WORK PERFORMED (ACWP)	98.5	716.0
D. BUDGET AT COMPLETION (BAC)		1060.8
E. LATEST REVISED ESTIMATE (LRE)		1063.3

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-10.2	-1.44
H. AT COMPLETION VARIANCE (D-E)	-2.5	-0.24

Remarks:

Variances within threshold. No analysis required.

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

For: MAY 1986 Date: June 20, 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
1271	Management and Integration	.000	.000	.000	.000	.000
1272	Testing	705.836	705.835	715.996	-.001	-10.161
1273	New Facility Acquisitions	.000	.000	.000	.000	.000
127	TEST FACILITIES	705.836	705.835	715.996	-.001	-10.161

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								▲				

△ 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.

PLANNED WORK

To be included in future NNWSI Project Monthly Reports.

PROBLEM AREAS

None.

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

The draft NNWSI Project Management Plan (PMP) will be ready for internal SAIC review in mid-June. Relationships of Project documentation to legislation, regulations, etc., have been updated in the plan. A draft for the WMPO and NNWSI Project review should be issued by June 25.

The T&MSS contract modification has been signed by SAIC and by the DOE/NV to extend the period of performance through March 2, 1987.

Effective May 20, 1986, Sheldon D. Murphy was appointed F&S NNWSI Project Manager and Technical Project Officer (TPO) replacing Tom E. Goebel.

A complete set of Ralph M. Parsons Company ESF design subcontract deliverables was received at F&S on April 30, 1986. The drawings, specifications, and studies were reviewed by F&S personnel for subcontract specifications compliance. Copies of the documents were submitted to the WMPO for review and comment. F&S personnel updated the schedule for the ESF and submitted it to SAIC. They also reviewed and commented on the REECo ESF Safety Plan.

WBS 1.2.9.1.2 Interface Activities

Eleven F&S geologists attended a one-day QA seminar conducted by the USGS and one F&S geologist attended a three-day REECo computer training course.

WBS 1.2.9.1.4 Records Management

F&S Management and QA personnel attended the NNWSI Project review of participants Information Management Systems, conducted by WMPO and SAIC personnel at the F&S Mercury Records Library.

A draft of the REECo NNWSI Project QA records management procedure was completed and issued for internal review. REECo was tasked with preparing QA Level I procedures for the departments involved in design estimates.

The WMPO Records Administrator visited each of the NNWSI Project participant's records processing centers in order to review the existing Project information systems. She will coordinate records and indexing information submitted to the

Project Records Center by all NNWSI Project participant records processing centers, and provide direction to all participant Records Coordinators in meeting WMPO requirements in the area of records management.

Effective Solutions, Inc., visited the SAIC/Golden records center on May 12-13 to install the upgrades to the QA records management system data base and to train the records center staff in using the upgrades. Several new activities were added to the system, and the speed of the system was increased.

WBS 1.2.9.2 PROJECT CONTROL

Input of cost plan data (to check system functions) of the Budget Data Entry System (BDES) was completed. Further BDES software testing is on hold pending the outcome of coordination meetings with the DOE/Resource Management and Budget Division that are scheduled for early June 1986.

At the QA Coordiantion Group (QACG) workshop in Denver on May 28-29, three major issues were discussed:

1. QA alert system. A system should be developed to identify QA problems on individual projects and the problems shared with other projects. A procedure has been developed and is forthcoming.

2. Minimum requirements for certification of personnel.

3. The participation of States and Indian tribes in audits.

Three audits have been conducted to date as scheduled in FY 86. Of the 15 audits conducted in FY 85, 8 remain open.

A total of six surveillances were conducted during the month of May. The surveillances were concentrated in the following locations: Westinghouse Electric Corp., Nevada Test Site; Sandia National Laboratories, Albuquerque, NM; USGS, Nevada Test Site Core Library; REECo, Nevada Test Site; and Los Alamos National Laboratory, Los Alamos, NM.

A total of 28 items and activities were monitored and no nonconformances (NCRs) were reported. Six reports that document the surveillances are in various stages of processing.

To date, a total of 39 surveillances have been conducted in FY 86 and 184 items or activities monitored. During this effort, 27 NCRs have been recorded.

Presently the QA Records Management System (QARMS) is installed at USGS/Denver, SAIC/Las Vegas (includes QASC and T&MSS QA records), LLNL, SNL, and Los Alamos. The QARMS data base has been updated at SNL, Los Alamos, and USGS. The installation of the QARMS at the NNWSI Project Records Center and the update to the SAIC data base is scheduled for early June 1986. The computers and printers have been received for H&N, F&S, and REECo. A meeting to establish an installation schedule is planned for the week of June 9, 1986.

SAIC staff prepared an overview discussion of the technical review, surveillance, and audit procedures for scientific investigations that will be necessary to comply with the NRC QA Review Plan. The discussion included an evaluation of where we stand now with regard to NRC expectations and what will be necessary to bring the program up to those expectations.

The Sample Overview Committee SOP concerning cores and samples was reviewed and comments were provided by SAIC staff.

SAIC staff members attended the ESTP committee meeting in Albuquerque on May 1 and presented an explanation of the interim changes to NVO-196-17, SOP-02-01, and SOP-02-02.

Representatives from SAIC, USGS, H&N, and the WMPO (technical staff) attended a meeting held at the DOE/NV office on May 16 concerning the Instrumentation Data Acquisition System (IDAS). The meeting was held to discuss and plan a course of action for assigning QA levels as a prerequisite for authorizing H&N to design the IDAS. Due to the restrictions of the USGS stop work order, it was agreed that a QA Level Assignment Sheet (QALAS) would be prepared by USGS for a preliminary design phase having a QA Level of III. Once the QALAS is approved by the WMPO, USGS would forward the necessary criteria letters through NTSO to direct H&N design activities.

Interim changes to Section 3.0 of NVO-196-17, NNWSI Project SOP-02-01, and NNWSI Project SOP-02-02 were issued to be effective May 9. The interim changes were necessary to clarify the requirements for scientific investigations, design control, and QA level assignments.

At SAIC the review of all Los Alamos QA Program documents was completed. An approval letter was forwarded to the WMPO for issuance.

SNL has submitted their QAPP to the WMPO for review. The review is underway with expected completion by the end of June 1986. The effort will include a review of the applicable implementing procedures which are referenced in the QAPP.

SAIC staff members completed a review of 17 LLNL procedures. The procedures submitted were either new or revisions to existing procedures; the need for these was identified during internal and external audits of the LLNL program. Staff members will meet with LLNL to evaluate and possibly resolve the comments on June 9-10.

SAIC QA staff members attended an OGR workshop for QA managers on May 28-29. All OGR project QA managers, as well as OGR QA personnel, were in attendance. The major efforts of the meeting included agreement on a procedure for immediate dissemination of QA information among the projects and on the OGR supplement dealing with certification of personnel performing quality-related activities. The discussion also covered the DOE commitment to a fully qualified QA program to be in place prior to the initiation of formal site characterization activities, e.g., the excavation of the exploratory shafts, and that the DOE projects and contractors be ready for an NRC audit prior to the issuance of the SCP.

The USGS stop work order remains in effect: As a result of further discussion between USGS and the WMPO QAM, it was agreed that USGS would submit their plan as to which activities should continue with interim controls and which would be halted immediately. WMPO should confer with USGS personnel and evaluate the plan, responding by June 27, 1986.

A draft Scientific Investigation Plan (SIP), prepared by USGS staff members, was reviewed and edited by SAIC/Golden according to a proposed format.

A new milestone list was compiled for the USGS NNWSI Project by SAIC/Golden. The list includes several milestones requested by the WMPO, but not yet reviewed by the USGS. The list was organized by the WBS, date, and level.

WBS 1.2.9.3 QUALITY ASSURANCE

USGS staff planned future studies of Yucca Mountain outcrops and pavements and revised existing QA procedures for outcrop and pavement mapping and reconnaissance traverses.

The draft USGS QA Manual was completed. Five copies of the manual were prepared and distributed for internal USGS and preliminary Project review. The new manual represents a considerable expansion that provides compliance with the latest revision of the Project QA Program, NVO-196-17, Revision 4.

A second writing session was conducted at Los Alamos in review and comment on four quality assurance (QA) procedures. The procedures discussed and rewritten covered surveillance, audits, calibration control, and quality level assignments. Participants in this session included local quality assurance line personnel, Project leaders, and a WMPO/SAIC representative.

Updated Los Alamos QA manuals were prepared for initial external distribution to the NRC, the DOE/HQ, Weston, and the State of Nevada. Replacement QA manuals will be sent to the WMPO and SAIC/Las Vegas during this external distribution cycle.

Final approval of the disposition of Los Alamos NCR 0401 was forwarded to the WMPO for approval before closure of the NCR.

Los Alamos staff put together a trial package consisting of scientific investigation plans and quality level assignments for three WBS subtasks for informal review by WMPO.

A quality assurance program plan specific to the SNL effort within the NNWSI Project was written and submitted to the WMPO for approval. This completed Milestone R088.

A Repository Design Control Board was established. The establishment of the board, with the concurrent implementation of quality-assurance III-6 for NNWSI Project repository design changes, provides the means to effect changes to baselined design documents.

SNL staff reviewed Chapter 9 (Quality Assurance) of the draft RCD/SC and final comments provided by the quality assurance coordinator.

The following SNL quality assurance activities were conducted in support of WBS 1.2.3.2.1.1, Site Geology: (1) a draft modified work plan and quality-assurance-level assignment sheets were reviewed and commented upon, (2) a draft test plan for seismotectonic investigations at the Surface Facility Reference Conceptual Site was also reviewed and commented upon, (3) a similar review and commentary was provided for letters of criteria for NTS Support Contractor services (aerial photography and excavation) necessary for this work, and (4) because of information developed as a result of items (1) and (2), the contractual requirements for the main geologic work in this effort were reviewed. This proposed work had been sent out for quotes, and a contractor has been selected. Subsequently, coordination was effected with the appropriate parties to incorporate additional necessary quality assurance requirements in the proposed contract.

An SNL a technical procedure for machining of rock samples to proper test specimen dimensions was written and reviewed. Both technical and quality assurance reviews have been conducted.

The SNL draft quality assurance procedure, "Definition and Change Control System for the Nevada Nuclear Waste Storage Investigations Projects," is being developed. It will standardize the revision and receiving procedures for drawings and drawing-related documents.

The Quality Assurance Program Plan specific to the SNL NNWSI Project was completed on May 29, 1986.

Five requirements covering the control of testing activities for the Project were submitted for LLNL internal review on May 2.

Members of the LLNL QA staff met with WMPO and SAIC staff members to discuss the handling of information within the NNWSI Project. Meetings were held on May 7-8 to describe the controlled document system and procedures used for the archiving of quality assurance records. A report on the overall Information Management System is to be developed as a result of their visits to LLNL and the other participating organizations.

A meeting was held at LLNL on May 16 to determine the quality assurance levels of the four major activities of the EQ3/6 Task. Three of the four were assigned Level II and the remaining activity was determined to be Level III.

Two LLNL procedures were submitted on May 20 for WMPO review and approval. A meeting is scheduled for June 9 to discuss WMPO comments of 17 procedures that were submitted for WMPO approval during the period from November 1985 to April 11, 1986.

An LLNL staff member presented a paper entitled "Control of Research Oriented Software Development" at the 40th Annual Quality Congress in Anaheim, May 19-21.

Two LLNL procedures that comprise the procurement control system were issued for their fifth and final review on May 23. These two procedures have received extensive comment and consideration because of the complex nature of the LLNL procurement system. A final version is expected to be submitted for WMPO review and approval on June 20.

LLNL personnel conducted a review of the Westinghouse Hanford Company's QA Plan for work being done for the waste package task in the area of waste form testing.

F&S personnel completed and submitted to the WMPO the revision to the Quality Assurance Manual to conform to NVO-196-17, Revsion 4. An estimate of the number of audits and surveillances to be conducted in FY 86, 87, 88, and 89 was prepared and also submitted to the WMPO. An F&S internal QA audit of the NNWSI Project program was conducted May 19-21, 1986.

REECo personnel further defined and developed the training program to be given to personnel involved in the NNWSI Project; developed Company Procedure NOP 4.1 for the review and processing of purchase requisitions; developed a QA requirements package for inclusion in the ESF mining subcontract; participated in two meetings on the USGS Instrumentation and Data Acquisition System (IDAS); and delivered Lakeshore headframe drawings to procurement for formal transmittal to F&S.

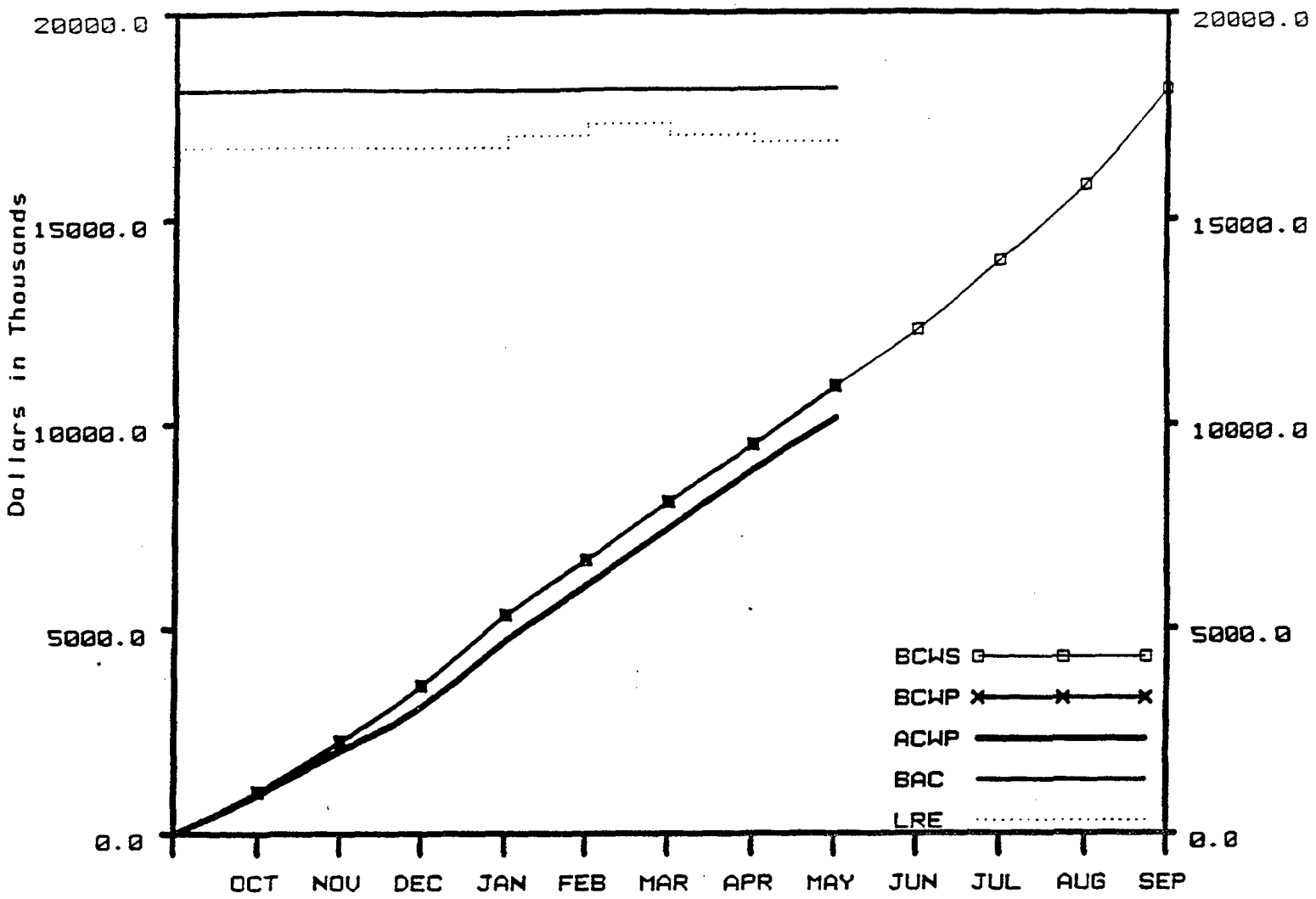
H&N received approval from the WMPO on amendments to the QA Manual. The letter states that the H&N QA Manual is approved for all QA Level I, II, and III activities except procurement, site investigations, in-service inspections, experiments, and research. Proposed revision to the NNWSI Project amendments to the H&N QA Manual is estimated to be approved and issued by June 20.

PLANNED WORK

All the SNL Q1 and Q2 designated documents that have been gathered since October 1, 1985, are being individually indexed on Records Management System forms. This information will then be placed on the NNWSI Project Quality Records Management System software and prepared to be shipped to the Project Records Center in Mercury, Nevada. Transfer will not occur until authorization is received from the WMPO Records Administrator.

Planned work for SNL staff includes: (1) initiation of a contract to provide the service of writing quality assurance procedures necessary to complete remaining quality assurance procedures in a timely manner, (2) initiation of a request for proposals for the service of performing quality assurance audits of contractors to this organization, and (3) instruction of WBS task leaders in development of modified work plans and quality-assurance-level assignment sheets for their work.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR MAY 1986
WBS: 1.2.9



PROJECT MANAGEMENT	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1419.8	10908.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1419.8	10909.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1259.0	10143.2
D. BUDGET AT COMPLETION (BAC)		18147.3
E. LATEST REVISED ESTIMATE (LRE)		16857.1

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.9	0.01
G. COST VARIANCE (B-C)	765.9	7.02
H. AT COMPLETION VARIANCE (D-E)	1290.2	7.11

Remarks:

Variances within threshold. No analysis required.

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

For: MAY 1986

Date: June 20, 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	5,595.175	5,595.206	5,359.562	.031	235.644
1292	Project Control	2,351.312	2,351.862	2,211.446	.550	140.416
1293	Quality Assurance	2,961.616	2,961.966	2,572.175	.350	389.791
129	PROJECT MANAGEMENT	10,908.103	10,909.034	10,143.183	.931	765.851

MILE-STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
M907	SAIC	1.2.9.1	Draft Project Management Plan △ 3/85								◇		◇		
M901	SAIC	1.2.9.1	Submit FY 85 NNWSI Project Plan to DOE/HQ for Approval △ 2/85	◆											
M719	WMPO	1.2.9.1	Submit FY 88 Budget to DOE/HQ							◆					

△ 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	MAY 1986	
LOCATION: P.O. Box 14100 Las Vegas, NV 89114				TITLE: PROJECT MANAGER
				Date: June 24, 1986

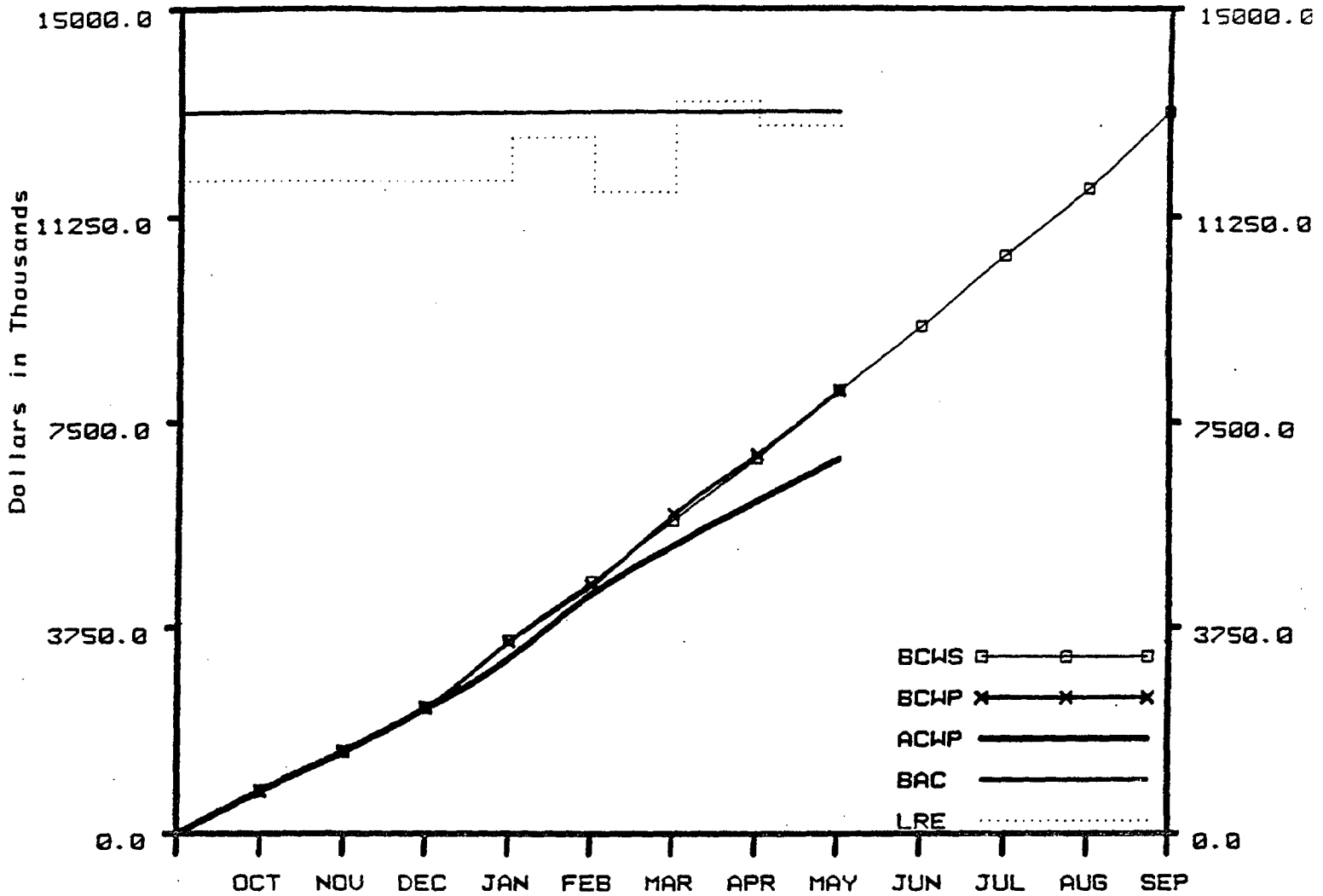
WBS NUMBER AND DESCRIPTION	CURRENT PERIOD					YEAR TO DATE					FISCAL YEAR COMPLETION		
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE	VARIANCES COST	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES 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	602.197	604.915	487.309	2.718	117.606	4,207.557	4,171.009	3,742.056	-36.548	428.952	6,688.000	5,982.761	705.239
122 WASTE PACKAGE	652.900	599.902	572.700	-52.998	27.201	4,343.200	4,347.201	4,068.400	4.001	278.801	8,529.800	8,102.082	427.718
123 SITE INVESTIGATIONS	3,602.975	3,575.323	2,231.913	-27.652	1,343.410	19,477.565	19,241.691	16,688.207	-235.874	2,553.484	34,224.800	29,142.408	5,082.392
124 REPOSITORY INVESTIGATIONS	1,627.665	1,340.771	908.717	-286.894	432.053	7,983.270	7,681.391	6,723.809	-301.879	957.582	14,664.680	13,190.869	1,473.731
125 REGULATORY AND INSTITUTIONAL INVESTIGATIONS	1,422.372	1,365.909	879.193	-56.463	486.716	7,441.011	7,028.545	5,913.631	-412.466	1,114.914	13,103.000	11,070.135	2,032.865
126 EXPLORATORY SHAFT INVESTIGATIONS	1,231.942	1,165.942	811.369	-66.000	354.573	7,237.124	7,164.562	6,457.828	-72.562	706.734	12,341.700	11,569.940	771.760
127 TEST FACILITIES	88.491	88.491	98.466	-.000	-9.975	705.836	705.835	715.996	-.001	-10.161	1,060.000	1,051.512	9.288
128 LAND ACQUISITION	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
129 PROJECT MANAGEMENT	1,419.828	1,419.829	1,259.838	.001	160.791	10,908.183	99.834	10,143.183	.931	765.851	18,147.300	16,857.117	1,290.183
12 NNWSI - TOTAL	10,648.370	10,161.082	7,248.706	-487.289	2,912.376	62,303.666	61,249.266	54,453.110	-1,054.400	6,795.157	108,760.000	96,966.825	11,793.175

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:	SIGNATURE:
M&O/ Pro_ *		NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS	MAY 1986	
LOCATION: P.O. Box 14100 Las Vegas, NV 89114				TITLE: PROJECT MANAGER
				Date: June 24, 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)
1211 Systems Management and Integration	18.000	18.000	6.000	.000	12.000	118.000	118.020	78.000	.020	40.020	180.000	118.952	61.048
1212 Systems Engineering	198.197	198.197	152.309	-.000	45.888	1.438.557	1.438.905	1.209.856	.348	229.049	2.325.000	1.963.370	361.630
1213 Technical Data Base Management	102.000	104.718	99.000	2.718	5.718	243.000	706.002	647.000	-36.998	59.002	1.126.000	1.052.812	73.188
1214 Total Systems Performance Assessment	284.000	284.000	230.000	.000	54.000	1.908.000	1.908.082	1.808.000	.082	100.082	3.057.000	2.847.627	209.373
121 SYSTEMS	602.197	604.915	487.309	2.718	117.606	4.207.557	4.171.009	3.742.856	-36.548	428.952	6.688.000	5.982.761	705.239
1221 Management and Integration	37.900	37.900	35.100	.000	2.800	224.200	224.201	225.900	.001	-1.699	589.000	365.202	144.598
1222 Package Environment	52.000	55.000	87.600	3.000	-32.600	576.000	570.000	649.500	-6.000	-79.500	970.000	1.010.037	-40.037
1223 Waste Form & Materials Testing	481.000	425.001	353.500	-55.999	71.501	2.929.000	2.989.000	2.638.000	10.000	351.000	5.895.000	5.579.862	315.138
1224 Design, Fabricate, and Prototype Testing	34.000	34.000	43.300	.000	-9.300	252.000	252.000	275.500	-.000	-23.500	555.000	526.995	-21.995
1225 Performance Assessment	48.000	48.000	51.200	.000	-3.200	312.000	312.000	279.500	.000	32.500	680.000	569.987	30.014
122 WASTE PACKAGE	652.900	599.902	572.700	-52.998	27.201	4.343.200	4.347.201	4.068.400	4.001	278.801	8.529.000	8.102.082	427.718
1231 Management & Integration	298.024	298.024	178.801	.000	111.223	1.569.329	1.568.957	1.422.308	-.372	146.649	2.780.000	2.298.737	481.263
1232 Geology	683.618	683.618	598.778	.000	84.840	4.433.496	4.396.624	4.184.066	-36.782	212.558	7.191.000	6.966.419	224.581
1233 Hydrology	595.600	595.600	478.137	-.000	27.463	3.373.112	3.344.166	3.287.613	-28.946	56.553	5.451.300	5.349.433	101.867
1234 Geochemistry	553.900	531.000	466.900	-22.900	64.100	3.930.500	3.971.987	3.692.200	41.487	279.787	6.095.000	6.073.470	21.530
1235 Drilling	1.309.900	1.309.901	272.720	.001	1.037.181	4.760.751	4.751.648	2.799.718	-9.103	1.951.930	10.011.800	5.455.461	4.556.339
1236 Environment	123.053	97.688	84.362	-25.375	13.326	582.587	497.619	520.069	-84.888	-22.450	970.400	1.047.419	-77.019
1237 Socioeconomic	41.870	32.491	45.115	-9.379	-12.624	334.960	172.690	282.541	-162.270	-109.852	502.300	981.503	-479.203
1238 Geochemical Modeling Code E03/6	95.000	125.001	107.100	30.001	17.901	493.000	538.000	499.700	45.000	38.300	1.223.000	974.966	248.034
1239 Deferred Site Close Out	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
123 SITE INVESTIGATIONS	3.602.975	3.575.323	2.231.913	-27.652	1.343.410	19.477.565	19.241.691	16.688.207	-235.874	2.553.484	34.224.800	29.147.408	5.082.392
1241 Management and Integration	530.765	530.764	400.717	-.001	130.047	2.922.970	2.922.859	2.837.809	-.111	85.051	4.922.600	4.847.982	74.698
1242 Development and Testing	562.900	276.006	225.000	-286.894	51.006	2.777.308	2.476.270	2.248.000	-301.038	228.270	5.096.000	5.019.768	76.232
1243 Facilities	362.000	362.001	145.000	.001	217.001	1.321.000	1.320.334	986.000	-.666	334.334	2.937.000	2.125.212	811.788
1244 Operations and Maintenance	45.000	45.000	21.000	.000	24.000	235.000	235.014	186.000	.014	49.014	441.000	349.813	91.187
1245 Decommissioning	6.000	6.000	.000	.000	6.000	21.000	21.000	.000	.000	21.000	48.000	48.000	.000
1246 Repository Performance Assessment	121.800	121.800	117.000	-.000	4.800	706.000	705.912	466.000	-.088	239.912	1.220.000	800.974	419.026
124 REPOSITORY INVESTIGATIONS	1.627.665	1.340.771	908.717	-286.894	432.853	7.983.278	7.681.391	6.723.809	-301.879	957.582	14.664.600	13.190.869	1.473.731
1251 Management and Integration	61.981	61.981	94.824	.000	-32.123	494.439	494.311	586.247	-.119	-91.936	762.400	904.905	-142.505
1252 Licensing	557.021	500.699	634.611	-56.322	-133.913	3.723.452	3.343.979	3.342.508	-379.483	1.471	6.008.000	6.608.714	-607.714
1253 Environmental Compliance	92.657	92.518	79.076	-.139	13.442	1.124.700	1.091.845	985.328	-32.855	106.517	1.397.600	1.256.521	141.079
1254 Communication and Liaison	25.293	25.293	17.284	.000	8.009	190.766	190.767	150.577	.001	40.190	292.000	230.483	61.517
1255 Technology and Financial Assistance	685.500	685.498	54.278	-.002	631.220	1.987.653	1.987.644	848.971	-.009	1.058.673	4.650.000	2.069.432	2.580.568
125 REGULATORY AND INSTITUTIONAL INVESTIGATIONS	1.422.372	1.365.989	879.193	-56.463	486.716	7.441.011	7.028.545	5.913.631	-412.466	1.114.914	13.103.000	11.070.135	2.032.865
1261 Management and Integration	306.237	306.238	207.167	.001	99.071	1.845.486	1.845.192	1.509.971	-.294	335.221	3.086.800	2.585.991	500.809
1262 Site Preparation	1.805	1.805	.625	.000	1.180	184.050	184.050	117.400	-.000	13.340	111.300	124.557	-13.257
1263 Surface Facilities	1.950	1.950	2.400	.000	-.440	13.320	13.320	13.300	.000	.020	21.200	21.188	.012
1264 First Shaft	10.700	10.700	2.752	.000	8.028	74.078	74.078	235.046	.000	-160.968	117.400	314.470	-197.070
1265 Second Shaft	2.210	2.210	1.292	.000	.918	19.064	19.064	108.272	.000	-89.208	28.800	167.186	-138.386
1266 Subsurface Excavations	36.200	36.200	53.889	.000	-17.689	179.496	179.496	210.162	.000	-30.666	325.200	326.379	-51.179
1267 Underground Service Systems	19.550	19.550	1.200	.000	18.350	178.200	178.200	289.853	-.000	-111.653	256.600	253.252	3.348
1268 Operations	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1269 Testing	853.200	787.200	542.044	-66.000	245.156	4.823.500	4.751.152	3.973.824	-72.348	777.328	8.395.200	7.806.937	588.263
126 EXPLORATORY SHAFT INVESTIGATIONS	1.231.942	1.165.942	811.369	-66.000	354.573	7.237.124	7.164.562	6.457.828	-72.562	706.734	12.341.700	11.569.940	771.760
1271 Management and Integration	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1272 Testing	88.491	88.491	98.466	-.000	-9.975	705.836	705.835	715.996	-.001	-10.161	1.060.800	1.051.512	9.288
1273 New Facility Acquisitions	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
127 TEST FACILITIES	88.491	88.491	98.466	-.000	-9.975	705.836	705.835	715.996	-.001	-10.161	1.060.800	1.051.512	9.288
128 LAND ACQUISITION	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
1291 Management and Integration	646.074	646.075	596.305	.001	49.770	5.595.175	5.595.206	5.359.562	.031	235.644	9.321.400	9.137.808	183.592
1292 Project Control	341.270	341.269	303.391	-.001	37.878	2.357.312	2.351.862	2.211.446	-.550	140.416	3.927.200	3.506.955	420.245
1293 Quality Assurance	432.484	432.485	399.342	.001	73.142	2.961.616	2.961.966	2.572.175	.350	389.791	4.898.200	4.212.354	685.846
129 PROJECT MANAGEMENT	1.419.828	1.419.829	1.299.038	.001	160.791	10.908.103	10.909.034	10.143.183	.931	765.851	18.147.300	16.857.117	1.290.183
12 M&O - TOTAL	10.648.370	10.161.082	7.248.706	-487.289	2.912.376	62.303.666	61.249.266	54.453.110	-1.054.400	6.796.157	108.760.000	96.966.825	11.793.175

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



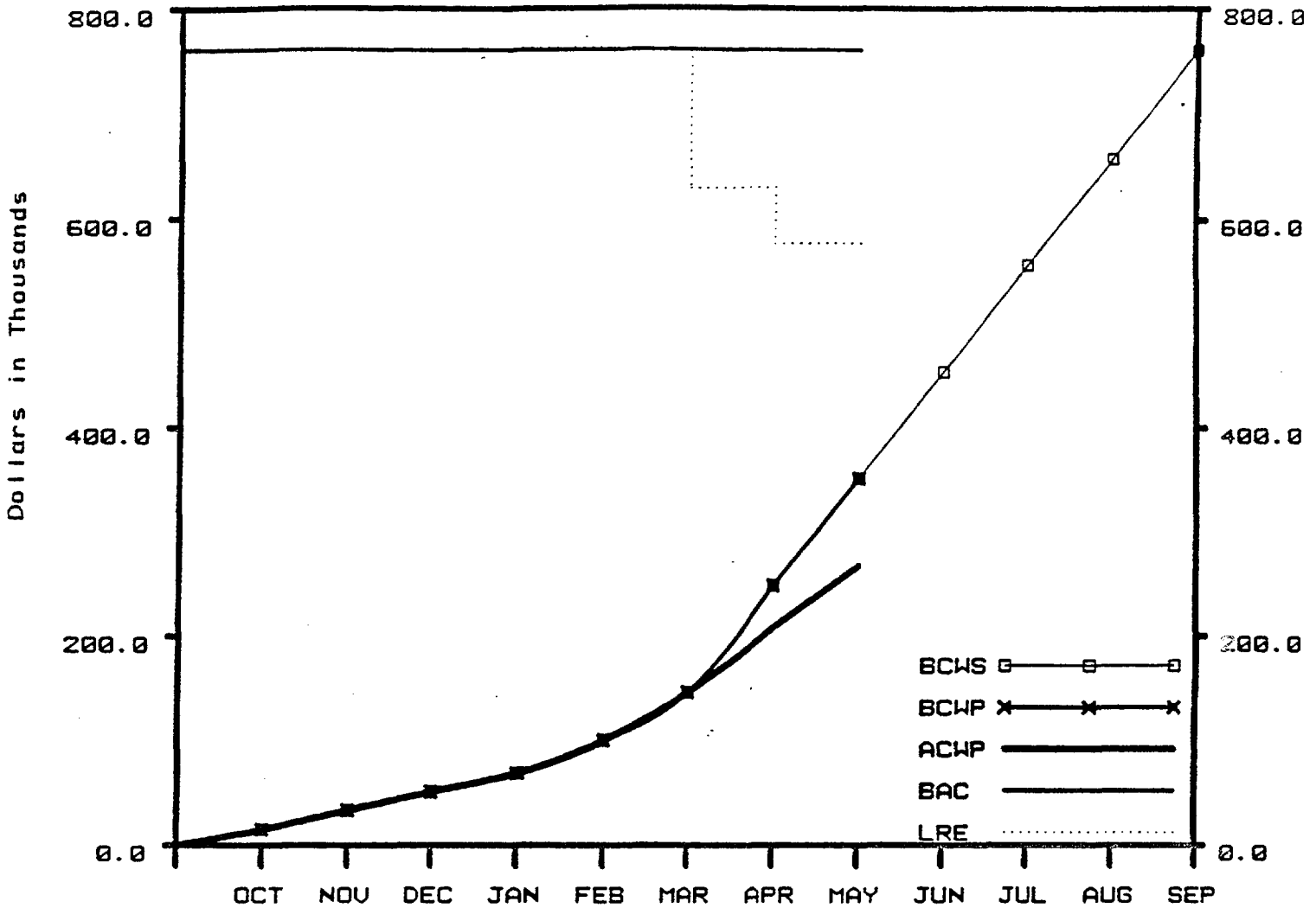
LOS ALAMOS - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1231.8	8072.5
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1169.9	8074.9
C. ACTUAL COST OF WORK PERFORMED (ACWP)	775.9	6831.0
D. BUDGET AT COMPLETION (BAC)		13149.0
E. LATEST REVISED ESTIMATE (LRE)		12881.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	2.4	0.03
G. COST VARIANCE (B-C)	1243.9	15.40
H. AT COMPLETION VARIANCE (D-E)	268.0	2.04

Remarks:

Cost variance due to billing lag with a subcontractor, posting error and pending redefinition of work.

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



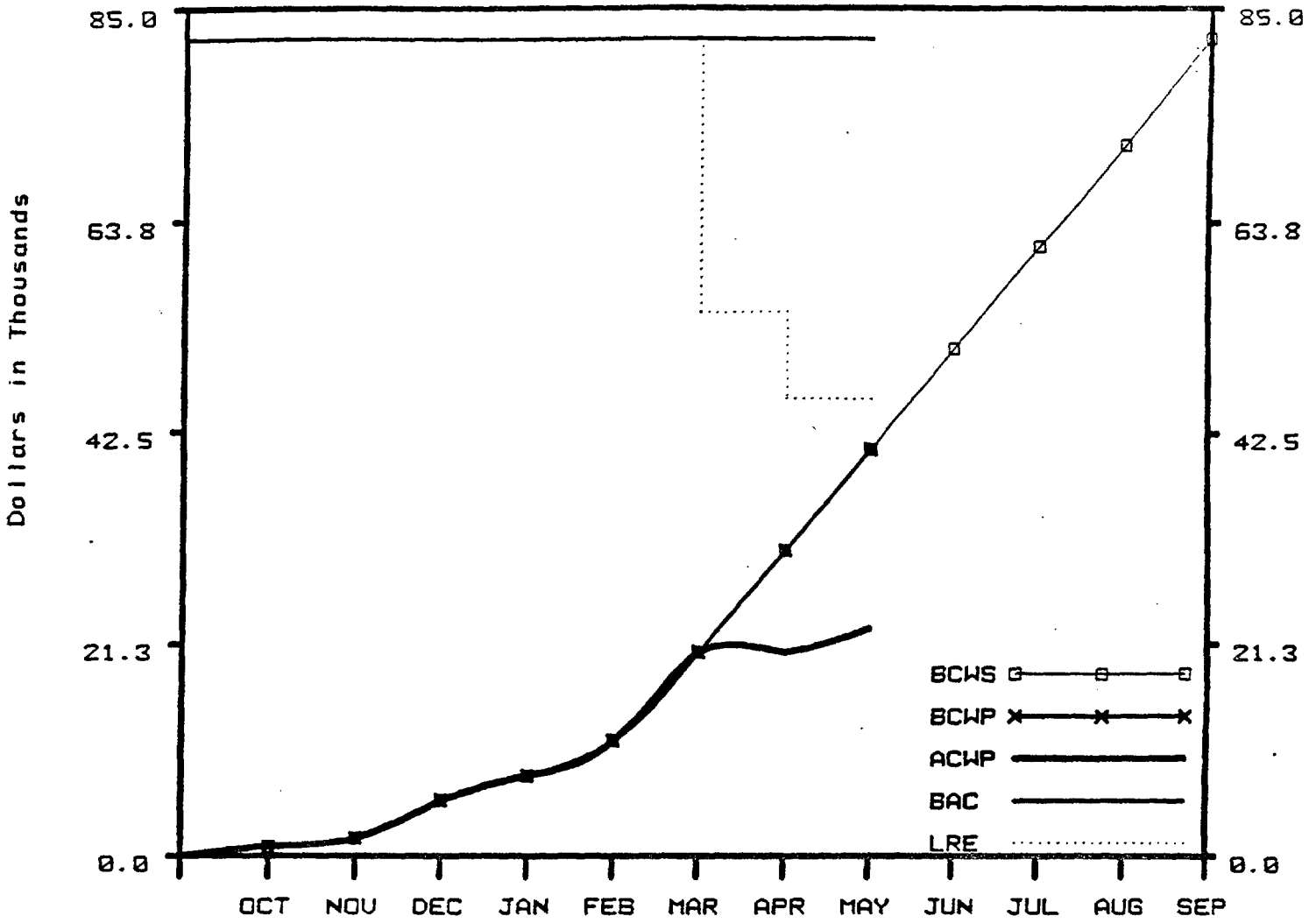
LBL - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	102.3	351.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	102.3	351.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	59.2	267.4
D. BUDGET AT COMPLETION (BAC)		761.0
E. LATEST REVISED ESTIMATE (LRE)		575.6

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-0.1	-0.02
G. COST VARIANCE (B-C)	83.7	23.83
H. AT COMPLETION VARIANCE (D-E)	185.4	24.36

Remarks:

Cost variance due to comparison of actual costs to a straight-lined budget as per instruction from DOE/HQ.

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



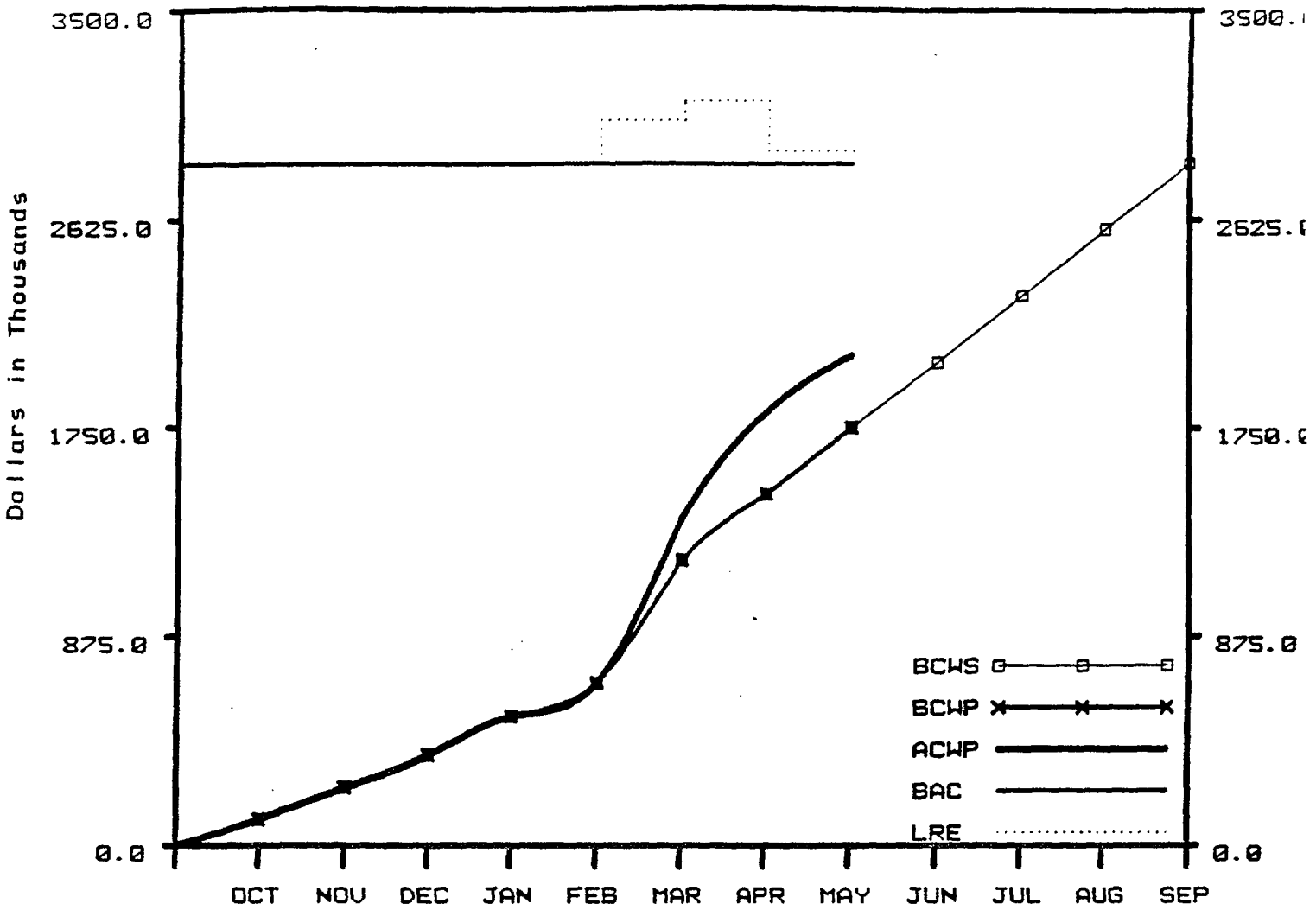
EG&G - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	10.2	40.9
B. BUDGETED COST OF WORK PERFORMED (BCWP)	10.2	40.9
C. ACTUAL COST OF WORK PERFORMED (ACWP)	2.4	22.9
D. BUDGET AT COMPLETION (BAC)		82.0
E. LATEST REVISED ESTIMATE (LRE)		45.9

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	18.0	44.02
H. AT COMPLETION VARIANCE (D-E)	36.1	44.02

Remarks:

Cost variance due to comparison of actual costs to a straight-lined budget as per instruction from DOE/HQ.

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



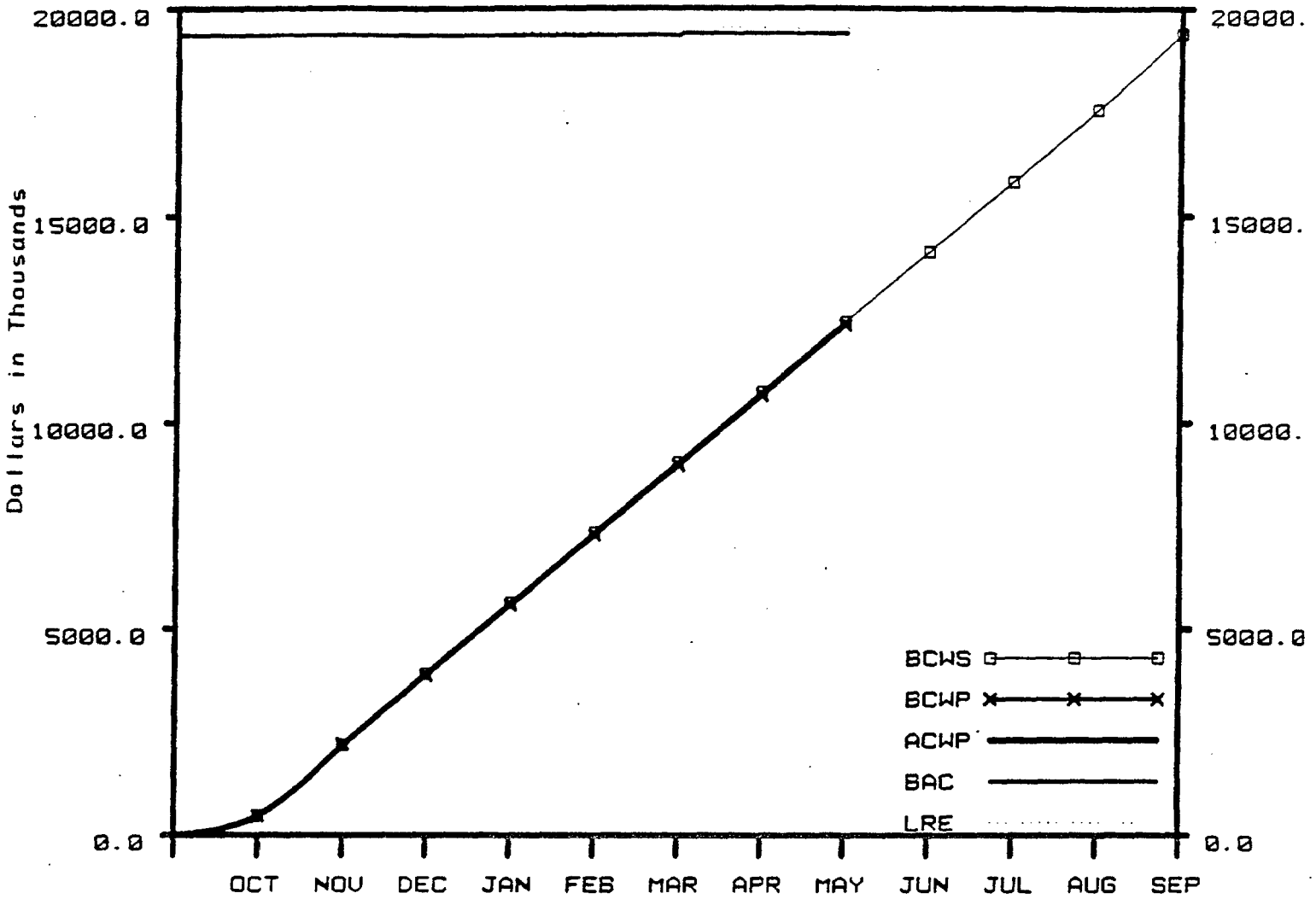
F&S - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	277.4	1749.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	277.4	1749.6
C. ACTUAL COST OF WORK PERFORMED (ACWP)	238.9	2056.1
D. BUDGET AT COMPLETION (BAC)		2860.2
E. LATEST REVISED ESTIMATE (LRE)		2913.3

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-306.5	-17.52
H. AT COMPLETION VARIANCE (D-E)	-53.1	-1.86

Remarks:

Cost variance due to comparison of actual costs to a straight-lined budget and accounting adjustments.

NNWSI PROJECT
COST PERFORMANCE GRAPH FOR MAY 1986
WBS: 1.2.G



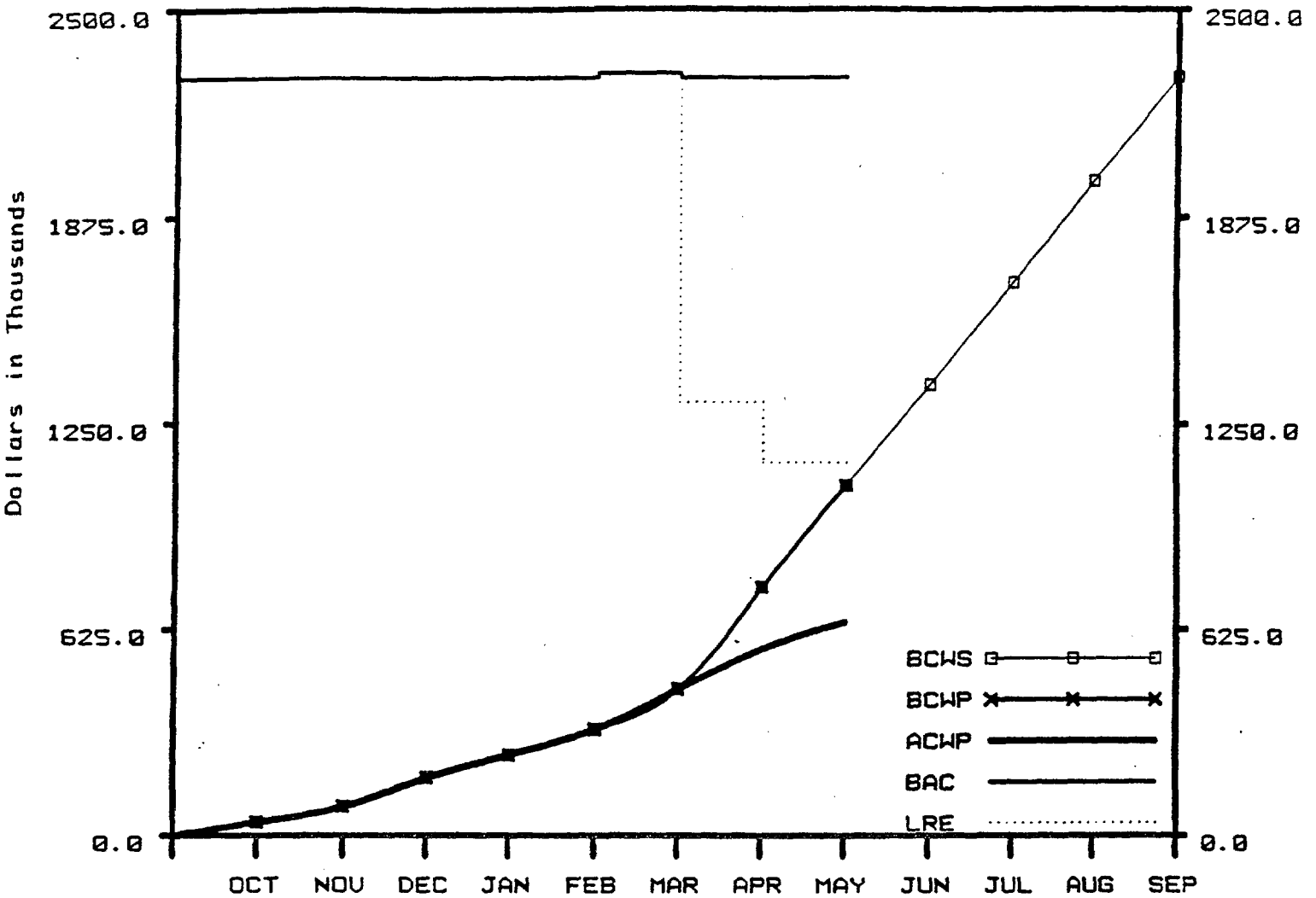
USGS - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1704.3	12450.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1704.3	12375.5
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1704.3	12423.5
D. BUDGET AT COMPLETION (BAC)		19391.9
E. LATEST REVISED ESTIMATE (LRE)		19508.5

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-74.5	-0.60
G. COST VARIANCE (B-C)	-48.0	-0.39
H. AT COMPLETION VARIANCE (D-E)	-116.6	-0.60

Remarks:

Variance within threshold. No analysis required.

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



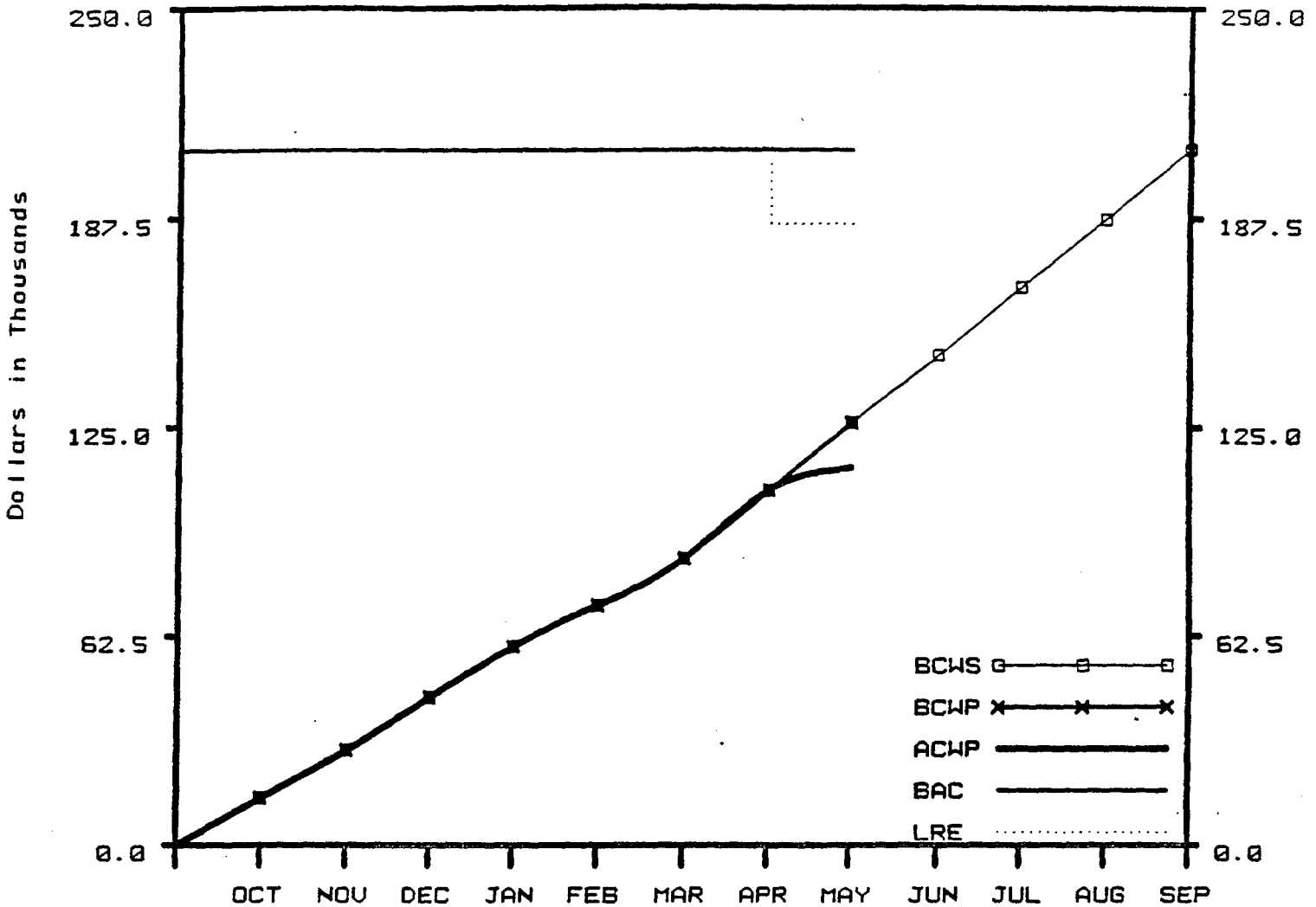
H&N - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	308.4	1062.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	308.4	1062.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	81.6	647.9
D. BUDGET AT COMPLETION (BAC)		2298.4
E. LATEST REVISED ESTIMATE (LRE)		1130.3

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	414.2	39.00
H. AT COMPLETION VARIANCE (D-E)	1168.1	50.82

Remarks:

Cost variance due to comparison of actual costs to a straight-lined budget as per instruction from DOE/HQ.

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



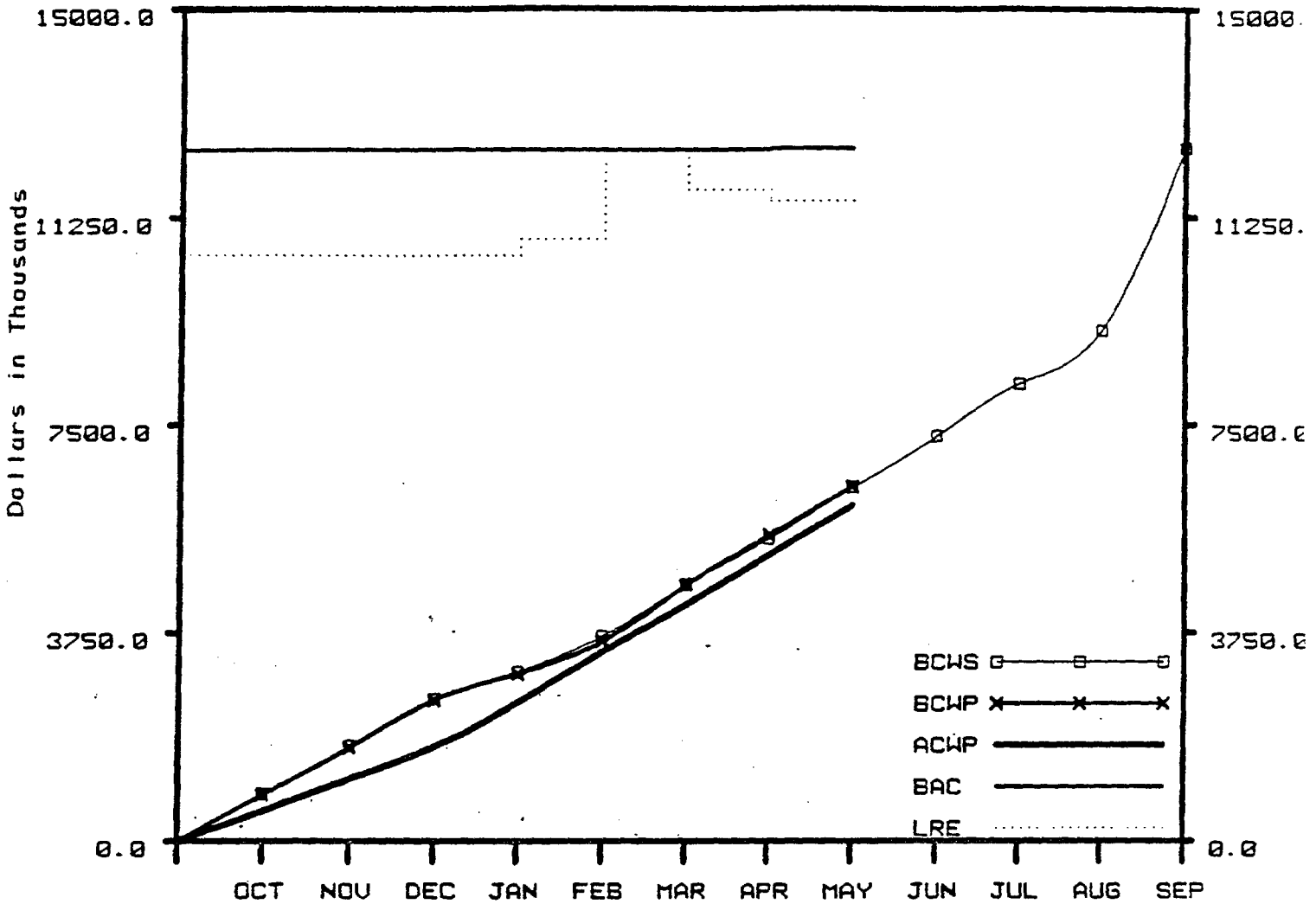
WSI - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	20.3	126.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	20.3	126.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	6.5	112.9
D. BUDGET AT COMPLETION (BAC)		208.0
E. LATEST REVISED ESTIMATE (LRE)		185.8

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	13.5	10.67
H. AT COMPLETION VARIANCE (D-E)	22.2	10.67

Remarks:

Cost variance due to comparison of actual costs to a straight-lined budget as per instruction from DOE/HQ.

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



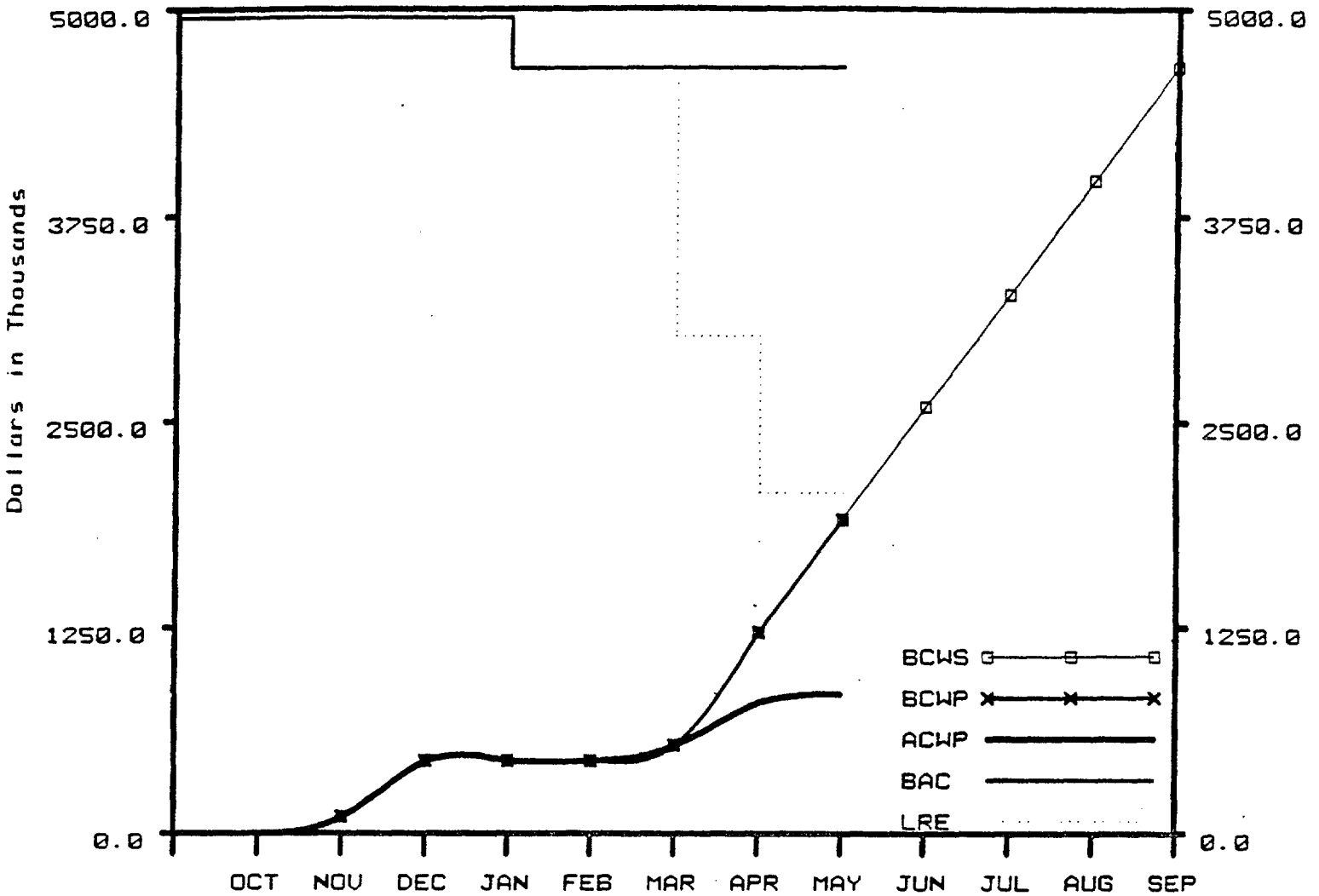
LLNL - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	931.0	6372.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	881.0	6387.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	884.8	6044.9
D. BUDGET AT COMPLETION (BAC)		12495.0
E. LATEST REVISED ESTIMATE (LRE)		11549.3

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	15.0	0.24
G. COST VARIANCE (B-C)	342.1	5.36
H. AT COMPLETION VARIANCE (D-E)	945.7	7.57

Remarks:

Variances within threshold. No analysis required.

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



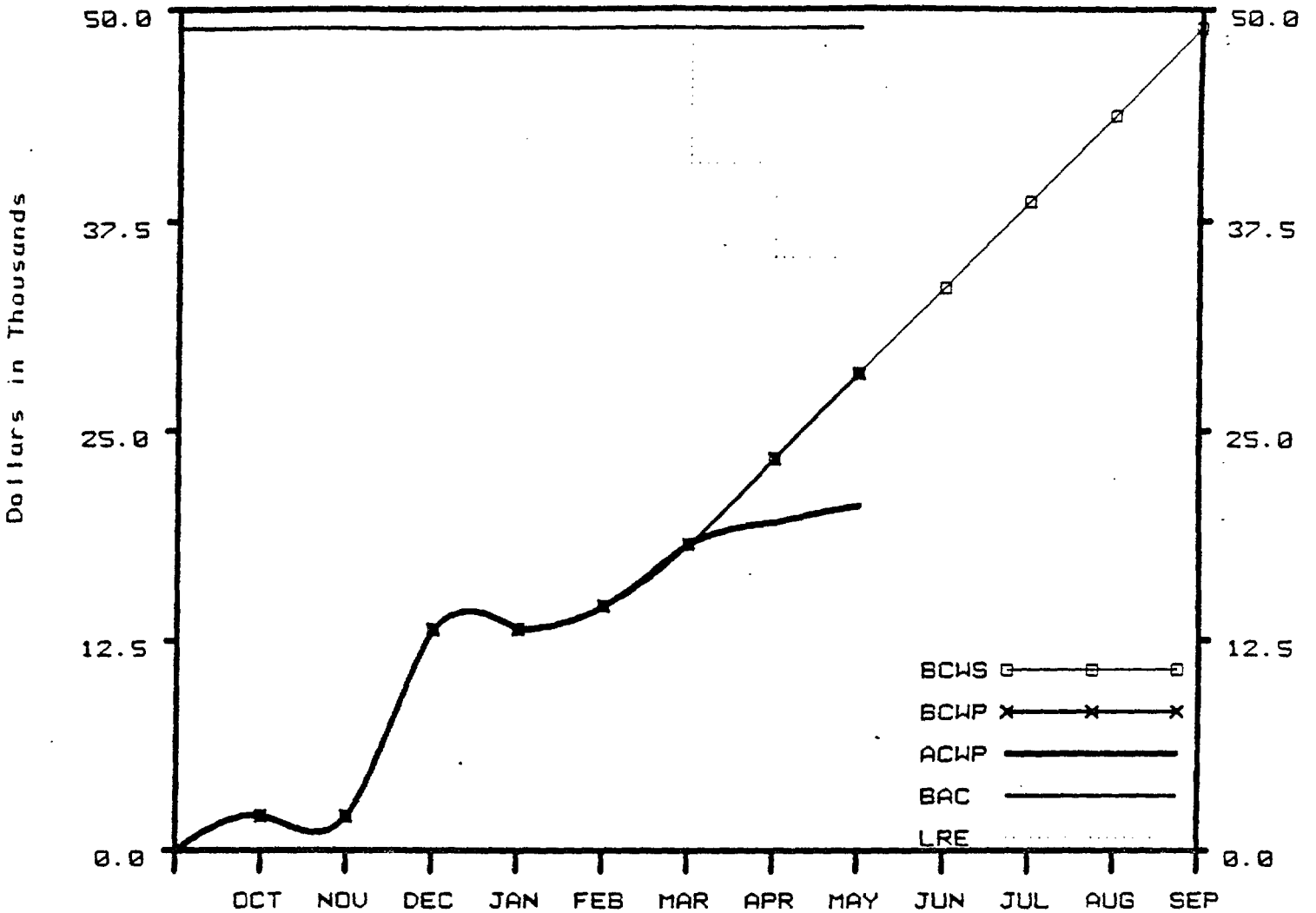
STATE - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	685.5	1907.7
B. BUDGETED COST OF WORK PERFORMED (BCWP)	685.5	1907.6
C. ACTUAL COST OF WORK PERFORMED (ACWP)	54.3	849.0
D. BUDGET AT COMPLETION (BAC)		4650.0
E. LATEST REVISED ESTIMATE (LRE)		2069.4

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	1058.7	55.50
H. AT COMPLETION VARIANCE (D-E)	2580.6	55.50

Remarks:

Cost variance due to comparison of actual costs to a straight-lined budget as per instruction from DOE/HQ.

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



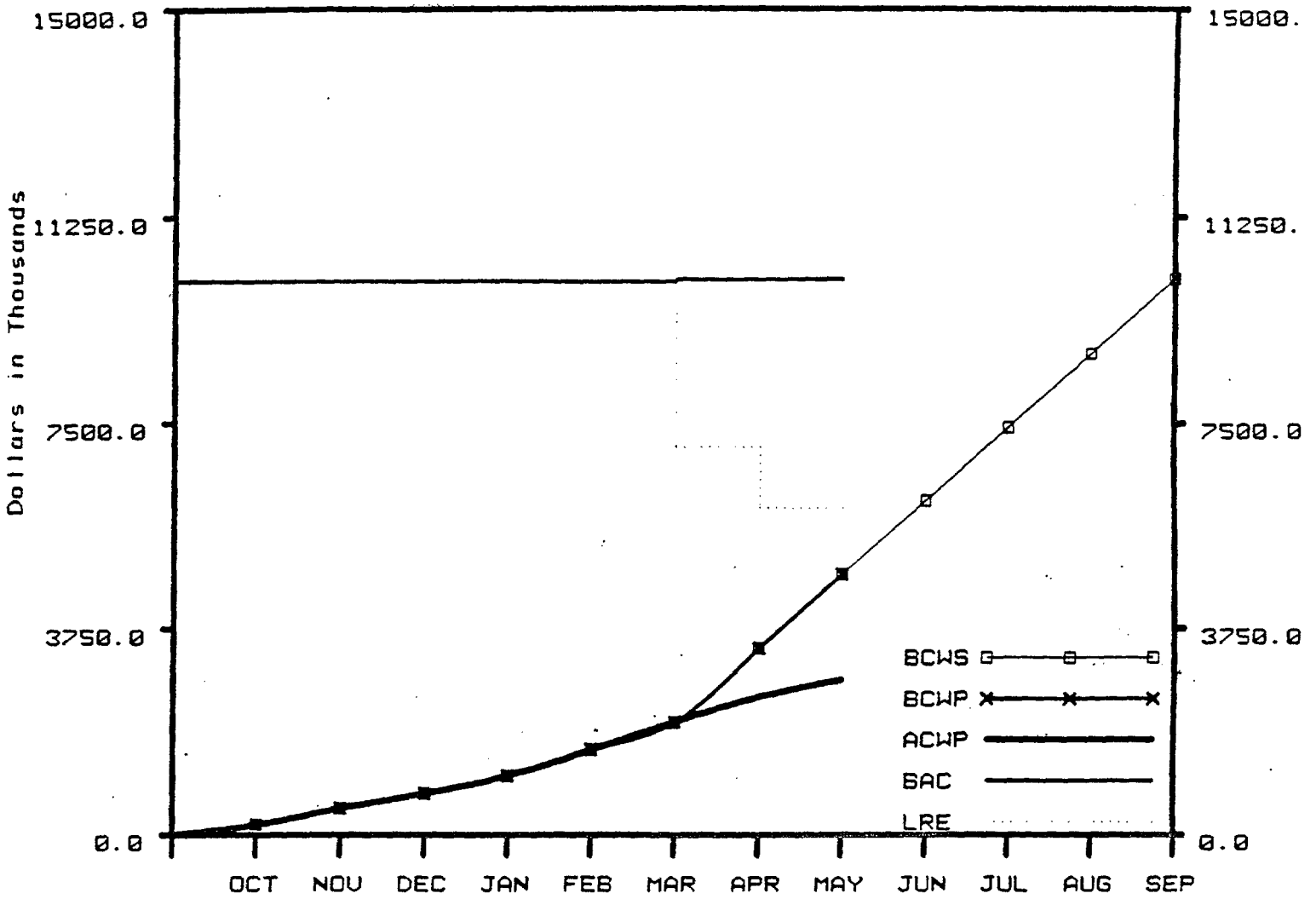
PAN AM - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	5.1	28.5
B. BUDGETED COST OF WORK PERFORMED (BCWP)	5.1	28.5
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1.0	20.6
D. BUDGET AT COMPLETION (BAC)		48.9
E. LATEST REVISED ESTIMATE (LRE)		35.3

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	7.9	27.71
H. AT COMPLETION VARIANCE (D-E)	13.6	27.71

Remarks:

Cost variance due to comparison of actual costs to a straight-lined budget as per instruction from DOE/HQ.

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



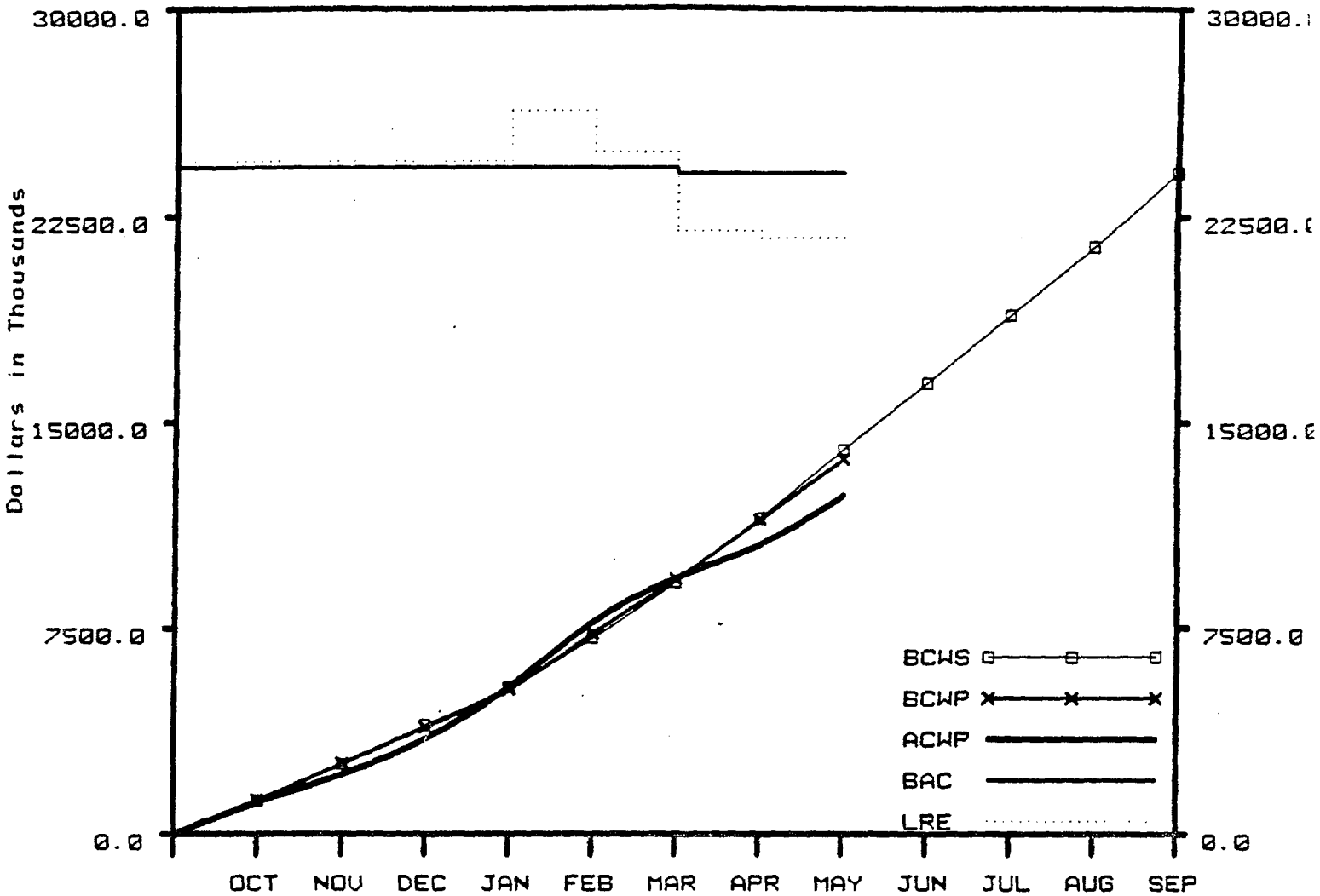
REECO - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1342.7	4741.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1342.7	4741.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	318.2	2833.2
D. BUDGET AT COMPLETION (BAC)		10113.4
E. LATEST REVISED ESTIMATE (LRE)		5943.8

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	1907.9	40.24
H. AT COMPLETION VARIANCE (D-E)	4169.6	41.23

Remarks:

Cost variance due to comparison of actual costs to a straight-lined budget as per instruction from DOE/HQ, drilling work delay at site.

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



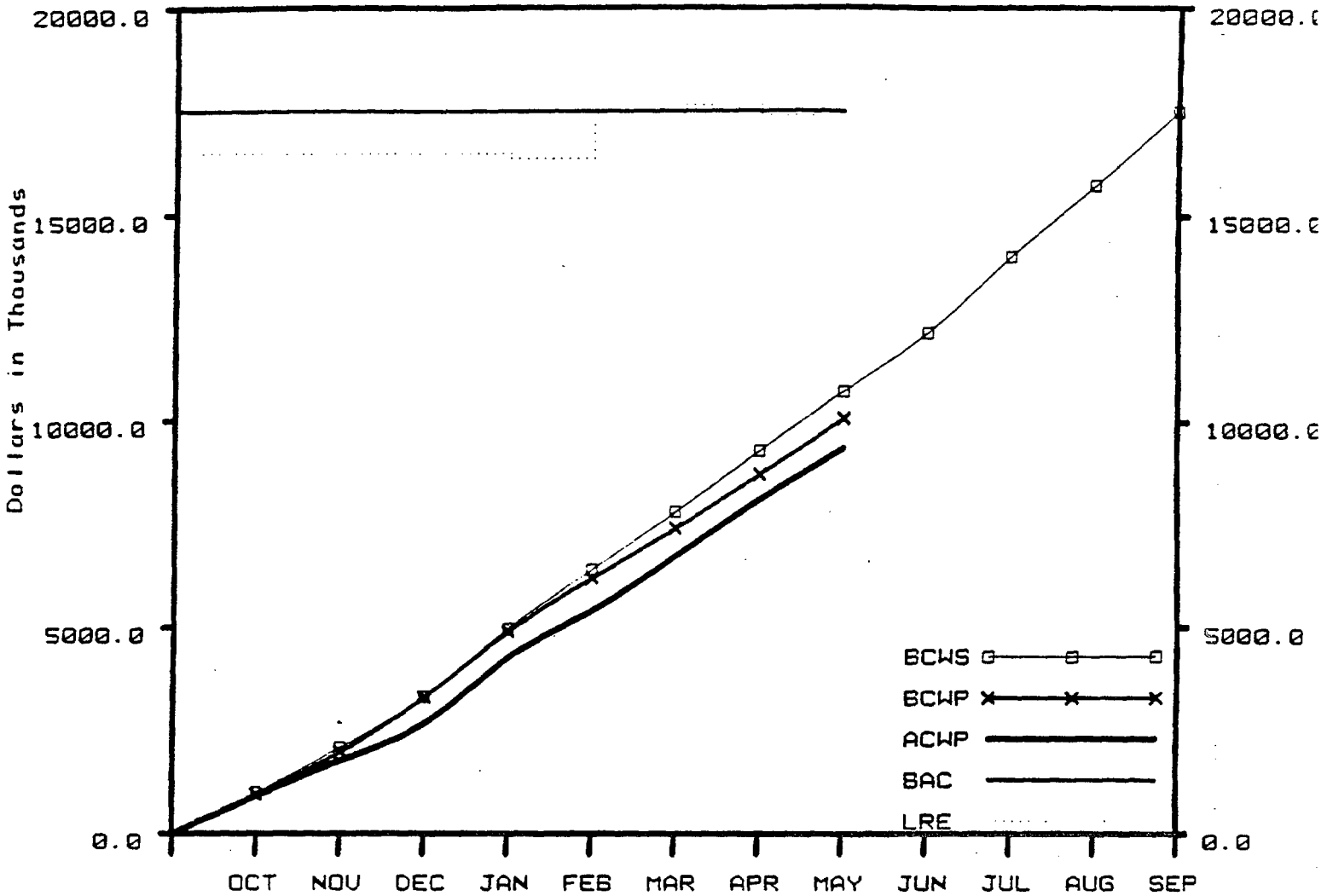
SNL - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	2483.0	13974.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	2198.8	13635.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1773.0	12307.0
D. BUDGET AT COMPLETION (BAC)		24084.0
E. LATEST REVISED ESTIMATE (LRE)		21686.1

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-339.0	-2.43
G. COST VARIANCE (B-C)	1328.0	9.74
H. AT COMPLETION VARIANCE (D-E)	2397.9	9.96

Remarks:

Variances within threshold. No analysis required.

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



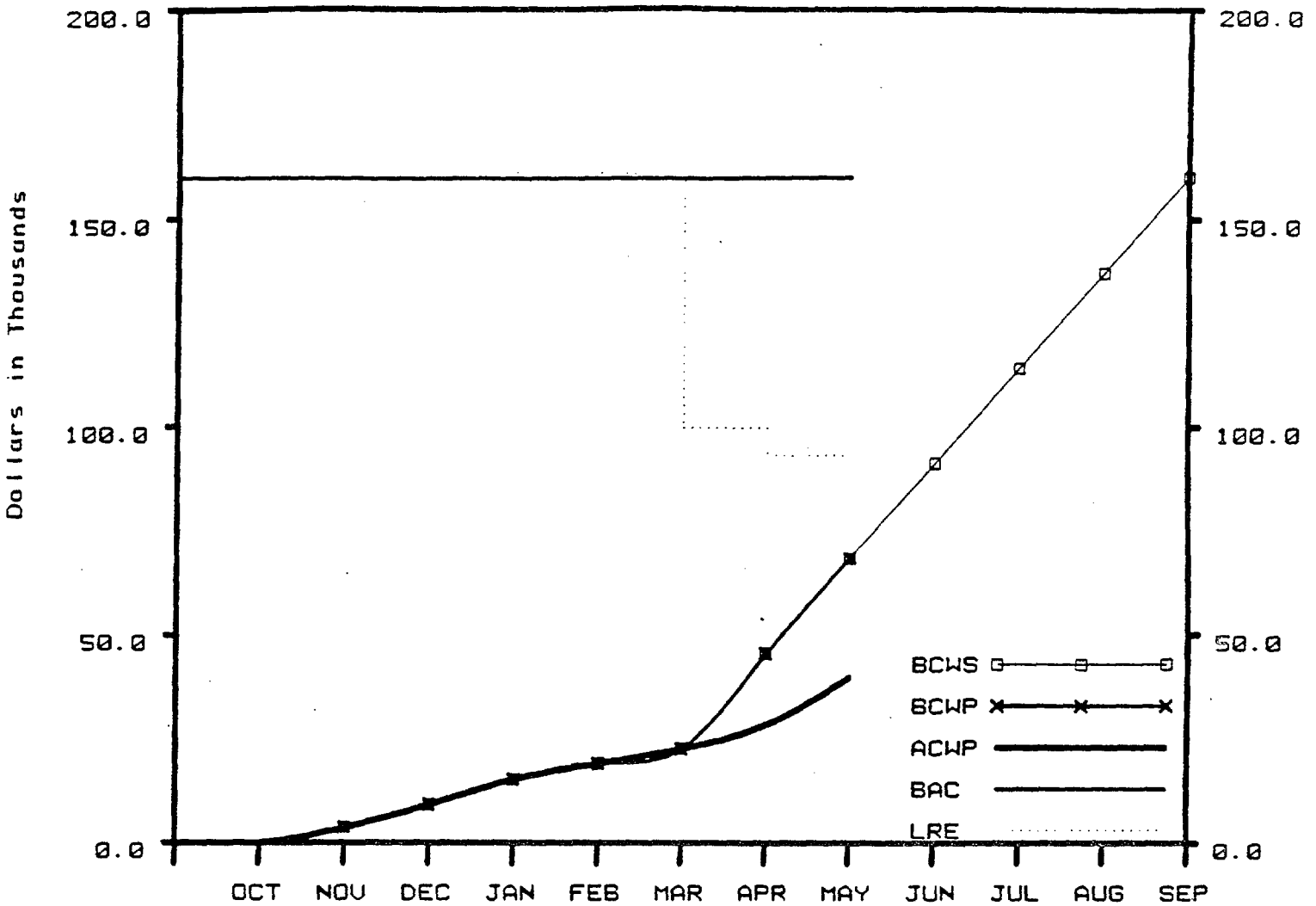
SAIC - TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1446.0	10739.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1354.7	10081.2
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1259.6	9376.9
D. BUDGET AT COMPLETION (BAC)		17523.9
E. LATEST REVISED ESTIMATE (LRE)		17415.1

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-658.2	-6.13
G. COST VARIANCE (B-C)	704.3	6.99
H. AT COMPLETION VARIANCE (D-E)	108.8	0.62

Remarks:

Variances within threshold. No analysis required.

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



DRI - TOTAL

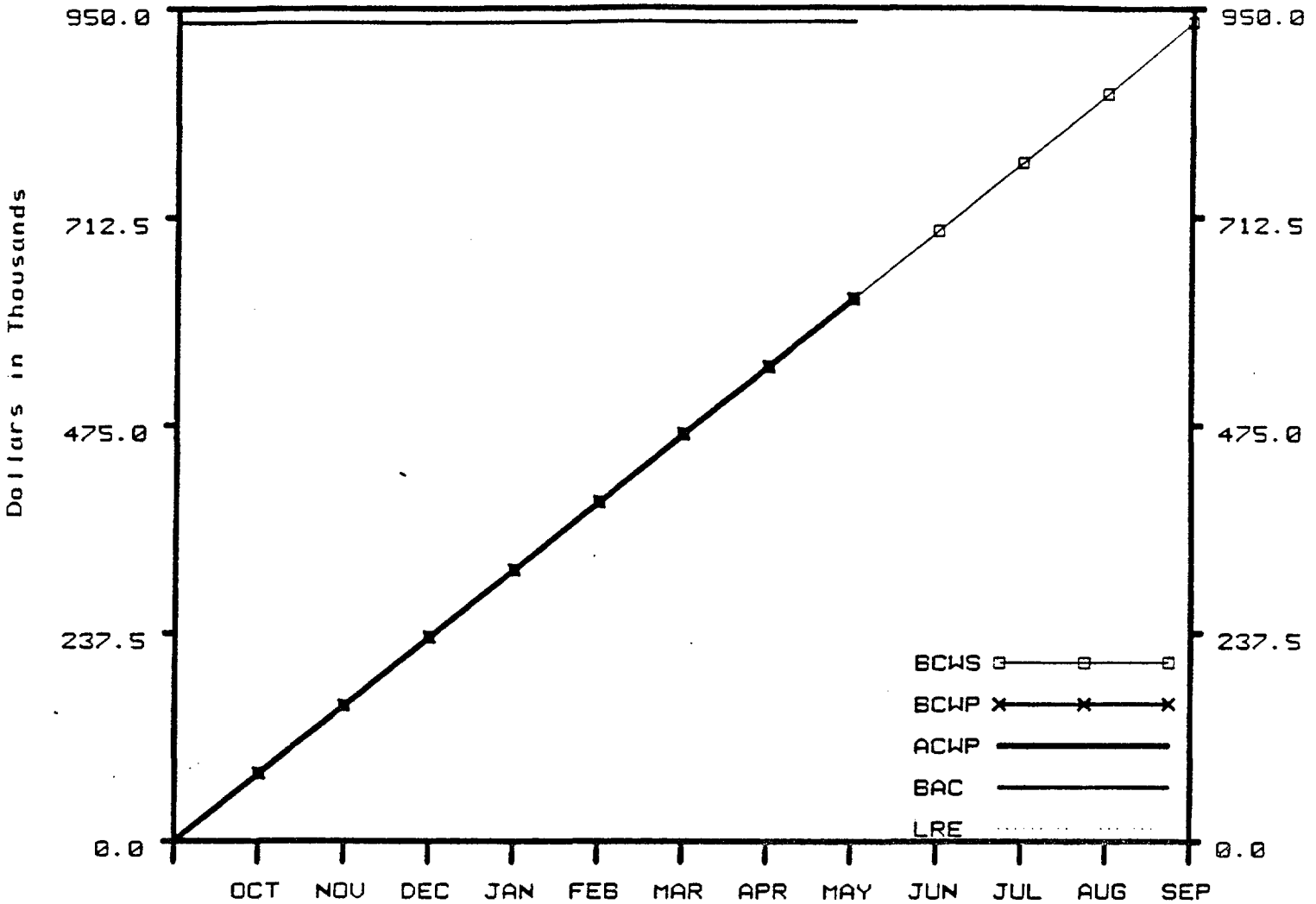
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	22.9	68.5
B. BUDGETED COST OF WORK PERFORMED (BCWP)	22.9	68.5
C. ACTUAL COST OF WORK PERFORMED (ACWP)	11.4	39.9
D. BUDGET AT COMPLETION (BAC)		160.0
E. LATEST REVISED ESTIMATE (LRE)		93.1

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	28.6	41.81
H. AT COMPLETION VARIANCE (D-E)	66.9	41.81

Remarks:

Cost variance due to comparison of actual costs to a straight-lined budget as per instruction from DOE/HQ.

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



NTS - TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	77.5	620.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	77.5	620.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	77.5	620.0
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:

Variances within threshold. No analysis required.

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
LEVEL 1 MILESTONES IN A TIME WINDOW OF 1 Oct 1985 TO 30 Sep 1986
Run Date: 2 June 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	Blanchard	1	SNL	M870	B	30 Sep 86	E
Yucca Mountain Mined Geologic Disposal System (MGDS) Requirements	1.2.1.2.1.S	Skousen	1	SNL	M120	B	30 Nov 85	E
Draft Yucca Mountain Site-Specific Mined Geologic Disposal System (MGDS) Description	1.2.1.2.1.S	Skousen	1	SNL	M261	B	30 Sep 86	E
System Engineering Management Plan (SEMP)	1.2.1.2.4.S	Skousen	1	SNL	M108	B	2 May 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 Jul 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 1 Sep 86	E
Initiate Waste Package Advanced Conceptual Design	1.2.2.4.L	Valentine	1	LLNL	M233	B	31 Jan 86 30 Jun 86	E
Report on the System Model for Waste Package Performance Analysis	1.2.2.5.L	Valentine	1	LLNL	M276	B	30 Jun 86	E

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
LEVEL 1 MILESTONES IN A TIME WINDOW OF 1 Oct 1985 TO 30 Sep 1986
Run Date: 2 June 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 Jul 86 E
Final Radiological Monitoring Plan Complete	1.2.3.6.1.T	Jankus	1	SAIC	M897	B	28 Feb 86 28 Feb 87 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 E
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 Jan 86 30 Jun 86 E
Initial Subsystem Design Requirement (SDR)	1.2.4.1.2.S	Skousen	1	SNL	N433	B	31 Jan 86 30 Jul 86 E
Repository Conceptual Design in Support of Site Characterization	1.2.4.1.3.S	Skousen	1	SNL	N432	B	31 Mar 86 15 Jul 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 E
Feasibility Analysis of Horizontal Emplacement and Retrieval - Letter Report	1.2.4.2.2.1.S	Skousen	1	SNL	M295	B	31 Oct 85 31 Jul 86 E
Horizontal Waste Emplacement Equipment Development Plan	1.2.4.2.2.1.S	Skousen	1	SNL	N406	B	30 Apr 86 31 Jul 86 E

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

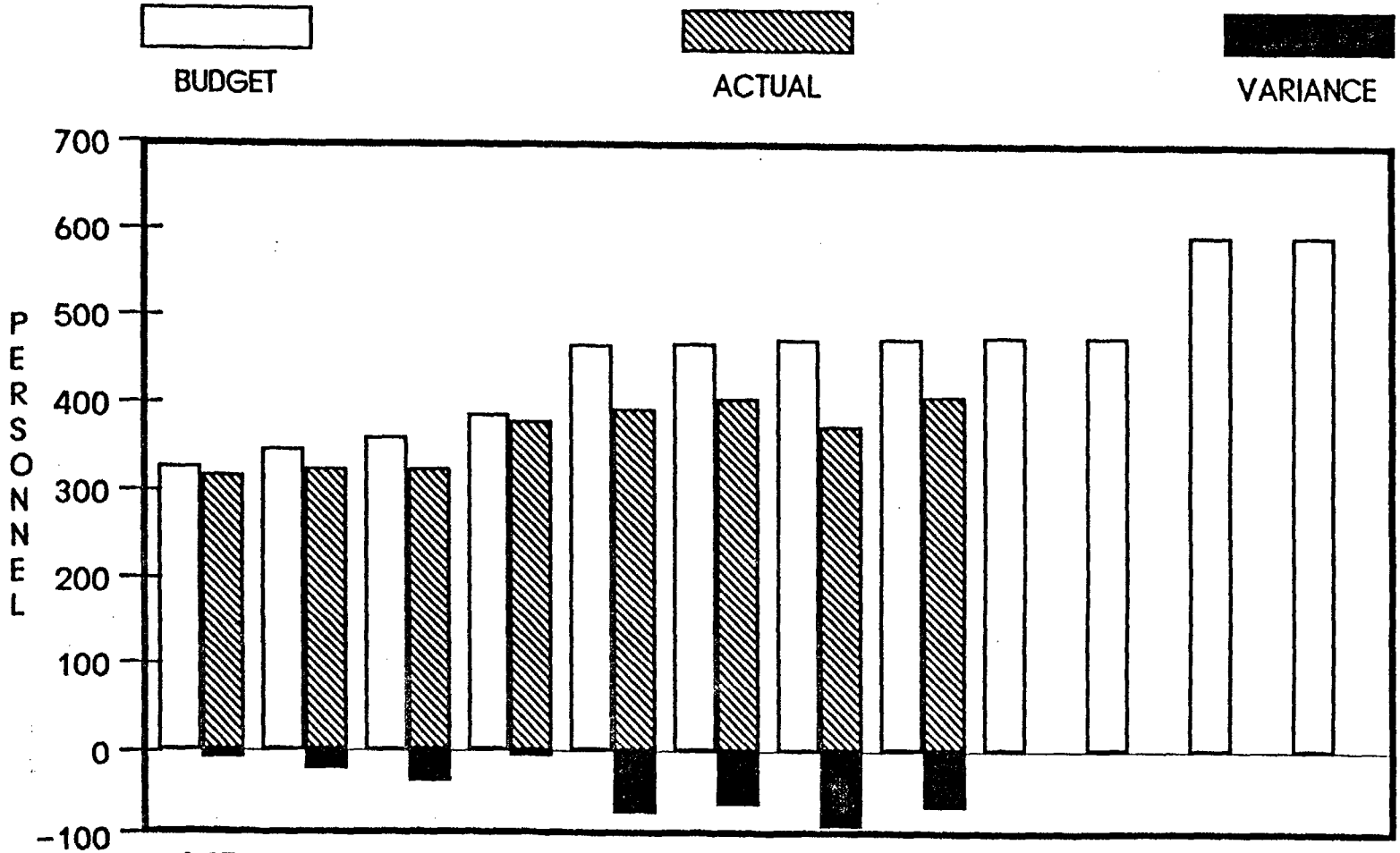
MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL/ EXPECTED
Prepare Design Requirements and Materials Recommendation Report	1.2.4.2.3.1.S	Skousen	1	SNL	P404	B	30 Jul 86 30 Sep 86 E
Preliminary Study of the Effects of Uncertain Geologic Data on Design of the Underground Facility	1.2.4.6.2.S	Skousen	1	SNL	N457	B	30 Aug 86 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 E
Camera Ready Environmental Assessment/Comment Response Appendix (EA/CRA) to DOE/HQ	1.2.5.3.1.T	Blanchard	1	SAIC	M504	B	6 Dec 85 24 Jan 86 A
ESF Shaft and Mining Subcontract Awarded	1.2.6.1.1.A	Irby	1	LANL	M022	B	21 Mar 86 5 Sep 86 E
Complete Exploratory Shaft Readiness Review	1.2.6.1.1.A	Irby	1	LANL	M243	B	24 Feb 86 21 Nov 86 E
Start First Shaft (ES-1) Construction	1.2.6.1.1.A	Irby	1	LANL	M652	B	28 Aug 86 27 Mar 87 E
Start ESF Site Preparation	1.2.6.2.A	Irby	1	LANL	M645	B	20 Mar 86 1 Dec 86 E
Final Report on the SFT-C	1.2.7.2.1.L	Zavada	1	LLNL	M708	B	28 Feb 86 30 Jun 86 E

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

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINED	HQ PLANNED HQ ACTUAL/ EXPECTED
Completion of Mining for G-Tunnel Welded Tuff Mining Evaluations	1.2.7.2.3.S	Skousen	1	SNL	M279	B	30 May 86 29 May 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 24 May 86 A

NO. MILESTONES IN THIS REPORT: 35

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				
V	-10	-23	-37	-7	-73	-63	-99	-66				

*These budgeted and actual amounts reflect input from six project participants: E&S, Los Alamos

PLANNED NNWSI PROJECT FIELD ACTIVITIES
For JULY

Participant	Activity	Location	Planned Day	Planned Time
LLNL	Geotomography testing	G-Tunnel	Days to be determined (contact J. Yow or A. Ramirez for definite days and time).	
Los Alamos	Sampling for potassium argon dating	Paiute Mesa, Black Mountain region	8-1 Bruce Crowe and Chuck Harrington and various USGS personnel	
SAIC	Meteorological monitoring	Yucca Mountain	Field site technician will maintain stations weekly, 3 days per week.	
USGS	Seismic network monitoring	NTS and vicinity	Continuous throughout the month	
	Prototype ES and drift wall mapping	G-Tunnel and Fran Ridge	10 days throughout the month (unscheduled)	
	Service stream gaging stations	NTS	1-2 days Mid-month	8-4
	Collect precipitate runnoff data	NTS	Following storm events	
	Monitor shallow neutron holes	Yucca Mountain and vicinity	Continuous throughout the month	