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U.S. DEPARTMENT OF ENERGY

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# NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT



## MONTHLY REPORT

APRIL 1987

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UNITED STATES DEPARTMENT OF ENERGY  
NEVADA OPERATIONS OFFICE

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT

MONTHLY REPORT

APRIL 1987

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

UNITED STATES DEPARTMENT OF ENERGY  
NEVADA OPERATIONS OFFICE

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## ABSTRACT

### 1.2.1 SYSTEMS

Sections of the Draft Systems Description (SD) document were distributed to Systems Engineering Integration Group (SEIG) members for review. The Sandia National Laboratories (SNL) report entitled "A Cost Estimate of the Yucca Mountain Repository Based on the Site Characterization Plan Conceptual Design" was transmitted to the Waste Management Project Office (WMPO). The Systems Engineering Management Plan (SEMP) was forwarded to WMPO on March 31, 1987. A large-scale base map showing the township/range land grid for the entire Yucca Mountain region was prepared for use in environmental permit activities. Preliminary comparison of the Point Estimate Method (PEM) with the Latin Hypercube method for generating the moments of ground-water travel times has been completed. Two SNL reports, "Proposed Preliminary Definition of the Disturbed-Zone Boundary Appropriate for a Repository at Yucca Mountain" and "Proposed Definition for the Engineered-Barrier System Appropriate for Yucca Mountain" were submitted to WMPO for review. Open-borehole calculations that are the counterpart to the closed-borehole calculations were completed. SNL Milestones M735, incorporate WMPO and TPO comments into letter report on studies of coupled processes and resubmit to WMPO; "A Cost Estimate of the Yucca Mountain Repository Based on the Site Characterization Plan Conceptual Design"; and M107, NNWSI Project position paper describing engineered-barrier system and disturbed-zone boundaries, were completed.

### 1.2.2 WASTE PACKAGE

The vitric tuff alteration experiment was successfully completed. The Series 2, Cycle 5 bare fuel tests were terminated by Lawrence Livermore National Laboratory (LLNL). Visual and microscopic examinations of corrosion specimens were completed by LLNL personnel. Work on Site Characterization Plan (SCP) preparation has delayed progress on other activities in this Work Breakdown (WBS) task.

### 1.2.3 SITE INVESTIGATIONS

The stop-work order issued to the U.S. Geological Survey (USGS) in March 1986 remained in effect through April and almost all site characterization technical activities continued to be suspended. Work on logic diagrams for the SCP continued. USGS data was transmitted to the NNWSI Project records-repository. The USGS Scientific Investigation Planning (SIP) document entitled "Hydraulic and Conservative-tracer Tests in Fractured Rock" was transmitted to WMPO for approval. The USGS manuscript "Radiocarbon Dates V," received WMPO approval and was transmitted to the USGS Regional Hydrologist for approval for publication in the American Journal of Science. A Los Alamos National Laboratory (Los Alamos) paper titled "Infiltration at Yucca

Mountain, Nevada, Traced by  $^{36}\text{Cl}$ " was presented at the Fourth International Symposium on Accelerator Mass Spectrometry. A draft of the study plan for the speciation determination subtask was completed. Cores received by Los Alamos from the core library in 1985 are being prepared for batch sorption measurements. The Core Transfer Plan for inventorying and transferring core to the Sample Management Facility (SMF) was completed in draft form. The Science Applications International Corporation (SAIC) report entitled "Population Densities Along Nevada Transportation Routes" was approved by WMPO for publication. Los Alamos Milestone R202, "Preclosure Volcanic Effects: Evaluations for Potential Repository at Yucca Mountain, Nevada," was approved by WMPO. During April Los Alamos milestones R357, "The Kinetics of Silica-Phase Transitions"; R347, update report on fracture flow in saturated tuff; and R346, "FEHMS: A Finite Element Heat-Mass-Stress Code for Coupled Geological Process" were sent to WMPO for review.

#### 1.2.4 REPOSITORY INVESTIGATIONS

The comment resolution draft of the SCP-Conceptual Design Report (CDR) was sent to the Office of Geological Repositories (OGR) and WMPO for review and approval. SNL personnel completed conceptual designs for several components of the vertical and horizontal emplacement/retrieval equipment systems. Repository drift and emplacement borehole layouts have been completed for short horizontal boreholes. SNL received the final draft of the report on fan reversibility prepared by Mine Ventilation Services. Work in this WBS task focused on revising the SCP and SCP-CDR. SNL Milestones N432, repository conceptual design in support of site characterization; P198, incorporate comments from WMPO and OGR into SCP-CDR; P210, prepare design requirements and materials recommendation report; and P218, incorporate WMPO comments into preliminary study of the effects of uncertain geologic data on design to WMPO, have been completed.

#### 1.2.5 REGULATORY AND INSTITUTIONAL INVESTIGATIONS

SAIC is coordinating the Project's review of the Nuclear Regulatory Commission's (NRC) proposed rulemaking that will define high-level wastes. Reference verification is continuing for the SCP. The list of study plans that will supplement the SCP is being revised and will be distributed for review in May. Major efforts were focussed on resolving review comments on all sections of the SCP. With most Environmental Impact Statement (EIS) efforts rescheduled to begin in 1989, the planning effort to develop environmental field study plans will continue. Department of Energy/Headquarters (DOE/HQ) comments on Draft II of the Environmental Regulatory Compliance Plan (ERCP) were received and are being incorporated. The Revised Draft Environmental Monitoring and Mitigation Plan (EMMP) was sent to WMPO and DOE/HQ for review.

#### 1.2.6 EXPLORATORY SHAFT INVESTIGATIONS

A briefing was given to the NRC and the State of Nevada regarding the proposed relocation of the exploratory shafts and changes in the Exploratory Shaft Facility (ESF) configuration. Review comments from the DOE Safety and

Health Division (SHD) were incorporated into the ESF Safety and Health Program Plan. Drilling requirements for prototype testing were identified. A Reynolds Electrical & Engineering Company (REEC) Occupational Safety Professional reviewed support documentation for the Allis Chalmers Double Drum Hoist that has been proposed for use at the exploratory shafts. A draft copy of the quality assurance level assignments (QALAS) for the Integrated Data System (IDS) was completed. Review comments on the Exploratory Shaft Test Plan (ESTP) were distributed to principal investigators (PIs) for resolution.

#### 1.2.7 TEST FACILITIES

The remaining LLNL Spent Fuel Test-Climax (SFT-C) reports are being prepared for printing.

#### 1.2.8 LAND ACQUISITION

NNWSI Project representatives attended a meeting on "lessons learned" from the Waste Isolation Pilot Project (WIPP) in Albuquerque, New Mexico, and they toured the proposed low-level storage facility.

#### 1.2.9 PROJECT MANAGEMENT

Computer indexing of all WMPO records was completed and a total of 5,193 documents were indexed in preparation for "discovery." Comments from WMPO and Project participants are being incorporated into the Project Management Plan. Approximately 5,000 Los Alamos documents were transferred to the Central Records Facility. The Correspondence Control Facility (CCF) began full operation at SAIC. About 21,000 documents have been indexed in the Information Management System (IMS) Automated Records System (ARS). Of the five audits conducted in FY 86, four remain open and of the 15 audits conducted in FY 85 four remain open. To date, 18 surveillances have been conducted in FY 87 and 58 items or activities monitored and nine standard deficiencies reported. SNL Milestone T138, management assessment of quality assurance, was completed.

APRIL 1987

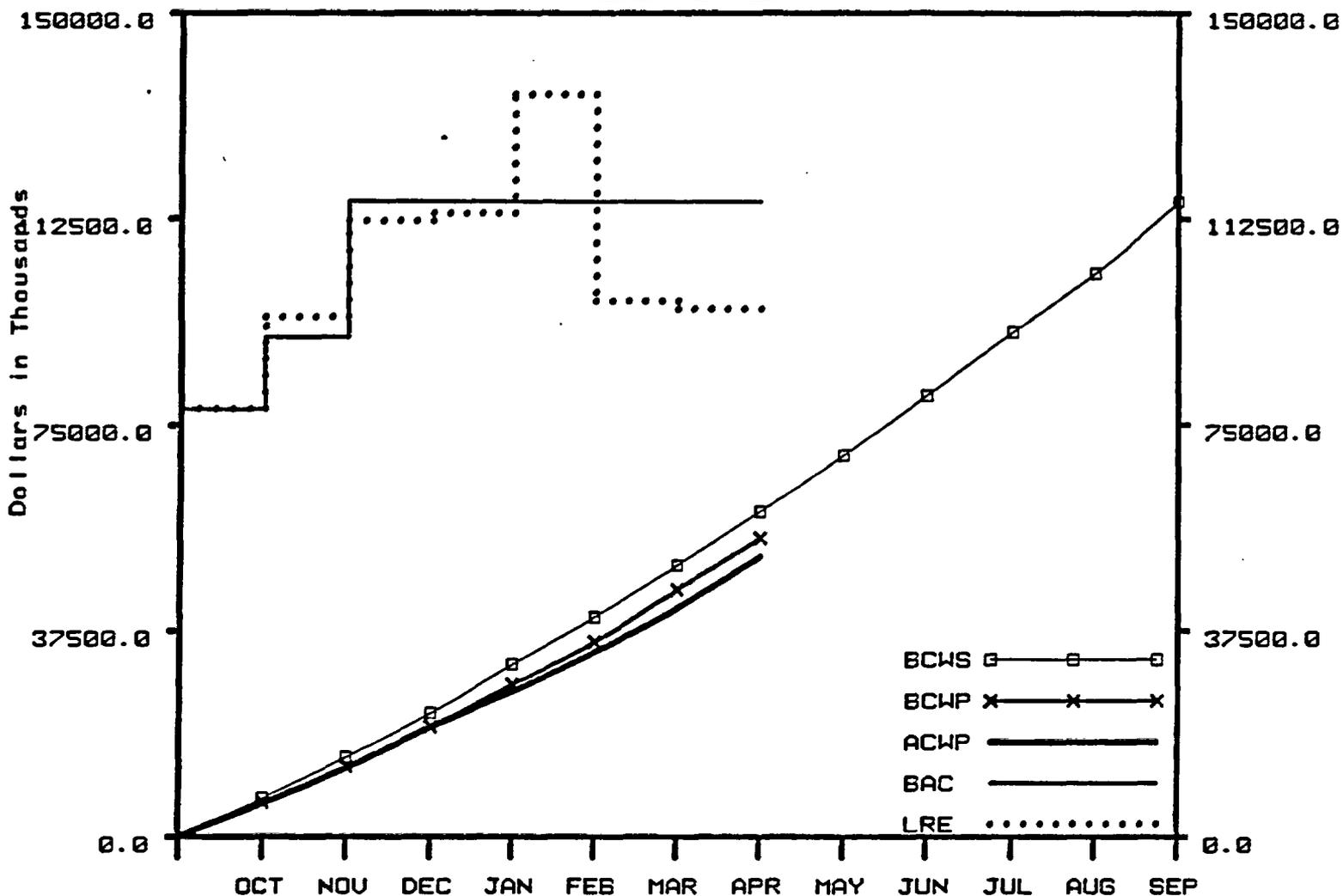
Funding Overview

The month-end estimated costs were \$9,441,231 against a plan of \$9,878,160 resulting in a cost underrun of \$436,929.

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

	<u>Plan</u> <u>(\$000)</u>	<u>Cost</u> <u>(\$000)</u>	<u>Variance</u>	<u>%</u> <u>Variance</u>
WBS 1.2.1 Systems	\$ 3,714	\$ 3,490	\$ 224	6
WBS 1.2.2 Waste Package	4,682	4,124	558	12
WBS 1.2.3 Site	16,497	11,913	4,584	28
WBS 1.2.4 Repository Investigations	5,027	5,336	(309)	(6)
WBS 1.2.5 Regulatory and Institutional Investigations	4,403	4,727	(324)	(7)
WBS 1.2.6 Exploratory Shaft Investigations	8,283	6,193	2,090	25
WBS 1.2.7 Test Facilities	322	232	90	28
WBS 1.2.8 Land Acquisition	70	53	17	24
WBS 1.2.9 Project Management	13,254	11,872	1,382	10
WBS 1.2.10 Financial and Technical Assistance	3,010	3,068	(58)	(2)
WBS 1.2 NNWSI Project	<u>\$ 59,262</u>	<u>\$ 51,008</u>	<u>\$ 8,254</u>	<u>14</u>

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2



**NNWSI - TOTAL**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	9878.2	59261.5
B. BUDGETED COST OF WORK PERFORMED (BCWP)	9374.4	54292.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	9441.2	51007.8
D. BUDGET AT COMPLETION (BAC)		115573.0
E. LATEST REVISED ESTIMATE (LRE)		96010.9

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-4969.6	-8.39
G. COST VARIANCE (B-C)	3284.1	6.05
H. AT COMPLETION VARIANCE (D-E)	19562.1	16.93

Remarks:

NNWSI PROJECT BUDGET BASELINE

APRIL 1987

<u>Contractors</u>	(\$000) Original FY 87 Funding	(\$000) Current Baselined Budget	(\$000) Change
SNL	\$ 16,148	\$ 23,289	\$ 7,141
LLNL	9,311	13,654	4,343
Los Alamos	10,003	13,128	3,125
USGS	13,333	20,592	7,259
SAIC	12,138	21,067	8,929
REECo	3,889	6,584	2,695
H&N	2,182	3,371	1,189
F&S	5,472	5,344	(128)
WSI	230	230	0
Pan Am	5	72	67
State Grant	3,765	5,162	1,397
DRI	100	125	25
EG&G	60	80	20
LBL	267	450	183
OSTI/TC	0	5	5
HEDL	0	117	117
CSC	0	80	80
NTS Allocation	980	2,223	1,243
Undistributed Budget	1,398	1,893	495
	<hr/>	<hr/>	<hr/>
SUBTOTAL	\$ 79,281	\$ 117,466	\$ 38,185
CAPITAL EQUIPMENT	\$ 5,081	\$ 11,045	\$ (5,964)
TOTAL	\$ 84,362	\$ 128,511	\$ 44,149

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# 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

##### WBS 1.2.1.2.1 System Description

Sandia National Laboratories (SNL) staff members received a reply to the Nevada Nuclear Waste Storage Investigations (NNWSI) Project's proposal about the structure and content of certain Advanced Conceptual Design (ACD) prerequisites from the Office of Geologic Repositories (OGR). All but one of the Project's requested waivers from the format of the Generic Requirements document were rejected by OGR. Additionally, OGR refused the Project's proposal to add nonlicensing, nonsite selection system requirements in a systematic way during ACD, an approach which would have led to a System Requirements document (SR) for License Application Design that is a completed, allocated set of system requirements. Addition of these other requirements will require input from Science Applications International Corporation (SAIC).

Draft sections of the Systems Description (SD) document were distributed to Systems Engineering Integration Group (SEIG) members for comment.

##### WBS 1.2.1.2.3 Cost Schedule

The SNL report entitled "A Cost Estimate of the Yucca Mountain Repository Based on the Site Characterization Plan Conceptual Design" (SAND85-1964), has been completed and transmitted to the Waste Management Project Office (WMPO) for policy review, satisfying Milestone R058.

##### WBS 1.2.1.2.4 Systems Engineering Integration

A draft charter for the SEIG was presented at the April 14-16, 1987, SEIG meeting in Las Vegas. Based on discussions at this meeting, a revised draft of the SEIG Charter, AP 3.3Q, and the Systems Engineering Management Plan (SEMP) were completed for delivery to WMPO management on April 30, 1987. Other major topics of discussion included: (1) the roles of SEIG and SAIC/licensing in developing Project definitions for regulatory terms, (2) plans for the implementation of the Reference Information Base and its status within SNL, and (3) management of Project interfaces, working groups, and study plans.

The SEIG reviewed all comments received on the SEMP. The SEMP was officially forwarded to WMPO on March 31, 1987, fulfilling Milestone M293.

The SEMP is currently being reviewed by WMPO prior to being sent to Department of Energy/Headquarters (DOE/HQ).

A revised version of the SEMP incorporating comments by the OGR and WMPO staffs and the Technical Project Officers (TPOs) was submitted by SNL for approval by WMPO. Disagreement persists within WMPO regarding the interface between systems engineering and configuration management. This disagreement is encumbering the WMPO approval of the SEMP and is being negotiated by the affected WMPO Branch Chiefs, SAIC, and SNL.

#### WBS 1.2.1.2.5 Configuration Management and Change Control

The Configuration Management Branch (CMB) is attempting to resolve and incorporate the Independent Review Committee (IRC) comments into the NNWSI Project Draft Configuration Management Plan (CMP). The release of this revised document is scheduled for May 1987.

The SAIC CMB added 14 milestones, updated 187 milestones, and completed 25 milestones during April.

The SAIC CMB submitted 52 Cost/Schedule Change Requests (C/SCRs) to the Change Control Board (CCB) where they approved 38 C/SCRs, and deferred 14 C/SCRs.

#### WBS 1.2.1.3.1 Site and Engineering Properties Data Base

Personnel from SNL received candidate information for the Site and Engineering Properties Data Base (SEPDB) with TPO authorization from SAIC (meteorologic data) and the U.S. Geological Survey (USGS) (drillhole data for USW H-1). This information will not be entered until the parameters to be included in the SEPDB are resolved.

#### WBS 1.2.1.3.2 Computer Graphics

SNL staff prepared a large-scale base map showing the township/range land grid for the entire Yucca Mountain region for SAIC environmental permit activities.

#### WBS 1.2.1.3.3 Reference Information Base

Staff members at SNL held a meeting with data base staff for the Salt Repository Project at Battelle Columbus Laboratories on April 3, 1987, to discuss the feasibility of the DM software package for providing on-line computer access to the Reference Information Base (RIB). A presentation was given on April 16 at the SEIG meeting at SAIC in Las Vegas on current RIB status, future plans for managing it, and the interface with the SEIG for review and approval.

#### WBS 1.2.1.3.4 Data Base Computer Support

The Technical Data Base requirements analysis is under way at SNL and substantial progress has been made in the areas of parameter and data specifications for the SEPDB, Milestone R086. SCPPARM data base, which is a comprehensive compilation of parameters identified in Chapter 8 of the Site

Characterization Plan (SCP), is being used in this effort. Implementation plans are now being specified, with emphasis on requirements for interfaces (both system and user) and detailed data organization.

SCPPARM parameter specifications related to SCP Issues 1.1, 1.6, 1.11, and 4.4 have been updated. All SCPPARM parameters are being characterized by a common data category, which will ultimately allow all data requirements supporting design and performance-assessment activities to be correlated to site characterization data.

#### WBS 1.2.1.4.1 Flow and Radionuclide Transport

The report entitled "Hydrologic Modeling of Vertical and Lateral Movement of Partially Saturated Fluid Flow Near a Fault Zone at Yucca Mountain" (SAND87-7070), by Lawrence Berkeley Laboratory (LBL), has been returned to the authors with comments.

Preliminary comparison of the Point Estimate Method (PEM) with the Latin Hypercube method for generating the moments of ground-water travel time has been completed by SNL staff and reported in a technical memo entitled "Preliminary Assessment of the Point Estimate Method for the Moments of Ground-water Travel Time (GWTT)."

#### WBS 1.2.1.4.2 Radionuclide Source Term

Two SNL reports, "Proposed Preliminary Definition of the Disturbed-Zone Boundary Appropriate for a Repository at Yucca Mountain" (SAND86-1955), and "Proposed Definition for the Engineered-Barrier System Appropriate for Yucca Mountain" (SAND86-1954), were submitted to WMPO for review and approval. These reports satisfy Milestone M107.

A formal SNL problem definition memo (PDM) was distributed for the COVE3 heat-pipe problem. Acceptance of task memos (ATMs) were received from the participants, and the PDM was reviewed based upon their comments. An authorization to proceed memo (ATP) and the revised PDM were transmitted to participants.

LBL completed open-borehole calculations that are the counterpart to the closed-borehole calculations detailed in SAND86-7000 ("Effective Continuum Approximations for Modeling Fluid and Heat Flow in Fractured Porous Tuff"), which is presently under review. LBL performed additional calculations to examine space- and time-discretization errors and to study system behavior when fractures are assumed to have parallel-plate characteristics.

#### WBS 1.2.1.4.4 Radionuclide Releases from Total System

SNL NNWSI Project staff participated in the GEOVAL-87 Symposium on verification and validation of geosphere performance assessment models on April 7-10, 1987.

DOE/EQ papers presented at the GEOVAL-87 Symposium suggested a formalized, multi-stage, peer-review process as the focal point for validation activities. If a staged peer-review process is adopted in the U.S. program, it will significantly influence the scheduling of performance assessment

activities done in preparation for license application. Current schedules do not appear to allow for this.

SNL NNWSI Project staff presented the paper "Modeling Severe Discontinuities in the Unsaturated Zone" at the DOE workshop "Hydrologic Behavior of Rock Discontinuities" at Berkeley, CA, on April 22-23.

#### PLANNED WORK

SNL personnel will continue cost estimating plans for the ACD with the understanding that additional guidance is forthcoming.

Drillhole information in the old TUFF data base from Holmes & Narver (H&N) has been compiled by SNL staff members and will be sent to H&N with a request for TPO authorization prior to transfer of this data to the SEPDB.

Rewriting two sections of the SCP will supercede most other Interactive Graphics Information System (IGIS) activities at SNL.

Further major inputs for the SCPPARM data base are expected from SCP authors covering Issues 1.4, 1.5, 1.12, 2.1, 2.2, and 2.3. These inputs are expected to be available on May 1, 1987, when the SCP draft information is due. These inputs will be prepared for project and DOE/HQ review by the end of May. Also, all parameter specifications should be ready for correlation with characterization issues by the end of May. The objective is to provide a set of consistently formatted parameter tables for the SCP, as appropriate for different issues. These tables are major input for the Technical Data Base requirements analysis.

A library of FORTRAN subroutines and functions will be developed by SNL staff on the IGIS VAX-11/750 for hydrogeologic models that use IGIS graphical data. This work is being done to support WBS 1.2.1.4.1, Flow and Radionuclide Transport.

SNL staff members will continue comparison of point-estimate techniques with other methods for generating the moments of GWTT.

A symposium on uncertainties in unsaturated flow is scheduled for June 15-16, 1987, at SNL.

Some of the SNL staff assigned to this WBS element will be involved with the production of the SCP. This work includes revision of the Chapter 8 sections associated with Issue 1.1 and this WBS Element, and the review of other Chapter 8 sections that directly and indirectly affect this WBS element.

#### PROBLEM AREAS

Commitments of key SNL staff normally assigned to the radionuclide releases task to work on the SCP will continue to delay technical work needed to complete milestones within the baselined schedule.

## MILESTONE PROGRESS

SNL Milestone M735, incorporate WMPO and TPO comments into letter report on studies of coupled processes and resubmit to WMPO, has been completed.

SNL Milestone M772, incorporate WMPO and TPO comments into performance studies report and resubmits to WMPO, is to be delayed.

SNL Milestone R109, report on studies of coupled processes included in the SCP, has been delayed.

The new estimated date of completion for SNL Milestone M291, incorporate WMPO comments into Yucca Mountain MGDS System Requirements and resubmit document, is July 31, 1987.

SNL Milestones M120, Yucca Mountain Mined Geologic Disposal System (MGDS) System Requirements submitted to DOE/HQ; M290, incorporate comments from WMPO and TPOs into SAND86-1631; and M769, submit Yucca Mountain site-specific MGDS description to WMPO; will be delayed.

The new estimated date of completion for SNL Milestone P126, establish System Studies Register, is June 15, 1987.

SNL Milestone R058, prepare and submit "A Cost Estimate of the Yucca Mountain Repository Based on the Site Characterization Plan Conceptual Design," SAND85-1964, has been completed.

The new estimated date of completion for SNL Milestone M108, WMPO sends SEMP to OGR for review, is June 15, 1987.

SNL Milestone M074, OGR systems engineering review of the NNWSI Project, has been delayed.

The new estimated date of completion for SNL Milestone R078, revised three-dimensional reference model of the NNWSI Project repository site, is June 30, 1987.

SNL Milestone P631, geostatistical evaluation of alternative drilling programs, has been delayed and the new date of completion is May 30, 1987.

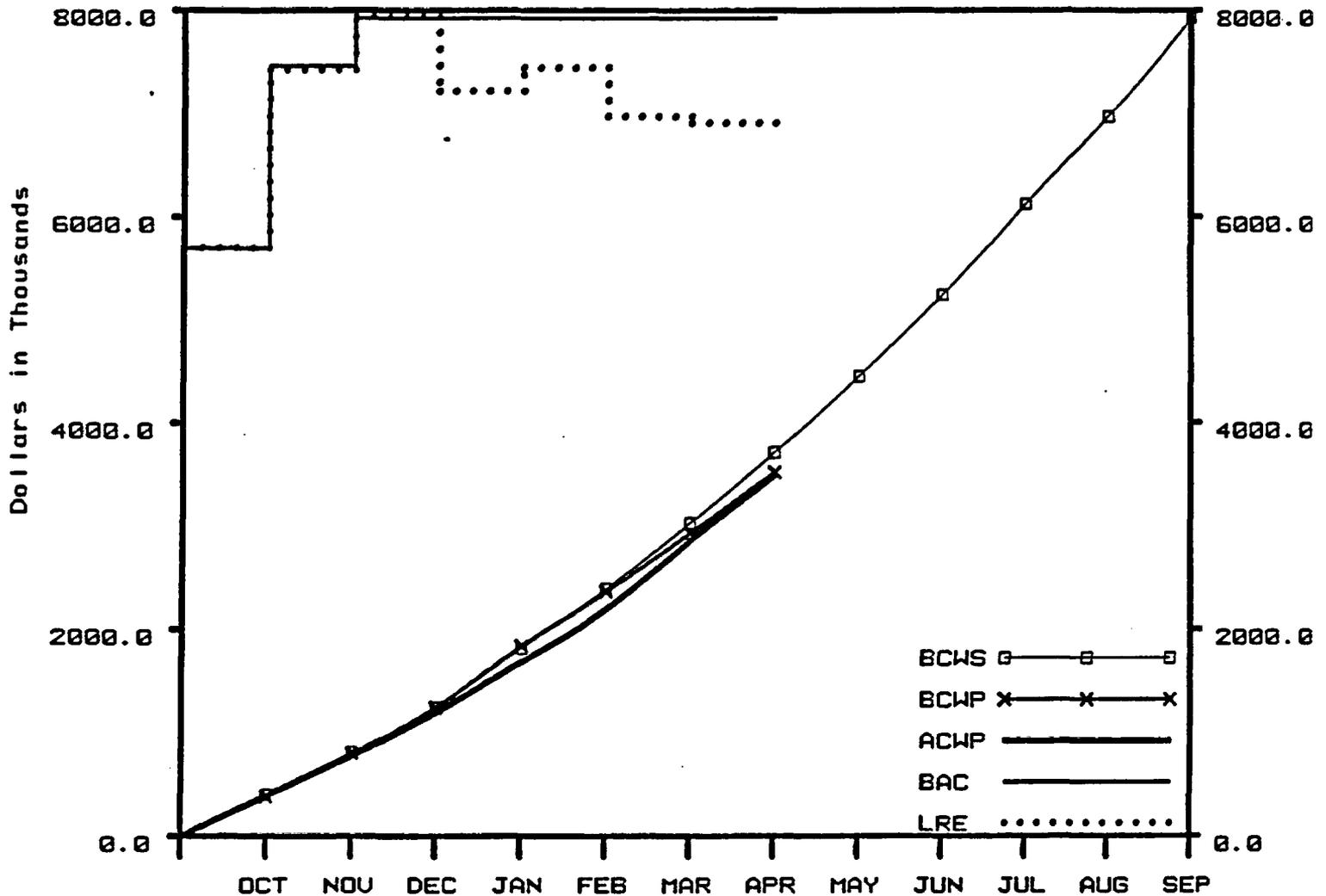
SNL Milestone M763, incorporate WMPO and TPO comments into annual version of RIB has been delayed and the new estimated date of completion is June 15, 1987.

The new estimated date of completion for SNL Milestone R092, hardcopy of 1987 annual versions of RIB sent to OGR for information, is June 15, 1987.

SNL Milestone M107, NNWSI Project position paper describing engineered-barrier system and disturbed-zone boundaries, was completed.

The new estimated date of completion for SNL Milestone M102, prepare and submit "Documentation of the Total System Performance-Assessment Code (TOSPAC) Volume 1: Physical and Mathematical Basis," SAND85-0002, is June 2, 1987.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.1



**SYSTEMS**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	680.9	3713.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	583.7	3521.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	626.8	3490.0
D. BUDGET AT COMPLETION (BAC)		7923.0
E. LATEST REVISED ESTIMATE (LRE)		6902.5

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-192.2	-5.17
G. COST VARIANCE (B-C)	31.4	0.89
H. AT COMPLETION VARIANCE (D-E)	1020.5	12.88

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1211 Systems Management and Integration	217.000	217.000	112.827	.000	104.173
1212 Systems Engineering	1,324.600	1,323.111	1,227.164	-1.489	95.947
1213 Technical Data Base Management	685.000	494.328	508.000	-190.672	-13.672
1214 Total Systems Performance Assessment	1,487.000	1,486.996	1,642.000	-.004	-155.004
121 SYSTEMS	3,713.600	3,521.435	3,489.991	-192.165	31.444

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	MONTHS													
				O	N	D	J	F	M	A	M	J	J	A	S		
P132	WMPO/ SNL	1.2.1.1	WMPO submits Annual PASS Program Interaction Letter Report for FY 87 to OGR														△
R108	WMPO/ SNL	1.2.1.1	WMPO submits Letter Report on Studies of Performance Allocation Included in SCP to OGR					△						◇			
R109	WMPO	1.2.1.1	WMPO submits Letter Report on Studies of Coupled Processes Included in the SCP to OGR for Information			△					◆						
M120	WMPO/ SNL	1.2.1.2	Yucca Mountain Mined Geologic Disposal System (MGDS) Requirements						△			◇					
M261	WMPO/ SNL	1.2.1.2	Draft Yucca Mountain Site-Specific Mined Geologic Disposal System (MGDS) Description											△			◇
M108	WMPO/ SNL	1.2.1.2	System Engineering Management Plan (SEMP)						△							◇	
R074	WMPO/ SNL	1.2.1.2	OGR Systems Engineering Review of the NNWSI Project							△						◇	
R092	WMPO/ SNL	1.2.1.3	WMPO Submits Hard Copy (1987 Annual) Version of the Reference Information Base to OGR										△				

1-7

◇  
1/88

△ 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 1.2.2.1 MANAGEMENT AND INTEGRATION

During April, the SAIC Engineering staff represented Technical and Management Support Services (T&MSS) at the International Topical Meeting on Remote Systems and Robotics in Hostile Environments, in Pasco, Washington and participated in SCP Chapter 7 Project Overviews Committee (POC) review in Washington, D.C.

#### WBS 1.2.2.2 WASTE PACKAGE ENVIRONMENT

The vitric tuff alteration experiment (DB29) being run for six months at 150°C was successfully completed this month. A fluid sample was collected at day 178 at in situ temperature and pressure and the following day another fluid sample was taken of the quenched solution after breaking down the gold bag reaction cell. These samples were submitted to chemistry for analysis. The solid wafer of glassy tuff was recovered intact, air-dried to constant weight, and stored in a desiccator awaiting scanning electron microscope/electron microprobe (SEM/EMP) analysis.

#### WBS 1.2.2.3.1.1 Waste Form Testing

The Series 2, Cycle 5 bare fuel tests were terminated by Lawrence Livermore National Laboratory (LLNL) staff after 139 days and will not be restarted for additional cycles. Total testing time for the Series 2 bare fuel tests has been 2.7 years. A 55-day sample for the Series 3, cycle 3 tests was also taken. Ceramographic characterization of fuel particles and SEM examination of particles and rinse residues from recent test cycle terminations was initiated. Preparation of the data for the Series 1 chemistry data package was 90 percent completed.

The two-month trial autoclave run at 150°C was completed at LLNL on April 1. As before, about 70 percent of the water had escaped (~175 ml), although there was no indication of the loss prior to opening the vessel. This loss corresponds to a loss of  $5.7 \times 10^{-2}$  cc/sec of water vapor at 100°C and atmospheric pressure, clearly more than the  $10^{-5}$  cc/sec maximum leak rate indicated by helium leak checks made prior to the trial. The leak check procedure will be reviewed again before the next trial.

#### WBS 1.2.2.3.2 Metal Barriers Testing

Visual and microscopic examinations have been completed by LLNL personnel on 37 sectioned corrosion specimens that were exposed in the Westinghouse-Hanford gamma pit in 1985 and 1986. Examinations were made before and after the etch of the polished surfaces with a formic acid-nitric acid solution.

Revision of Information Needs 1.4.1, 1.4.2, and 1.4.3 of the SCP plus some additions and modifications to Issue 1.4 were completed and reviewed by LLNL staff and delivered to SAIC. Some additional material on "uncertainties" in the Metal Barrier part of Chapter 7 was prepared for insertion in a special section (along with similar input from other tasks) in Chapter 7.

Despite the higher priority of the SCP, LLNL staff members made some progress toward completing the Metal Barrier Selection and Testing Scientific Investigation Planning (SIP) document. Twelve specific activities in four areas were identified, and quality assurance levels determinations and rationalizations were discussed. A draft version of the SIP is expected to be completed in early May.

#### WBS 1.2.2.5.1 Performance Assessment

Personnel Qualification Records for performance assessment staff, per LLNL NWMP QA Procedure 21B.0, were updated and submitted to the QA Records Center. Performance assessment staff observed the NNWSI Project QA audit April 27-29 of the Geochemical Modeling Code EQ3/6 Task.

#### PLANNED WORK

Current LLNL work activities will continue in deterministic model and code development, and in methodology development and testing for uncertainty analysis.

#### PROBLEM AREAS

Lack of staff is restricting progress in the other materials task by LLNL.

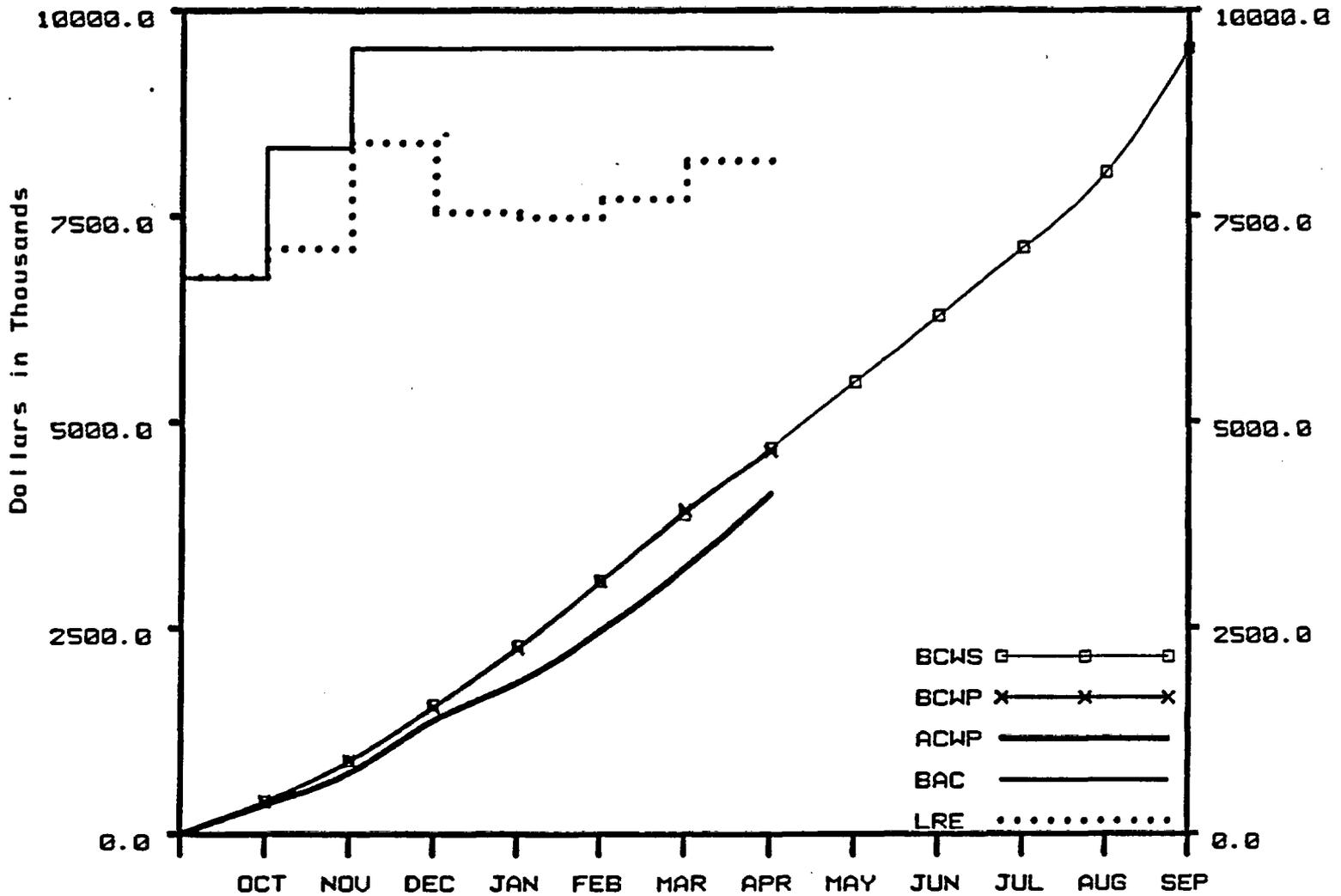
Attendance by LLNL staff members at review meetings for Chapter 8.3.5 of the SCP is causing delays to the writing of the SIP for a portion of this WBS element. The SIP for EQ3/6 (approved earlier this year) covers the laboratory activities to provide data for the EQ3/6 data base. These activities constitute more than half of the work in this WBS element.

Progress by staff members at LLNL in the near-field flow and transport task has been slowed by SCP related activities.

#### MILESTONE PROGRESS

LLNL Milestone M213 has been delayed due to SCP preparation. The new estimated date of completion is May 31, 1987.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.2



**WASTE PACKAGE**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	804.9	4682.2
B. BUDGETED COST OF WORK PERFORMED (BCWP)	729.6	4648.3
C. ACTUAL COST OF WORK PERFORMED (ACWP)	889.1	4123.4
D. BUDGET AT COMPLETION (BAC)		9535.0
E. LATEST REVISED ESTIMATE (LRE)		8168.2

**UARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-33.9	-0.72
G. COST VARIANCE (B-C)	524.9	11.29
H. AT COMPLETION VARIANCE (D-E)	1366.8	14.33

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1221 Management and Integration	418.200	368.200	311.746	-50.000	56.454
1222 Package Environment	585.000	479.400	583.900	-105.600	-104.500
1223 Waste Form & Materials Testing	2,665.000	2,854.705	2,540.700	189.705	314.005
1224 Design, Fabricate, and Prototype Testing	529.000	511.000	228.200	-18.000	282.800
1225 Performance Assessment	485.000	435.000	458.900	-50.000	-23.900
122 WASTE PACKAGE	4,682.200	4,648.305	4,123.446	-33.895	524.859

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
				RO03	WMPO/ LLNL	1.2.2.1	Waste Package Postclosure Compliance Strategy Document				△				
M236	WMPO/ LLNL	1.2.2.3	Progress Report on the Results of Testing Advanced Conceptual Design Metal Barrier Materials Under Relevant Environ. Conditions for a Tuff Repository				△							◇	
M257	WMPO/ LLNL	1.2.2.3	Decision Made on Using Packing Material in the Waste Package to Assist in Controlling Radionuclides Release Rate				△								◇
MO13	WMPO/ LLNL	1.2.2.4	Revised Draft Waste Package Subsystem Conceptual Design Requirements to DOE/HQ for Review							△					◇
M233	WMPO/ LLNL	1.2.2.4	Initiate Waste Package Advanced Conceptual Design												△
M260	WMPO/ LLNL	1.2.2.5	Report on Long-Term Performance Analysis of the Conceptual Waste Package Design							△					◇
M276	WMPO/ LLNL	1.2.2.5	Report on the System Model for Waste Package Performance Analysis	△			◆								

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

### 1.2.3 SITE INVESTIGATIONS

#### OBJECTIVE

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

#### ACTIVITIES

##### WBS 1.2.3.1 MANAGEMENT AND INTEGRATION

The stop-work order issued to USGS in March 1986 remained in effect through April and almost all site characterization technical activities continued to be suspended. Most Project personnel continued on the preparation of SIPs with their corresponding Quality Assurance Level Assignment Sheets (QALAS) -- a necessary step for resumption of work.

The SAIC Management and Integration staff completed the review of the revised State Grant Proposal and forwarded comments to WMPO. The Site M&I Semiannual Status Report, milestone P804, was also completed.

SAIC staff developed a report which summarizes the planned site characterization activities for the Yucca Mountain Site. Information was extracted from the current version of the SCP, and includes ESF as well as surface activities. The report is intended to support negotiations regarding land access and environmental permitting. When revised to be compatible with the final SCP, the report will be a useful summary of the SCP planned activities.

The SAIC Site M&I Branch is coordinating the technical reviews of SIPs and QALAs submitted by the Project participants.

##### WBS 1.2.3.2.1 Geologic Investigations

###### WBS 1.2.3.2.1.1 Site Geology

USGS staff worked on logic diagrams for Section 1.15 of the SCP. A USGS representative met in Denver on April 6 with personnel from DOE/HQ, SNL, SAIC/Golden, and SAIC/Las Vegas to discuss logic diagrams for the SCP. Spengler served on the Central Regional Geology Branch Promotion Committee April 7-17. For the remainder of the month, Spengler worked on revision of the parameter list for Section 1.15 of the SCP.

SNL NNWSI Project staff participated in planning activities at Yucca Mountain on April 22-24. An assessment of the suitability of the topography for conducting a ground-penetration radar survey was made with SNL Division 7116 staff. Quaternary units to be delineated during forthcoming mapping and trenching activities were visited with an SNL consultant. Lineaments observed on aerial photographs were examined in the field to determine potential suitability as trench sites.

#### WBS 1.2.3.2.2 Geophysical Investigations

##### WBS 1.2.3.2.2.1 Gravity and Magnetic

Personnel at USGS worked on a lead paper which will introduce a special issue of the Journal of Geophysical Research on Radioactive Waste Disposal scheduled for June. Six other papers on that subject have now been accepted, five additional papers emanating from the 1982 American Geophysical Union Fall meeting have already been published in the JGR. D. Ponce worked on the QA procedures for both ground- and aeromagnetic data. R. Harris finished a first draft of a principal facts report on all NTS gravity data and sent it to coauthor D. Healey for additions on the accuracies of data sets obtained under the Weapons program.

#### WBS 1.2.3.2.3 Site Stability

##### WBS 1.2.3.2.3.1 Tectonics and Volcanism

No technical work was reported for the USGS staff involved in Tectonics and Volcanism task. Project staff were engaged in planning, QA activities, SIP and Study Plan preparation.

##### WBS 1.2.3.2.3.2 Isotope Geology

A considerable volume of USGS data for the NNWSI Project records-repository in Las Vegas was submitted. Work continued on preparation of a SIP for tectonics and volcanism while awaiting lifting of the stop-work-order. A report entitled, "Uranium Trend Dating of Fluvial and Fan Deposits in the Beatty Area, Nevada," is being completed and is scheduled for release as a USGS Bulletin, with an estimated October 1987 completion date.

#### WBS 1.2.3.3 HYDROLOGY

#### WBS 1.2.3.3.2 Saturated Zone Hydrology

##### WBS 1.2.3.3.2.2 Fractured-Rock Hydrology

The USGS SIP, "Hydraulic and conservative-tracer tests in fractured rock," (SIP-3332G-01) was transmitted to WMPO for approval.

#### WBS 1.2.3.3.3 Unsaturated Zone Hydrology

USGS Project staff spent most of the month on planning activities for the Exploratory Shaft and on SIP and Study Plan preparation for unsaturated-zone activities.

The USGS manuscript, "Radiocarbon Dates V," which received WMPO review and approval, was transmitted to the USGS Regional Hydrologist for approval for publication in the American Journal of Science.

The following USGS abstracts were transmitted to WMPO for review and approval for presentation at the American Geophysical Union (AGU) Spring meeting, Baltimore, Maryland on May 18-22, 1987:

"Design of Measurement Network to Determine Boundary Conditions for Groundwater Modeling at a Proposed High-Level Radioactive-Waste Repository."

"Preliminary Capillary Hysteresis Simulations in Fractured Rocks."

The following USGS abstract was transmitted to WMPO for review and approval for presentation at the International Conference on Measurement of Soil & Plant Water Status, July 6-10, 1987, at Logan, Utah:

"A Collimated Neutron Probe for Soil-Moisture Measurement."

#### WBS 1.2.3.3.4 Climatology

A USGS representative revised parts of Chapter 5 (Climate) and Chapter 8 (Testing Strategy) of the SCP and completed logic diagrams for performance allocation.

A draft of the USGS report, "Isotope Content and Temperature of Precipitation in Southern Nevada, August 1983 - August 1986," was transmitted to WMPO for review and approval.

#### WBS 1.2.3.4 GEOCHEMISTRY

##### WBS 1.2.3.4.1.2 Natural Isotope Chemistry

A Los Alamos representative met with Hydro Geo Chem personnel in Tucson on April 8 to discuss the chlorine-36 and chloride analysis work to be performed under the current contract during the remainder of this fiscal year. Hydro Geo Chem plans to develop a technique to reduce the mass of tuff necessary for cosmogenic chlorine-36 analyses from 40 kg to a mass as low as 5 kg. This development work should be complete by the end of September.

A Los Alamos paper titled "Infiltration at Yucca Mountain, Nevada, Traced by  $^{36}\text{Cl}$ " was presented at the Fourth International Symposium on Accelerator Mass Spectrometry, which was held in Ontario, Canada, from April 26 through May 1. One of the meeting participants who expressed more than a passing interest in this presentation was a representative from Mifflin & Associates, Las Vegas, Nevada. This company is a consultant for the State of Nevada in areas of high-level nuclear waste disposal. The representative requested a reprint of previously published work concerning chlorine-36 measurements at Yucca Mountain.

#### WBS 1.2.3.4.1.4 Solubility Determination

A first draft of the study plan was completed by Los Alamos personnel for the speciation determination subtask. This document is currently undergoing revisions. Work was also begun on the preparation of the study plan for the colloid formation, characterization, and stability subtask.

#### WBS 1.2.3.4.1.5 Sorption and Precipitation

Revisions to Chapter 8.3 of the SCP were completed by Los Alamos staff.

Los Alamos personnel are preparing three cores received from the core library late in 1985 for batch sorption measurements using nickel, americium, and neptunium with various ground waters.

#### WBS 1.2.3.4.1.7 Retardation Sensitivity Analysis

A revised draft of Los Alamos Milestone R343, "Preliminary Geochemical/Geophysical Model of Yucca Mountain," was delivered to the WMPO on April 30, 1987.

Los Alamos staff revised Section 8.3.1.3.7, Investigation 1.14.7, of the SCP and responded to SCP Comment Response Forms and updated the milestone list for FY 88-92.

#### WBS 1.2.3.4.1.8 Reactive Tracer Testing

Two 55-gallon drums of J-13 water were shipped, received, logged, and stored for experiment use by Los Alamos staff. Forty gallons of that water are being stored in refrigerators at 4°C for archival purposes. Water samples (250 mL each) from the two drums were sent to a Chemical and Laser Science Group (CLS-1) for analysis.

#### WBS 1.2.3.4.2.3 Mineralogy of Transport Pathways

In April, x-ray diffraction (XRD) studies of clay minerals from drillhole UE-25p#1 were completed by Los Alamos staff. These clays are being studied to understand the causes, timing, and extent of hydrothermal alteration in the northern part of Yucca Mountain. The results of these studies will be included in a milestone report (R567).

### WBS 1.2.3.5 DRILLING

#### WBS 1.2.3.5.1 Core Library

REECo staff completed Title II design for Warehouse I and transmitted it for internal REECo review on April 28, 1987. Title I drawings and a budget estimate for Warehouse II were prepared and submitted to the WMPO for review. The subsequent review meeting was held on April 22, 1987.

REECo personnel provided electric and maintenance support on active monitoring hole No. USW UZ-1.

SAIC staff completed the Core Transfer Plan for inventorying and transferring core to the Sample Management Facility (SMF) in draft form.

#### WBS 1.2.3.5.2 Drilling, Construction, Engineering

USGS test hole USW U-28 remained at a temporary depth of 58 feet, as all drilling continued to be suspended under the stop-work order.

#### WBS 1.2.3.6.1 Environmental Survey

Operation of the meteorological monitoring program continues to function well with very high data recovery. SCP Chapter 5.0 was revised by SAIC staff, and DOE/HQ comments were resolved.

Five Environmental Radiological Monitoring Technical Procedures were issued by SAIC staff to support implementation of the Preliminary Site Characterization Radiological Monitoring Plan.

A draft of the Environmental Pathways Analysis Scoping Study for the Yucca Mountain site is in internal SAIC review. This document supports the Radiological Monitoring Plan for the selection of media to be monitored.

"Population Densities Along Nevada Transportation Routes" (DOE/NV/10270-12, SAIC-86-8005) was approved by WMPO for publication. The topical report documents the methodology utilized by the Nevada Nuclear Waste Storage Investigations Project in the final Environmental Assessment to estimate population density along Nevada transportation routes and the fraction of each Nevada route in urban, suburban, and rural population zones.

#### PLANNED WORK

SAIC SMF Title II design work on warehouses #1 and #2 is scheduled for completion on May 15; construction will begin on warehouse #2 around July 1, with planned completion in September; construction on warehouse #1 is scheduled to begin in October 1987.

A status report will be prepared on the progress of the SMF, and a presentation will be made by SAIC staff to the TPOs at the May TPO meeting.

Los Alamos staff members will continue organizing clinoptilolite solubility and cristobalite-to-quartz conversion kinetics experiments. Work will also start on the writing of a conceptual model for mineral alteration in Yucca Mountain.

A Los Alamos representative will present a paper entitled "Modeling Tracer Diffusion in Unsaturated Porous Media, Both Fractured and Unfractured" at the AGU Spring Meeting, Baltimore, May 30. This paper, based on Milestone R314, will be submitted for publication in a special issue of the Journal of Contaminant Hydrology.

A survey to determine the feasibility of using ground-penetrating radar to locate faults will be conducted by SNL staff members at the surface facility site east of Exile Hill. This geophysical technique has been used with some

success at the WIPP site. If successful at Yucca Mountain, a radar survey would provide an expedient and efficient way to locate trenches to study faults.

H&N staff will complete Title I design for modifications to Building 4215 in Area 25.

#### PROBLEM AREAS

A lack of core availability both for examination and sampling will cause a delay in Los Alamos Milestone R623. This same lack of core availability will soon impact all studies of fracture mineralogy. The erionite study mentioned above is limited to the interval specified because that is the interval already sampled and available.

The lack of a format for Study Plans continues to be a problem for USGS Project investigators involved in their preparation.

#### MILESTONE PROGRESS

SNL Milestone P499, study plan for conduct of geologic field studies for NNWSI Project repository preclosure facilities, is being redefined.

Los Alamos Milestone R202, "Preclosure Volcanic Effects: Evaluations for Potential Repository at Yucca Mountain, Nevada," was approved by WMPO on April 9, 1987.

Los Alamos Milestone R357, "The Kinetics of Silica-Phase Transitions" was sent to WMPO on April 21, 1987.

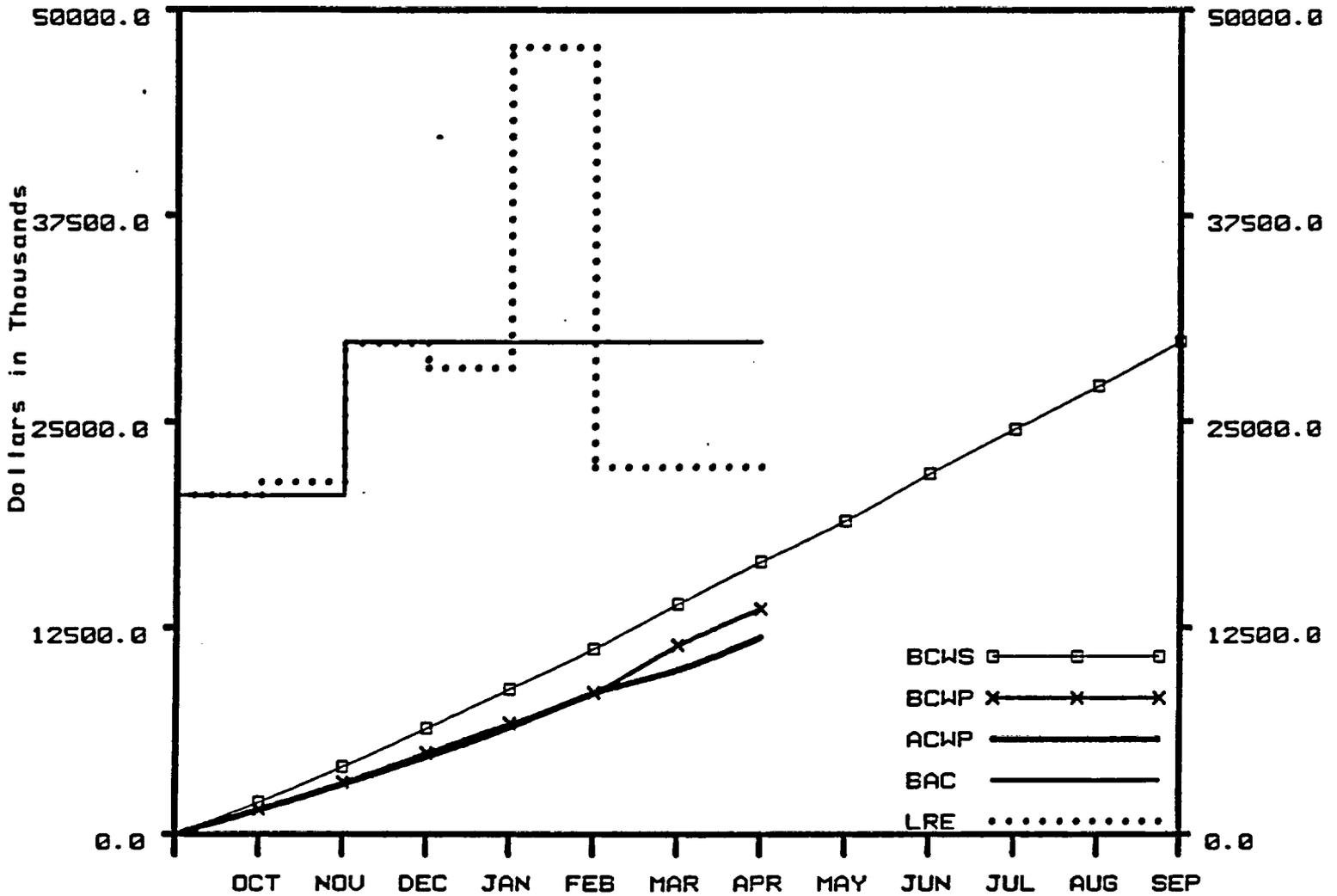
Los Alamos Milestone R347, update report on fracture flow in saturated tuff, was sent to WMPO on April 21, 1987.

Los Alamos Milestone R346, "FEHMS: A Finite Element Heat-Mass-Stress Code for Coupled Geological Process" was sent to WMPO on April 6, 1987.

LLNL Milestone C304, EQ3/6 Code Release, has been delayed and the new estimated date of completion is May 30, 1987.

LLNL Milestones C319, Interim Report on Modeling Sorption with EQ3/6; and M343, complete Draft MCRT User's Manual, have been delayed and the new estimated date of completion is May 30, 1987.

**NNWSI PROJECT  
COST PERFORMANCE GRAPH FOR APR 1987  
WBS: 1.2.3**



**SITE INVESTIGATIONS**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	2560.6	16497.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	2196.0	13619.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1966.6	11913.4
D. BUDGET AT COMPLETION (BAC)		29835.0
E. LATEST REVISED ESTIMATE (LRE)		22240.1

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-2878.0	-17.45
G. COST VARIANCE (B-C)	1705.6	12.52
H. AT COMPLETION VARIANCE (D-E)	7594.9	25.46

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1231 Management & Integration	3,345.000	3,013.645	2,122.913	-331.355	890.732
1232 Geology	2,826.900	1,624.920	1,461.459	-1,201.980	163.461
1233 Hydrology	3,815.000	3,273.320	2,753.452	-541.680	519.868
1234 Geochemistry	3,209.800	3,126.500	3,162.000	-83.300	-35.500
1235 Drilling	1,594.470	1,154.870	927.186	-439.600	227.684
1236 Environment	806.400	723.202	630.414	-83.198	92.788
1237 Socioeconomic	450.400	315.515	386.757	-134.885	-71.242
1238 Geochemical Modeling Code EQ3/6	449.000	387.000	469.200	-62.000	-82.200
1239 Deferred Site Close Out	.000	.000	.000	.000	.000
123 SITE INVESTIGATIONS	16,496.970	13,618.972	11,913.381	-2,877.998	1,705.590

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
R845	WMPO/ USGS	1.2.3.2	Recommendation to Proceed with Deep Regional Seismic Survey to OGR for Approval												△	◇ 8/88
M325	WMPO/ LANL	1.2.3.4	Report on Geochemistry Simulation of Yucca Mountain Using Best Available Data on Mineralogy, Water Chemistry, Flow Rates and Crack Statistics		△						◇					
R309	WMPO/ LANL	1.2.3.4	Preliminary Report on Sorption Modeling				△				◇					
M895	WMPO/ SAIC	1.2.3.1	Submit Report on Evaluation of Natural Resources at YM and Vicinity received to DOE/HQ for Information											△		
M897	WMPO/ SAIC	1.2.3.6	Final Radiological Monitoring Plan Complete					△			◇					
R327	WMPO/ SAIC	1.2.3.6	Submit Air Quality Monitoring Plan to DOE/HQ							△				◇		
N345	WMPO/ SAIC	1.2.3.6	Begin Air Quality Monitoring												△	◇ 12/87
R945	WMPO/ SAIC	1.2.3.7	Submit Working Draft Site Characterization Socioeconomic Monitoring and Mitigation Plan (SMMP)		◇	△										
P030	WMPO/ SAIC	1.2.3.7	Submit Draft Socioeconomic Monitoring and Mitigation Plan to DOE/HQ							△						◇

△ PLANNED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE

◆ 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

During April, the SAIC Engineering staff revised LAD/AE selection schedule and submitted to WMPO for review, and reviewed and commented on SCP Glossary.

##### WBS 1.2.4.1.1 Management

The DOE/HQ position on the content of the ACD is under review at SNL. The basis for the review is a memorandum dated January 21, 1987, from OGR. Review comments and budget estimates are being prepared for WMPO. These estimates will identify the funding required to support the work described in Stein's memorandum.

##### WBS 1.2.4.1.2 Basis for Design

Bechtel National, Inc., (BNI) has submitted two draft sections of the Repository Design Requirements (RDR) document, and Parsons Brinckerhoff Quade & Douglas has submitted one section. Work is now underway at SNL to review and edit these and other sections of the RDR. Efforts are being made to provide consistency with DOE/HQ guidance for this document and to develop design requirements at a level of detail consistent with the SR and the state of design development.

##### WBS 1.2.4.1.3 Major Design Deliverables

SNL staff sent the comment resolution draft of the SCP-CDR to ORG and WMPO for their review and approval on April 3, 1987. This transmittal completes Milestone P198, which is a precursor to level 1 Milestone N432.

Work on the Repository Design Plan (RDP) has started again after the interruption caused by redirection of SNL effort to the SCP-CDR. Comments on the initial draft of the RDP from Los Alamos, LLNL, WMPO, and SAIC are being cataloged and addressed.

#### WBS 1.2.4.1.4 Engineering Design Support: Special Studies

The SNL report entitled "Impact on Costs and Schedules of Using a Monitored Retrievable Storage Facility in Conjunction with a Repository in Tuff at Yucca Mountain" (SAND85-7112) has been sent to WMPO for policy review.

##### WBS 1.2.4.2.1.1 Rock Mass Analysis

The report entitled "Numerical Analyses for the G-Tunnel Small Diameter Heater Experiment" (SAND85-7115), by RE/SPEC Inc., has completed all reviews and is being prepared for printing.

##### WBS 1.2.4.2.1.2 Field Testing

The following two SNL conference papers were approved by WMPO for publication at the 28th U.S. Symposium on Rock Mechanics: "Analysis of Drift Convergence Phenomena from G-Tunnel Welded Tuff Mining Evaluations," and "Development of Diamond-Tipped Chain-Saws for Slot Cutting in Welded Tuff."

##### WBS 1.2.4.2.1.3 Laboratory Properties

Efforts by SNL staff under this WBS task have been directed toward revising Section 8.3.1.15 of the SCP and preparing reports that are SCP references. The status of these reports is as follows:

"Uniaxial and Triaxial Compression Tests Series on the Topopah Spring Member from USW G-2, Yucca Mountain, Nevada" (SAND85-0762) is being prepared for printing.

"Bulk, Thermal, and Mechanical Properties of the Topopah Spring Member of the Paintbrush Tuff, Yucca mountain, Nevada" (SAND85-07620) is being revised to incorporate peer review comments. All technical comments have been addressed. The remaining revisions will be made after a more detailed statistical analysis of the data is completed.

SAND87-0115, which comprises two previously unpublished memoranda containing material which is referenced in the SCP, is being prepared for printing.

SCP Section 8.3.1.15 was submitted to SAIC for production on April 13.

In addition, SAND86-0177, "Rock Joint Compliance Studies," is being prepared for printing. Two Technical Procedures were approved covering vacuum saturation and oven drying of laboratory test samples. Eleven other Technical procedures, covering topics related to mechanical testing and X-ray diffraction, are in various stages of review. Experiment Procedure EP-0002, discussing mechanical testing at higher temperatures and low strain rates, is in final review.

##### WBS 1.2.4.2.1.4 Water-Migration Analysis

Comments made by an GU reviewer are being resolved on a paper presented at the last AGU meeting. The paper, "Measuring and Modeling Water Imbibition into Tuff" (SAND86-1757C), discussed results of a simplistic laboratory

experiment and comparison of the experimental results with predictions made using the computer code TOSPAC.

The SNL paper entitled "Drying of an Initially Saturated Fractured Volcanic Tuff" (SAND87-0293C), is in the peer review and comment resolution stage.

#### WBS 1.2.4.2.2 Equipment Engineering and Instrument Development

SNL staff members completed negotiations for a contract with the Robbins Co. that will produce conceptual designs for borehole drilling equipment and off-normal core drill retrieval equipment. It is anticipated that the contract will be placed in the near future. The results of this work will be used in an ongoing emplacement option study being conducted at SNL.

Conceptual designs for several components of the vertical and horizontal emplacement/retrieval equipment systems have been completed by SNL personnel. These designs will be used to assess feasibility and differences in technology required for several different borehole lengths.

Repository drift and emplacement borehole layouts have been completed by Parsons Brinckerhoff Quade & Douglas for short horizontal boreholes. Drift stability analyses have been completed for the new layouts.

#### WBS 1.2.4.2.3.1 Seal Performance Requirements

The SNL report satisfying Milestone P210, "Technical Basis for Performance Goals, Design Requirements, and Material Recommendations for the NNWSI Repository Sealing Program" has been completed and was submitted to WMPO for policy review.

The SNL report entitled "Analysis to Evaluate the Effect of the Exploratory Shaft on Repository Performance at Yucca Mountain" (SAND85-05598, Milestone P212), is undergoing peer review.

Efforts by SNL staff during April have also been directed toward SCP activities. In particular, Chapter 5 of the SCP-CDR and Section 8.3.3 of the SCP were modified. This causes a redirection of personnel which impacts work in the sealing program.

#### WBS 1.2.4.2.3.3 Seal Concepts Development

The SNL report entitled "Modification of Rock Mass Permeability in a Zone Surrounding a Shaft in Fractured, Welded Tuff" (SAND86-7001), has been published, satisfying Milestone R037.

#### WBS 1.2.4.3.2 Surface Facilities

The SNL letter report entitled "Design Margin Philosophy for Use in the NNWSI Project" (SLTR86-1018) has been issued.

The design review comments on the BNI task entitled "Conceptualization of Improvements to Waste Handling Facilities" are being resolved by BNI after a discussion between SNL and BNI.

A change order revising the scope of work being performed by BNI to reflect more pre-ACD studies rather than the initiation of ACD as was originally planned has been approved by SNL management.

#### WBS 1.2.4.3.3 Shaft/Ramps

The ESF Hoisting Study and the second volume of the structural Design Study are currently being reviewed by SNL staff members.

Personnel from Parsons Brinckerhoff Quade and Douglas met with WMPO to examine a used mine hoist proposed for installation at the ESF.

#### WBS 1.2.4.3.4 Underground Excavations

A preliminary list of the parameters needed from the lateral exploratory drifts to support the Repository design has been developed. These parameters will be compared with the parameters identified in the exploratory shaft test plan to determine if they have already been identified.

A brief presentation of the design of the underground facilities was given to the Babcock and Wilcox personnel who are now under contract to LLNL to provide waste package design services.

SNL letter report SLTR87-4001, on the sizing of the Exploratory Shaft Facility lateral exploration drifts, has been released.

#### WBS 1.2.4.3.5 Underground Service System

The final draft of the report on fan reversibility has been received from Mine Ventilation Services. The report is being reviewed and will be published as an SNL report.

The SNL report on operator radiation dose for emplacement and retrieval of spent fuel has been released for publication after incorporation of changes based on comments received from WMPO.

#### WBS 1.2.4.4 OPERATIONS AND MAINTENANCE

OGR comments on the December 24, 1986, draft of the report entitled "OGR Repository-Specific Rod Consolidation Study - Effect on Costs, Schedules, and Operations at the Yucca Mountain Repository" (SAND86-2357) were received in late March 1987. The principal author of the report met with WMPO staff members on April 9, 1987, to develop a strategy for responding to OGR and WMPO comments. It was decided that at-reactor fuel consolidation will not be considered, for two reasons: first, the resulting waste emplacement schedules would be inconsistent with those in the SCP and the NNWSI Project reports, and second, at-reactor consolidation proliferates the number of container loadings that must be considered -- for only a 1 percent effect on the number of disposal containers required.

#### WBS 1.2.4.6.1 Repository Performance Code Development and Certification

The SNL reports entitled "NNWSI Unit Evaluation at Yucca Mountain, Nevada Test Site: Near Field Thermal and Mechanical Calculations Using the SANDIA-ADINA Code" (SAND83-0030); and "NNWSI Unit Evaluation at Yucca Mountain, Nevada Test Site: Near Field Mechanical Calculations Using a Continuum Jointed Rock Model in the JAC Code" (SAND83-0070), have completed policy review at WMPO and are undergoing final assembly for printing.

#### WBS 1.2.4.6.2 Design Analysis

During April 1987, SNL staff continued work on Section 8.3.2.2 of the SCP. Specifically, the text of Chapter 8 of the SCP was revised to be consistent with the new performance allocation tables for Issue 1.11, and the sections on milestones and activities and schedules were rewritten. Section 8.3.2.2 was also checked against Section 6.4.2 to assure consistency.

A list of publications of thermal, mechanical, and thermomechanical geotechnical design analyses was prepared by SNL personnel for use in reviewing manuscripts being prepared for publication and for identifying candidate analyses for the RIB.

Work is progressing on SNL SCP references. Two have returned from WMPO, three are at WMPO for review, and two are in line review.

#### WBS 1.2.4.6.3 Preclosure Safety Analysis

SNL staff members are continuing the rewrite of the issue resolution strategy sections of the SCP for Issues 2.1, 2.2, 2.3, and 2.7. Preliminary drafts for the rewrites of Issues 2.1 and 2.2 have been completed.

BNI has issued a draft of the report entitled "Preclosure Radiological Safety Analysis for Normal Conditions of the Yucca Mountain Repository" (SAND87-7073) for SNL review and comment.

More review and comment by SNL personnel on the SCP-CDR was performed with special attention to sections concerning items important to safety and waste isolation.

#### PLANNED WORK

Since Chapter 8 of the SCP-CDR will be directly affected by comments and changes to SCP Section 6.4, Chapter 8 of the SCP-CDR will be reviewed by SNL management after DOE has completed its review of Section 6.4.

Los Alamos and LLNL input on the Exploratory Shaft Facility (ESF) and the waste package will be required for the RDP. SNL will cooperate with these labs to facilitate integrating their input into the draft RDP.

Work on the exploratory shaft performance analysis will continue at SNL. Additional requirements to work on the SCP are anticipated.

A meeting is being planned to discuss the impact of the requirements of the repository sealing program on the repository. The goal of this meeting is to

present the new proposed requirements to the design architect/engineer so that the impact on the underground facility can be determined.

During May, the major emphasis of work by staff at SNL will be the SCP and SCP-CDR references for those documents and upon contract administration.

#### PROBLEM AREAS

The ACP Plan guidance given for the RDR requires extensive revision of the current SDR document. Given the resource conflicts with the Project activities, it appears that delivery of the RDR to DOE by the end of May is unlikely.

The BNI contract is due to expire October 1, 1987. If the ACD is to be initiated by this date, as is presently planned by DOE/HQ, the work scope for ACD should be finalized very soon and negotiation of BNI's contract extension with the new work scope initiated as soon as possible.

#### MILESTONE PROGRESS

SNL Milestones N430, Start ACD; and P195, SNL informs WMPO that repository ACD activities are ready to start, have been delayed and the new estimated date of completion is May 30, 1988.

SNL Milestone N432, repository conceptual design in support of site characterization, has been completed.

SNL Milestone N434, Repository Design Plan (RDP), including preclosure performance-assessment information, is being reassessed.

SNL Milestone P198, incorporate comments from WMPO and OGR into SCP-CDR, was completed.

SNL Milestone M434, report on G-tunnel mining evaluation, has been delayed and the new estimated date of completion is July 1, 1987.

SNL Milestones N406, horizontal waste emplacement equipment development plan, and N427, initiate procurement of development prototype boring machine, will be delayed.

SNL Milestone P156, incorporate WMPO and TPO comments into SAND84-2197, "A Recommendation for the Horizontal Emplacement of Radioactive Waste in Tuff, Basalt, and Granite," has been dropped.

SNL Milestone P210, prepare design requirements and materials recommendation report, has been completed.

The new estimated date of completion for SNL Milestone R211, WMPO reviews the technical basis for performance goals, design requirements, and materials recommendations for seals and sends comments to SNL, is May 30, 1987.

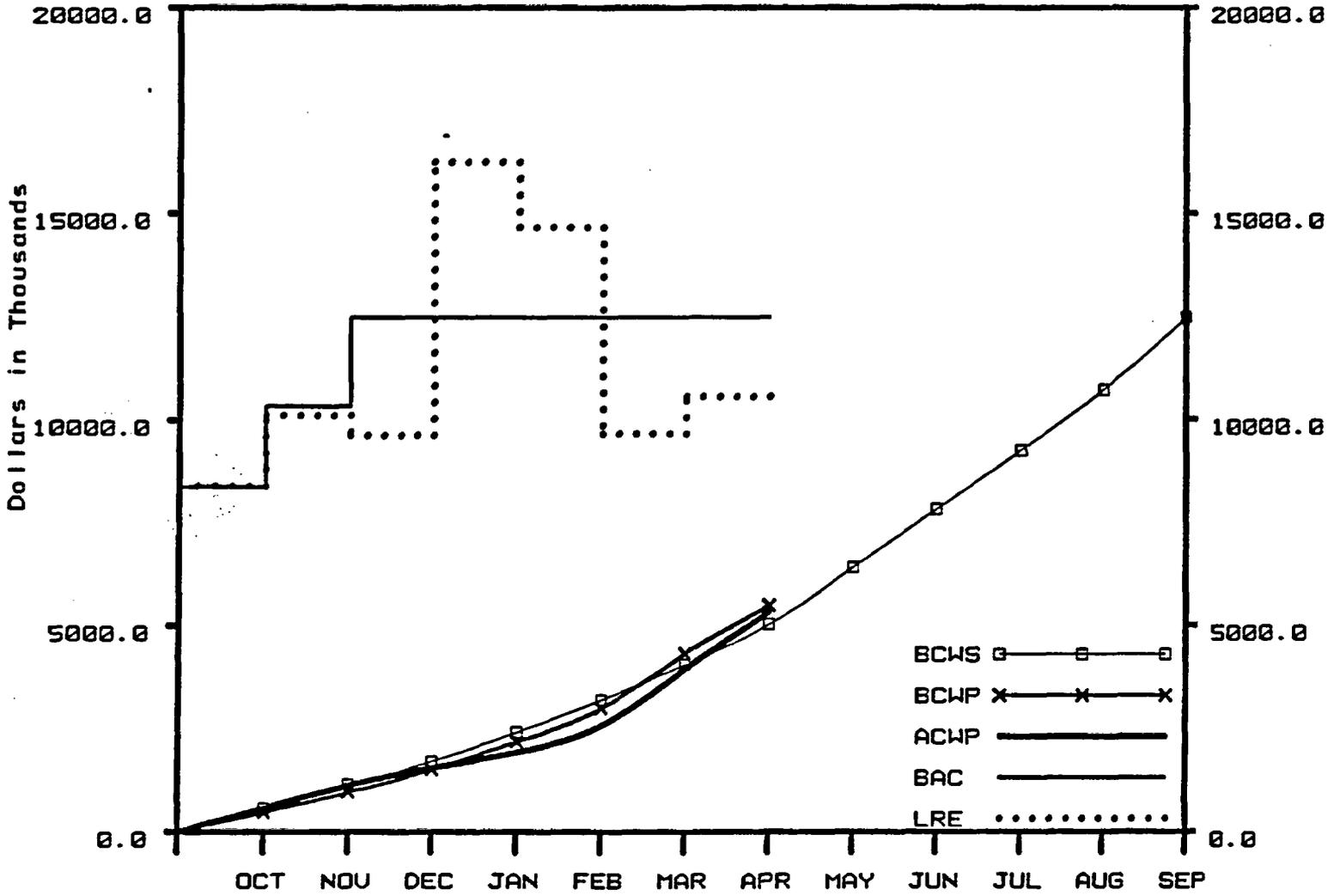
SNL Milestone P213, WMPO reviews the report on ES performance analysis to evaluate the effect of ES on repository performance assessment and returns to SNL, has been delayed and the new estimated date of completion is June 20, 1987.

SNL Milestone P129, prepare and submit "Report on the Welded Tuff Mining Demonstration Performed at the G-Tunnel Facility on the NTS," SAND86-7009, has been delayed and the new estimated date of completion is June 30, 1987.

SNL Milestone P218, incorporate WMPO comments into preliminary study of the effects of uncertain geologic data on design of the underground facility and resubmit to WMPO, has been completed.

SNL Milestone P159, radiological safety analysis for normal conditions of NNWSI Project Repository--ACD guidance, is in peer review.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.4



**REPOSITORY INVESTIGATIONS**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	971.7	5026.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1166.9	5486.9
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1383.1	5336.3
D. BUDGET AT COMPLETION (BAC)		12472.0
E. LATEST REVISED ESTIMATE (LRE)		10546.4

**UARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	460.3	9.16
G. COST VARIANCE (B-C)	150.6	2.74
H. AT COMPLETION VARIANCE (D-E)	1925.6	15.44

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1241 Management and Integration	1,497.600	1,984.000	2,172.317	486.480	-188.237
1242 Development and Testing	1,952.000	1,925.832	1,849.000	-26.168	76.832
1243 Facilities	597.000	597.001	654.000	.001	-56.999
1244 Operations and Maintenance	268.000	268.000	251.000	-.000	17.000
1245 Decommissioning	46.000	46.000	2.000	-.000	44.000
1246 Repository Performance Assessment	666.000	666.000	408.000	-.000	258.000
124 REPOSITORY INVESTIGATIONS	5,028.600	5,486.912	5,336.317	460.312	150.595

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
N430	WMPO/ SNL	1.2.4.1	Start Repository Advanced Conceptual Design												△
N433	WMPO/ SNL	1.2.4.1	Initial Subsystem Design Requirement (SDR)							△				◇	
N432	WMPO/ SNL	1.2.4.1	Repository Conceptual Design in Support of Site Characterization					△		◆					
M455	WMPO/ SNL	1.2.4.2	Report on G-Tunnel Underground Facility (GTUF) Summary				△			◆					
M295	WMPO/ SNL	1.2.4.2	Feasibility Analysis of Horizontal Emplacement and Retrieval - Letter Report			△									◆ 9/86
N406	WMPO/ SNL	1.2.4.2	Horizontal Waste Emplacement Equipment Development Plan					△					◇		
P404	WMPO/ SNL	1.2.4.2	Prepare "Technical Basis for Performance Goals, Design Requirements and Material Recommendation for the NNWSI Project Repository Sealing Program Report"						△				◇		
N427	WMPO/ SNL	1.2.4.2	Initiate Procurement of Development Prototype Boring Machine			△									◇
RO36	WMPO/ SNL	1.2.4.2	Analysis to Evaluate the Effect of the Exploratory Shaft on Repository Performance at Yucca Mountain					△						◇	
R848	WMPO	1.2.4.4	Submit Retrievability Compliance Strategy Plan to OGR for Review and Comment						△						◇
R267	WMPO/ SNL	1.2.4.4	Final Report on Spent Fuel Rod Consolidation			△								◇	
N457	WMPO	1.2.4.6	Preliminary Study of the Effects of Uncertain Geologic Data on Design of the Underground Facility					△				◇			

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

◇  
12/87

## 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 1.2.5.1 MANAGEMENT AND INTEGRATION

Members of the SAIC staff conducted several SCP Working Group-related activities including interface activities with HQ concerning Study Plan preparation and review guidance and changing the baselined OCRWM Common Issues Hierarchy.

#### WBS 1.2.5.2.1 Regulatory Interaction

On April 14, 1987, the eighth quarterly update of the NNWSI Project data catalog was submitted to WMPO by SNL staff; fulfilling Milestone R198.

The NRC announced a proposed rulemaking that will define high-level wastes. The SAIC Licensing Branch is coordinating the Project's review. Headquarters requested comments by April 10 and the Project requested an extension to June 1. The extension should not affect the Program's comments because the NRC intends to extend the rulemaking's comment period by 60 days.

#### WBS 1.2.5.2.2 Site Characterization Plan

During the first two weeks of April, comment resolution meetings were held on SCP Chapters 1 through 7, except 6. Chapters 1 and 7 had a fair number of comments. Comment resolution for Chapter 6 is scheduled for May 12-13, 1987. Revisions to Chapters 1-7, except 6, as a result of these meetings were completed and those chapters are currently in production.

Work continues on SCP Section 8.3 revisions resulting from comment resolution meetings (in February) on this section. Logic diagrams and parameter tables are being developed for each test program in Section 8.3 to link parameters called for by performance and design issues to parameters provided by the test programs (old characterization issues). The freeze-text date for Section 8.3 input was May 1. Comment resolution meetings on the new text are scheduled for the first two weeks of June. A Project integration review of Section 8.3 input is to be held the end of May and first week of June in parallel with the HQ review.

The SCP Glossary has been distributed for internal review at SAIC. Project-sensitive words have been defined and will be sent to WMPO for approval following this review. A meeting was held with SNL to ensure consistency of terms with the CDR.

Reference verification is continuing on the data and design chapters as well as Chapter 8. A meeting is expected to be held with Project participants to help expedite the reference verification process.

Work is continuing on development of Section 8.5, Schedules, Milestones, and Decision Points. A task force has been formed to review information to be included in the section and to provide any additional information necessary.

A new numbering system to be used in the SCP for test program studies and activities has been developed. The new system is consistent with HQ guidance requesting that study plans correspond exactly with the studies that are now presented under the investigations of Section 8.3. Changes to text, in terms of the new numbering system will be the responsibility of SAIC technical and production personnel during the production period prior to the second HQ review.

The list of study plans that will supplement the SCP is being revised and will be distributed for review in early May. A study plan meeting was held April 22, 1987, to discuss the approach in putting together the study plans and the Project review progress for them. The Project is concerned about the HQ guidance for study plan preparation and review which is currently a 34 week process.

Staff members at SNL have revised text and performance allocation tables, logic diagrams, and other descriptive figures with supporting text were created in response to the DOE/HQ review of SCP Section 8.3. Ninety percent of all revised text, figures, and tables for 12 issues sections and 10 non-issues sections was submitted to SAIC by May 1, 1987. The remaining materials will be submitted during the week of May 8.

USGS staff members completed revisions to Chapter 1 of the SCP in response to the assembled document review; a first draft of guidelines for activity and study plans was completed as a basis for discussion at the upcoming TPO meeting.

SAIC/Golden Regulatory and Compliance staff continues to provide management and technical support in the development and coordination of the USGS input to the NNWSI Project SCP. Work activity this month continued to center on the following task:

1. Coordination and development of geohydrology, saturated, and unsaturated zone testing strategies, site/design/performance allocation tables, and logic diagrams. This information was prepared to support the resolution of the appropriate Information Needs of the SCP Issues Hierarchy.
2. Coordination and development of the Study Plan for Site Unsaturated Zone Percolation-Exploratory Shaft studies. Study Plan activities by SAIC/ Golden staff include compilation of appropriate text,

tables, and figures from the SCP, SIP, and ESTP source documents. Specifically, the study plan is composed of eight exploratory shaft hydrologic activity descriptions. Each activity description follows a format similar to the SCP i.e., objectives, rationale, description of selected and alternative tests and analysis, methods, applications of results, schedules, milestones, and resource requirements.

3. Development and coordination of testing strategies for climatology and rock characteristics sections. This effort included performance allocation workshops with representatives of USGS, SNL, and DOE/HQ, text preparation (with some interim review by DOE/HQ), site/design/performance allocation tables, and logic diagrams. The effort was aimed at supporting resolution of appropriate needs in SCP issues hierarchy.

Major efforts by LLNL personnel were focused on resolving review comments for all sections of the SCP, and in generating a marked-up version of the sections for the May 1, 1987, freeze-text date. Comment resolution workshops on Chapter 7 held at HQ were attended by LLNL representatives. Comments were responded to and revisions to Chapter 7, including reference verification, were completed. The text was transmitted to SAIC prior to the May deadline.

Comment response revisions to Sections 8.3.4, 8.3.5.9, and 8.3.5.10 were completed by LLNL staff members. Comment resolution meetings were held at HQ for 8.3.4, 8.3.5.9, and 8.3.5.10. Mark-up text was produced and submitted before the May deadline.

The reference verification task for Chapter 4 of the SCP was completed by Los Alamos staff members this month. All verifications and text revisions as a result of the verification process were made to Chapter 4. Furthermore, all hard copies of references have been sent to SAIC for the SCP library for Chapter 4. At this time, Los Alamos participants are assuming that hard copies of references cited in Section 8.3.1.3 of the SCP are at the SAIC library.

#### WBS 1.2.5.3.2 Environmental Impact Statement

With most EIS efforts rescheduled to begin in 1989, the planning effort to develop environmental field study plans will continue in this WBS category. In the environmental planning meeting with DOE/HQ and the other Project Office in Washington, D.C., on March 17 through 19, 1987, a common format and outline for the environmental study plans was developed. The outline was transmitted this month to the environmental principal investigators conducting monitoring programs described in the Environmental Monitoring and Mitigation Plan. Draft study plans are due to DOE/HQ on July 7, 1987.

#### WBS 1.2.5.3.3 Environmental Regulatory Interactions

DOE/HQ comments on Draft II of the Environmental Regulatory Compliance Plan (ERCP) were received by SAIC on April 10, 1987. Draft II is due to HQ on June 1, 1987. The ERCP is scheduled for release to the States and Tribes on September 1, 1987.

#### WBS 1.2.5.3.4 Environmental Monitoring and Mitigation

The Revised Draft Environmental Monitoring and Mitigation Plan (EMMP) was sent to WMPO and DOE/HQ to satisfy SAIC Milestone T137 for April 7, 1987.

#### WBS 1.2.5.4.1 INSTITUTIONAL STUDIES

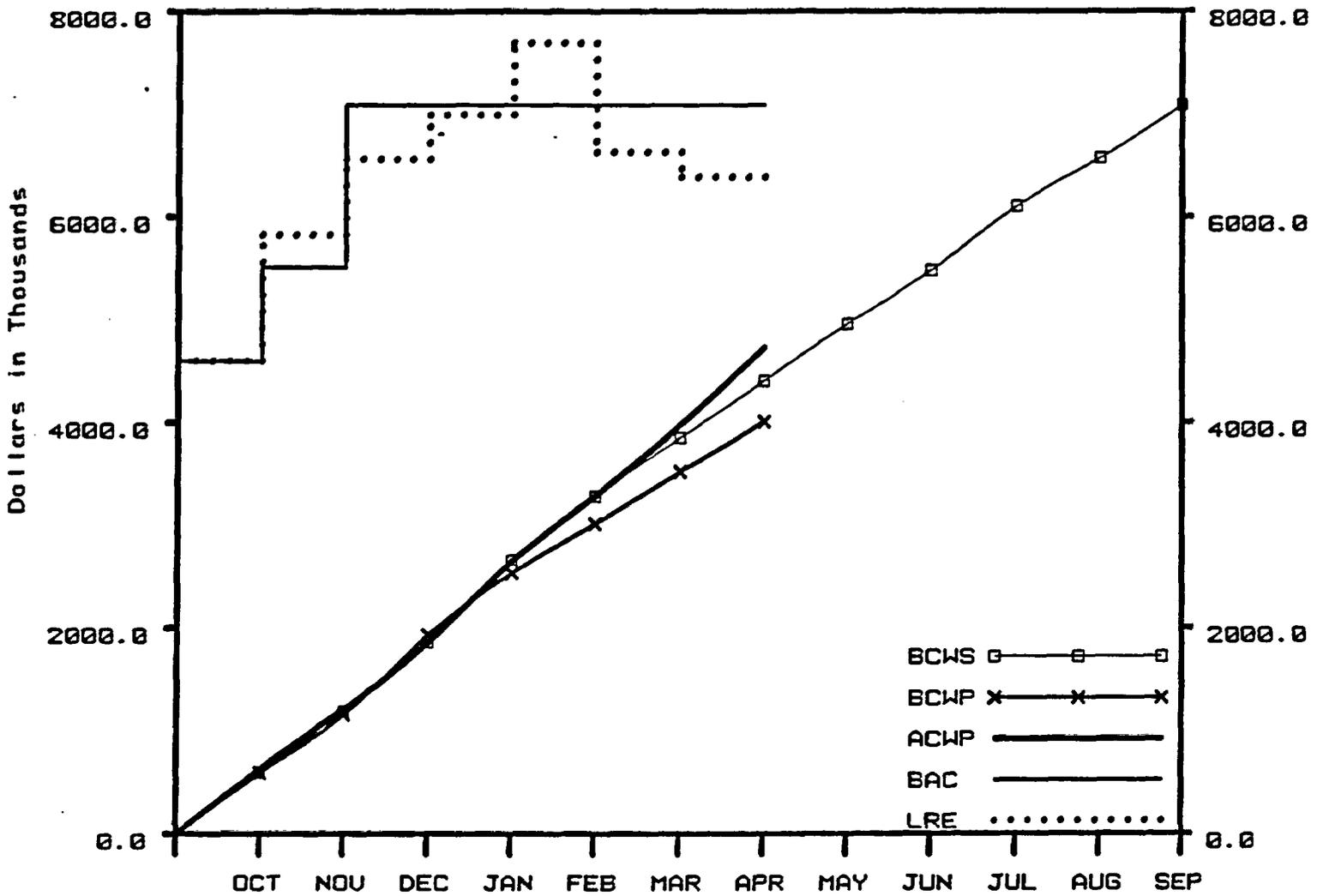
SAIC Institutional Branch staff reviewed and commented on the DOE/HQ draft "Report on the U.S. Secretary of Energy's Efforts to Comply with the Consultation and Cooperation Provisions of the Nuclear Waste Policy Act of 1982."

#### PLANNED WORK

Los Alamos personnel will continue work on the SCP to revise the geochemistry overview section, revise parameters tables, produce logic diagrams, and draft a section (1.14.7.2) proposing possible geochemical field test activities. These items must be completed by May 11 so that production time will not impact the Project review of Chapter 8 to be held at the end of May.

Study Plan efforts will be initiated by USGS staff for paleohydrology program activities under SCP Investigation 1.16.2 (effects of future climate on hydrologic characteristics); unsaturated zone exploratory shaft activities under SCP Investigation 1.13.2; surface-base zone activities under 1.13.2; and unsaturated-zone infiltration studies under 1.13.2. Additional support work will be conducted to support the Study Plan development for exploratory shaft geologic testing under SCP Investigation 1.15.2.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.5



REGULATORY AND INSTITUTIONAL INVESTIGATIONS	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	549.9	4402.8
B. BUDGETED COST OF WORK PERFORMED (BCWP)	489.2	4008.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	751.7	4727.1
D. BUDGET AT COMPLETION (BAC)		7086.0
E. LATEST REVISED ESTIMATE (LRE)		6384.6

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-394.4	-8.96
G. COST VARIANCE (B-C)	-718.6	-17.93
H. AT COMPLETION VARIANCE (D-E)	701.4	9.90

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1251 Management and Integration	389.400	370.400	238.297	-19.000	132.103
1252 Licensing	3,413.200	3,130.412	4,002.658	-282.788	-872.246
1253 Environmental Compliance	321.300	228.715	282.266	-92.585	-53.551
1254 Communication and Liaison	278.900	278.901	203.840	.001	75.061
1255 Technology and Financial Assistance	.000	.000	.000	.000	.000
125 REGULATORY AND INSTITUTIONAL INVESTIGATIONS	4,402.800	4,008.428	4,727.060	-394.372	-718.632



## 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

#### 1.2.6.1 MANAGEMENT AND INTEGRATION

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

Representatives from USGS actively participated in a briefing for the NRC and State of Nevada regarding proposed relocation of the shafts (ES-1, ES-2) and changes in the ESF configuration, on April 14-15, in Las Vegas,

The Technical Interface Control Study is on hold at H&N pending a meeting with WMPO and other Project participants on the Project Interface Control Procedure.

Staff members at REECo sent an ESF Shaft-Sinking Subcontract procurement schedule to WMPO and other Project participants for review and comments.

F&S staff completed the design verification, interdiscipline check and delivered the following studies to WMPO for review and comment; (1) Dust Abatement Study (#7), (2) Hoisting Study (#5), and (3) Structural Design Study (#11), Part II.

##### WBS 1.2.6.1.2 Quality Assurance

During April, the SAIC Engineering staff issued 115 Level II QALAS to WMPO, defined SAIC space requirements in the A/E building, and reviewed the hoist duty for ES-1 and ES-2 with REECo.

The draft technical procedure entitled "Calibration, Preparation, Installation, and Operation of the Sinco/Terraetrics Model 6-CSLT(R) Waste Isolation Extensometer," by SAIC is undergoing SNL review.

Personnel at REECo received review comments on the NNWSI Project ESF Safety and Health Program Plan from the NV Safety & Health Division (SHD) and incorporated them into the plan. SHD/NV was advised by letter of the disposition of submitted review comments.

A package of support documentation for the Allis Chalmers Double Drum Hoist #IM 19800 was reviewed by a REECo Occupational Safety Professional IV. The submitted comments indicate that the hoist appears to meet current NTS standards.

#### WBS 1.2.6.2.1 Site and Roads

Comments were received at H&N from WMPO on Special Study #1, Surface Site Layout, on April 10, 1987. Comments are being resolved and Study is being revised. Revisions should be completed by May 15, 1987.

#### WBS 1.2.6.2.2 Utilities & Communications

H&N Study #5, Waste Treatment, was submitted to WMPO for review March 13, 1987.

#### WBS 1.2.6.3.1 Buildings

Staff members at H&N received comments from WMPO on Special Study #3, Area 25 A/E Building, on April 10, 1987. Revisions are in progress and should be completed by May 11, 1987.

#### WBS 1.2.6.8.2 Project Operations

Staff members at REECo reviewed design and performance requirements for 1500 HP Allis Chalmers hoist as presented by WMPO. Electrical/mechanical condition of hoist and application to shaft sinking and level development at ESF was also discussed.

#### WBS 1.2.6.9 TESTING

##### WBS 1.2.6.9.1 Exploratory Shaft Test Plan

Exploratory shaft test plan (ESTP) committee members and principal investigators (PIs) for prototype testing toured G-Tunnel to evaluate proposed test locations and to begin to integrate activities related to prototype testing.

Review comments on the ESTP have been distributed to PIs for response. PIs are preparing to meet with the Peer Review Committee to discuss and resolve comments in early May 1987.

Drilling requirements for prototype testing were identified, and SCP Chapter 8.4 was revised by Los Alamos personnel.

##### WBS 1.2.6.9.3 Exploratory Shaft Integrated Data System

A review was completed by Los Alamos of the EG&G Quality Assurance Program Plan (QAPP) for the ESF Integrated Data System (IDS). The QAPP was approved.

Los Alamos staff completed a draft copy of the quality assurance level assignments (QALAs) for the IDS. A meeting was held on Tuesday, April 28, in Los Alamos to discuss the IDS QALAs with EG&G personnel.

#### WBS 1.2.6.9.4 Prototype Testing

##### WBS 1.2.6.9.4.1 Prototype Geologic Testing

The U.S. Bureau of Reclamation (USBR) reported that (1) the shaft mapping platform design was completed and construction is underway, (2) initial work on the study plan was begun, (3) the strike rail goniometer design was completed and construction is underway, (4) a contract for photogrammetry testing with VEXEL Corporation is underway, and (5) design and construction considerations for the ESF were reviewed by the geology and engineering staffs.

##### WBS 1.2.6.9.4.2 Prototype Hydrologic Testing

USBR staff completed draft Draft Technical Procedures (DTPs) for (1) Blast Effects on Instrumentation and (2) Prototype Intact Fracture Sampling Methods (Field). The SIP for the Mining Demonstration Room (MDR) is 80 percent complete after major revision in plan objectives and emphasis. The DTP for the MDR is 50 percent complete. Work continued on design of the instrumentation packer system for Drill Hole Instrumentation. The G-Tunnel Prototype Integration meeting was attended to discuss time and space requirements and scheduling. The Timeline prototype testing schedule was delivered to SAIC/Las Vegas for incorporation into the main Project schedule. The engineering and geology staff reviewed the ESF design and construction considerations package. A sample table for developing outlines for ES SIPs was filled out using Bulk Permeability Room instrumentation as an example.

Drilling requirements for prototype testing were delivered to USGS for transmittal to Los Alamos.

#### PLANNED WORK

Thermal Stress Prototype Testing activities will be initiated by SNL staff.

Los Alamos staff will write a study plan for the exploratory shaft diffusion test.

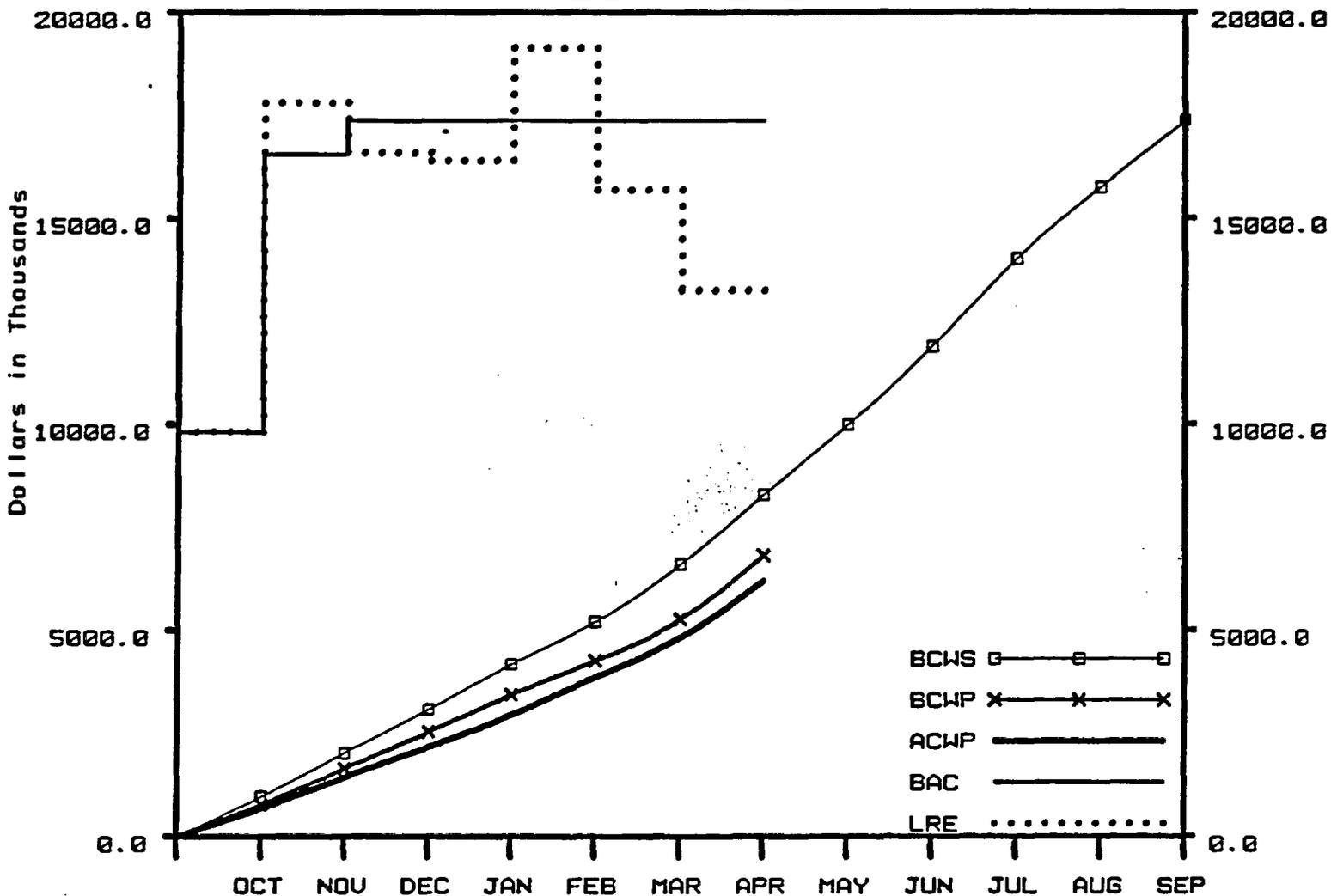
H&N staff will complete Special Study #2, Environmental Permitting Requirements, and a revised mock-up for Title I ESF Surface design.

REECO staff will conduct further review of mine hoist documentation to determine QA Level II compliance. This may require a trip to Denver, Colorado, to research additional reports and certifications.

#### PROBLEM AREAS

The SIP for prototype testing of geologic mapping was approved by WMPO in March and the criteria letter has been sent to Los Alamos but USGS still does not have approval to begin work.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.6



### EXPLORATORY SHAFT INVESTIGATIONS

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1685.6	8283.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1556.5	6821.2
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1367.8	6192.7
D. BUDGET AT COMPLETION (BAC)		17370.0
E. LATEST REVISED ESTIMATE (LRE)		13239.3

### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-1461.8	-17.65
G. COST VARIANCE (B-C)	628.5	9.21
H. AT COMPLETION VARIANCE (D-E)	4130.7	23.78

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1261 Management and Integration	2,819.430	2,581.280	2,532.527	-238.150	48.753
1262 Site Preparation	113.800	53.300	62.800	-60.500	-9.500
1263 Surface Facilities	68.900	39.200	33.900	-29.700	5.300
1264 First Shaft	139.000	139.000	94.972	-.000	44.028
1265 Second Shaft	62.000	62.000	43.630	-.000	18.370
1266 Subsurface Excavations	187.000	187.000	189.101	.000	-2.101
1267 Underground Service Systems	363.900	261.480	153.392	-102.420	108.088
1268 Operations	15.000	15.000	7.000	.000	8.000
1269 Testing	4,513.980	3,482.961	3,075.415	-1,031.019	407.546
126 EXPLORATORY SHAFT INVESTIGATIONS	8,283.010	6,821.221	6,192.737	-1,461.789	628.484

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION													
				O	N	D	J	F	M	A	M	J	J	A	S	
M105	WMPO/ LANL	1.2.6.1	Submit Prototype Test Plans to DOE/HQ for Review and Comment					△								
M243	WMPO/ LANL	1.2.6.1	Complete Exploratory Shaft Readiness Review													△
RB41	WMPO/ SAIC	1.2.6.1	DOE/HQ Receives Final FY 89 Project Validation Material						▲							
M282	WMPO/ LANL	1.2.6.1	Start Field Prototype Testing in G-Tunnel						△							
R241	WMPO/ LANL	1.2.6.1	Exploratory Shaft Facility (ESF) Subsystems Design Requirements Document			△				◆						
M773	WMPO/ SAIC	1.2.6.1	Final ESF Title II Design Requirements Document Submitted To DOE/HQ									△			◇	
P763	WMPO/ SAIC	1.2.6.1	Exploratory Shaft Title I Design Summary Submitted to WMPO									△			◇	

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

6-5

◇ T80

◇ 3/88

◇ T80

## 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.

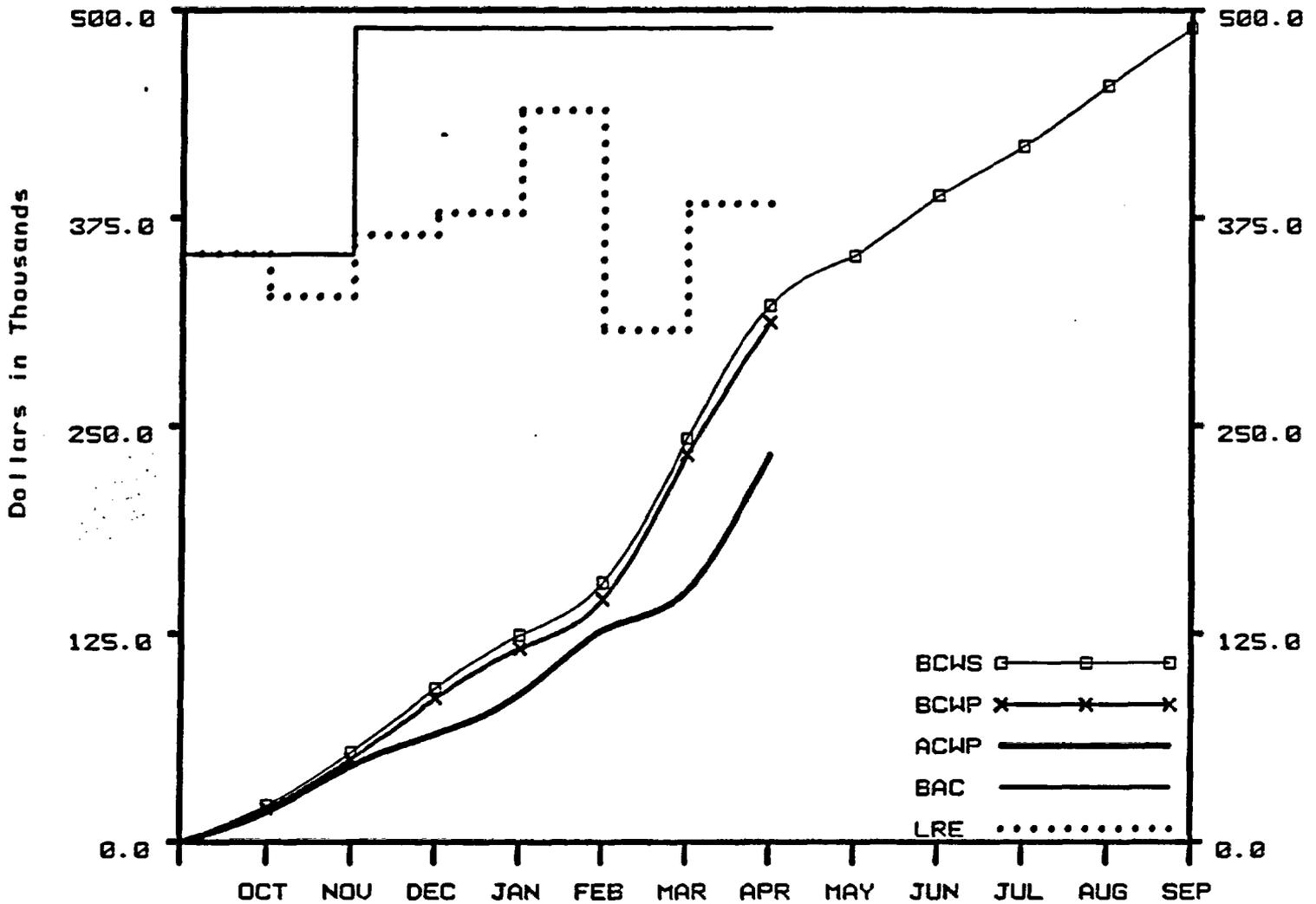
### ACTIVITIES

#### WBS 1.2.7.2.1 Spent Fuel Test

The remaining LLNL Spent Fuel Test-Climax (SFT-C) reports are in various stages of completion for printing at follows;

1. The final report (UCRL-537020) is in final review and layout. Estimated distribution is July 31, 1987.
2. The executive summary (UCRL-53762) is in TID for minor changes. Distribution should be in May 1987.
3. The report on post-test thermal analyses (UCRL-53728) has been delayed from printing because of problems with some of the figures.
4. The geomechanics report is in final editing.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.7



**TEST FACILITIES**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	79.7	322.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	79.7	312.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	81.6	232.1
D. BUDGET AT COMPLETION (BAC)		489.0
E. LATEST REVISED ESTIMATE (LRE)		383.2

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-10.0	-3.11
G. COST VARIANCE (B-C)	79.9	25.60
H. AT COMPLETION VARIANCE (D-E)	105.8	21.64

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1271 Management and Integration	.000	.000	.000	.000	.000
1272 Testing	321.990	311.990	232.121	-10.000	79.869
1273 New Facility Acquisitions	.000	.000	.000	.000	.000
127 TEST FACILITIES	321.990	311.990	232.121	-10.000	79.869

## 1.2.8 LAND ACQUISITION

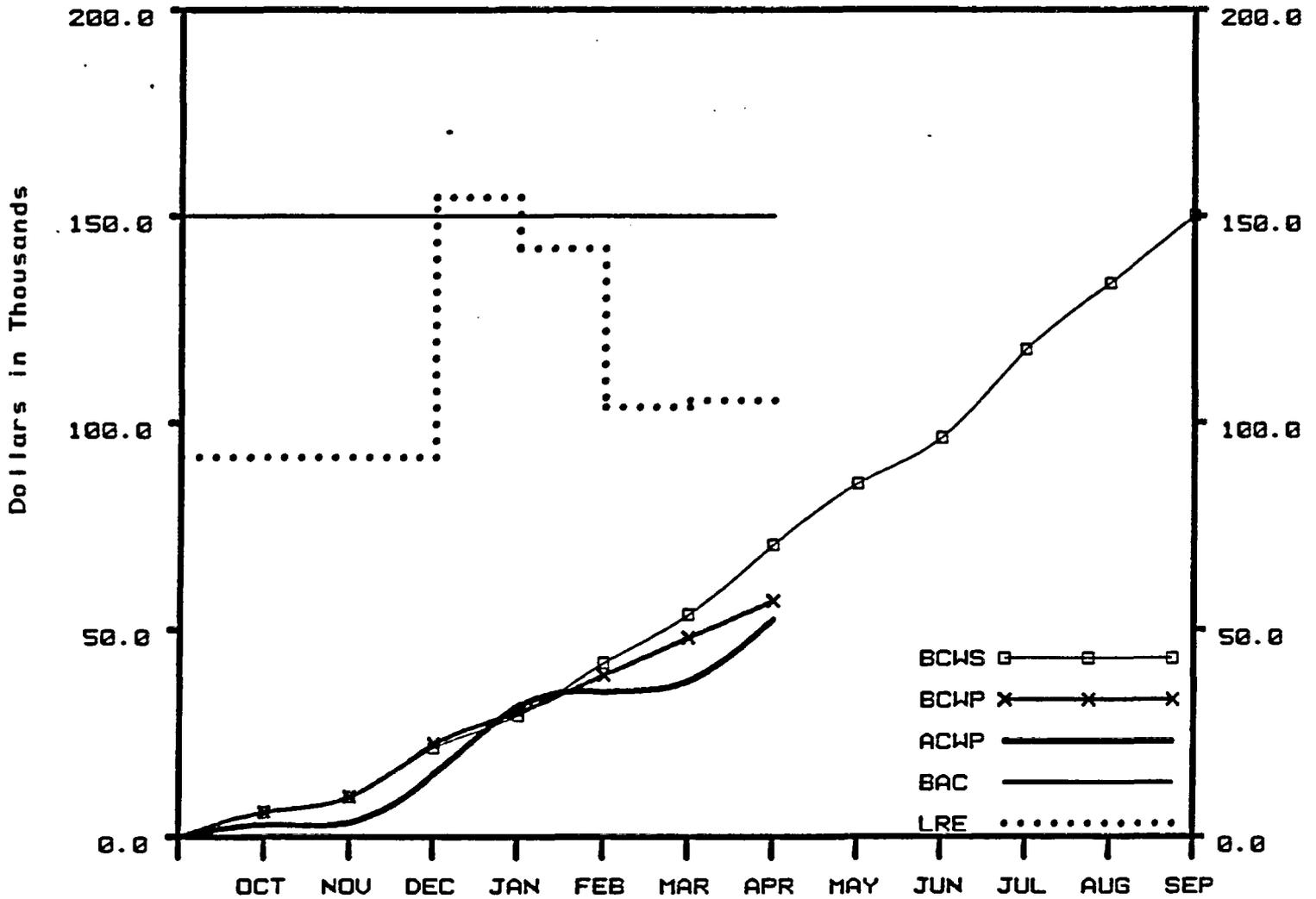
### OBJECTIVE

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

Activities during the month of April included a meeting on "Lessons Learned" from the Waste Isolation Pilot Project (WIPP) in Albuquerque, N.M., and a tour of the proposed low-level storage facility. Completed an initial draft Plan of Development and distributed internally at SAIC for comments. SAIC staff participated with DOE/NV, Nellis AFB, and BLM representatives in an organizational meeting on the development of a Range Management Plan for the Nellis range. The range is directly adjacent to the Yucca Mountain area (a portion of the Yucca Mountain area is within the Nellis range) and management plans may effect the Yucca Mountain area.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.8



**LAND ACQUISITION**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	16.9	70.5
B. BUDGETED COST OF WORK PERFORMED (BCWP)	9.0	57.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	14.9	52.4
D. BUDGET AT COMPLETION (BAC)		150.0
E. LATEST REVISED ESTIMATE (LRE)		105.3

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-13.5	-19.15
G. COST VARIANCE (B-C)	4.6	8.04
H. AT COMPLETION VARIANCE (D-E)	44.7	29.82

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1281 Land Acquisition	70.500	57.000	52.416	-13.500	4.584
128 LAND ACQUISITION	70.500	57.000	52.416	-13.500	4.584

## 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

On April 3, 1987, F&S submitted Special Study #5, ESF Hoisting System, to WMPO and designated participants for review and comment.

On April 7, 1987, F&S submitted Special Study #7, ESF Dust Abatement, to WMPO and designated participants for review and comment.

Staff at F&S submitted Revision No. 1 to Special Study #1, ESF Development, to WMPO for approval and acceptance and Special Study #11, ESF Structural Design Part II, was submitted for review and comment.

The H&N Project Management Plan was completed and submitted to WMPO on April 24, 1987.

#### WBS 1.2.9.1.1 Project Management

The Project Management Plan comments received from Project participants and WMPO are being incorporated and resolved internally at SAIC. The Plan will be updated to include the new Mission Plan schedule, current Project thinking on Systems Engineering Management and Configuration Management, new schedules, and most current Performance Measurement approach. The scheduled delivery date is June 30, 1987, to WMPO for DOE/NV and WMPO approval.

REECo staff expedited computer indexing of all WMPO records during April to meet a requirement from DOE/HQ to be prepared for "discovery" associated with suits against the DOE. A total of 5,193 documents were entered in the computer.

#### WBS 1.2.9.1.4 Records Management

Approximately 5,000 Los Alamos documents, consisting of 13 cartridges of microfilm, have been copied, indexed, and transferred to the Central Records Facility in Nevada.

The Correspondence Control Facility at SAIC began full operation.

Approximately 21,000 documents have been indexed in the SAIC Information Management System (IMS) Automated Records System (ARS).

Automated Records System, Version 1 to support to the IMS was installed on SAIC/T&MSS computer.

Purchase orders for the IMS Bridge Program equipment were approved by DOE and issued.

A review of LSS Commitments Tracking Subsystem Responsibilities and Procedures and LSS Issues Tracking Subsystem Responsibilities and Procedures was completed by members of the SAIC Information Management Section.

Attorneys for the State of Nevada received instruction on the use of the ARS data base and were provided approximately 5,000 pages of information for their review.

Although quality Level I and II records are being processed, they have not been entered into the Quality Assurance records software, REVELATION, because of a computer hardware malfunction. This problem is being corrected by the SNL Records Management staff with technical assistance from SAIC.

Plans are being made to identify and ultimately retrieve SNL environmental assessment documents for anticipated discovery activities through WMPO.

Records management activities by SAIC/Golden centered around changing records documentation requirements and devising a mechanism to qualify and incorporate pre-1980 records and data into the Project records.

Information is being gathered by REECO staff relating to the Discovery Process For Pending Litigation (WMPO Action 87-1470) for submission to WMPO by May 4, 1987.

H&N staff began work on identification and segregation of any records that might relate to environmental assessment or site selection. H&N has identified approximately 500 documents consisting of about 2,000 pages.

#### WBS 1.2.9.2 PROJECT CONTROL

Modifications to the milestone list, developed for and presented as the input to Chapter 8.5 of the SCP, were finalized by SAIC/Golden and submitted to the USGS. This action completes the input to satisfy Action Item 87-1428T.

A list was compiled by SAIC/Golden which contained all the 1987 and 1988 USGS milestones needing criteria and distributed to the appropriate USGS personnel. Criteria for these milestones were obtained and will be submitted to SAIC/Las Vegas in response to Action Items 87-1417T and 87-1418T.

SAIC personnel completed graphical and tabular comparisons of NNWSI Project budget history and SCP/Site Characterization costs to assist the WMPO in the GAO audit.

#### WBS 1.2.9.3 QUALITY ASSURANCE

An SNL contract with MAC Technical Services (MACTEC) for QA auditing services was initiated by means of a letter contract. Initial coordination took place between SNL and MACTEC in order to complete familiarization of MACTEC

personnel, to verify Lead Auditor qualifications, and to plan and prepare for an internal QA audit of SNL NNWSI Project Department and two audits of two contractors.

An internal REECo surveillance of the training organization was performed and no findings or observations were reported. The training program complied with 568-DOC-115, QAPP.

REECo completed a draft of QAPP 568-DOC-115, Revision 5, and issued it for internal review and comment.

QASC completed the verification process for corrective and preventive actions for NCR WMPO-009. This NCR is now closed. All QALAS have been formally approved by WMPO.

Corrective action in regard to WMPO NRCs -035 and -042, and WMPO CAR-87-001 has been completed. WMPO has been requested by T&MSS QA to close these documents.

On April 22, 1987, QA issued NCR SAIC-017 to the Computer Services branch in regard to violating QA requirements during the procurement of QA Level I computer equipment.

SAIC QA staff participated in a meeting with DOE/HQ to resolve comments on Chapter 8.6 of the SCP.

The second WMPO audit for FY 87 was conducted at Lawrence Livermore National Laboratory (LLNL) on April 27 thru May 1, 1987. The Holmes & Narver, Inc. Audit 87-2, has been rescheduled for September and the audit of SAIC/T&MSS (87-4), has been rescheduled for the month of June. The next audit to be performed will be Audit No. 87-5 at Sandia National Laboratory on June 1, 1987.

Of the five audits conducted in FY 86, four remain open. Of the 15 audits conducted in FY 85, four remain open.

Three surveillances were conducted during April at SAIC/T&MSS, Las Vegas, Nevada, and USGS, Denver, Colorado. Ten items or activities were monitored revealing no Standard Deficiency Reports. Three reports documenting the surveillances, are in various stages of processing.

To date, 18 surveillances have been conducted in FY 87 and 58 items or activities monitored. During this effort, nine Standard Deficiency Reports have been recorded.

QASC Overview completed a third version of Quality Management Procedure (QMP) 06-03, "Document Review/Acceptance/Approval" and submitted it to the WMPO for review and comment.

QASC has continued to issue QALAS for the ESF and has issued a status list of the QALAs. A total of 76 QALAs are listed with 10 Level I; 36 Level II; and, 30 Level III. Thirty-five QALAs are in the review and approval cycle where the major delay is being caused by the WMPO which has not been able to find time to return the Document Review Sheets. Personal contacts have been made

to impress the WMPO of the need for issuance of the QALAs, but only a small amount of progress has been made.

#### PLANNED WORK

At the request of the USGS QA Office, efforts are being directed by SAIC/Golden at resolving Project records maintenance issues and problems. Recommendations should be available by mid-May.

REEC staff will prepare the QA Records Management Handbook for distribution to all departments, upon receipt of approval from the WMPO.

REEC staff will complete and submit QAPP 568-DOC-115, Revision 5, to WMPO for approval. They will also rewrite all QA procedures (NQPs) and departmental procedures for compliance with Revision 5 of the QA program and develop a training program for the familiarization of personnel to the requirements of Revision 5.

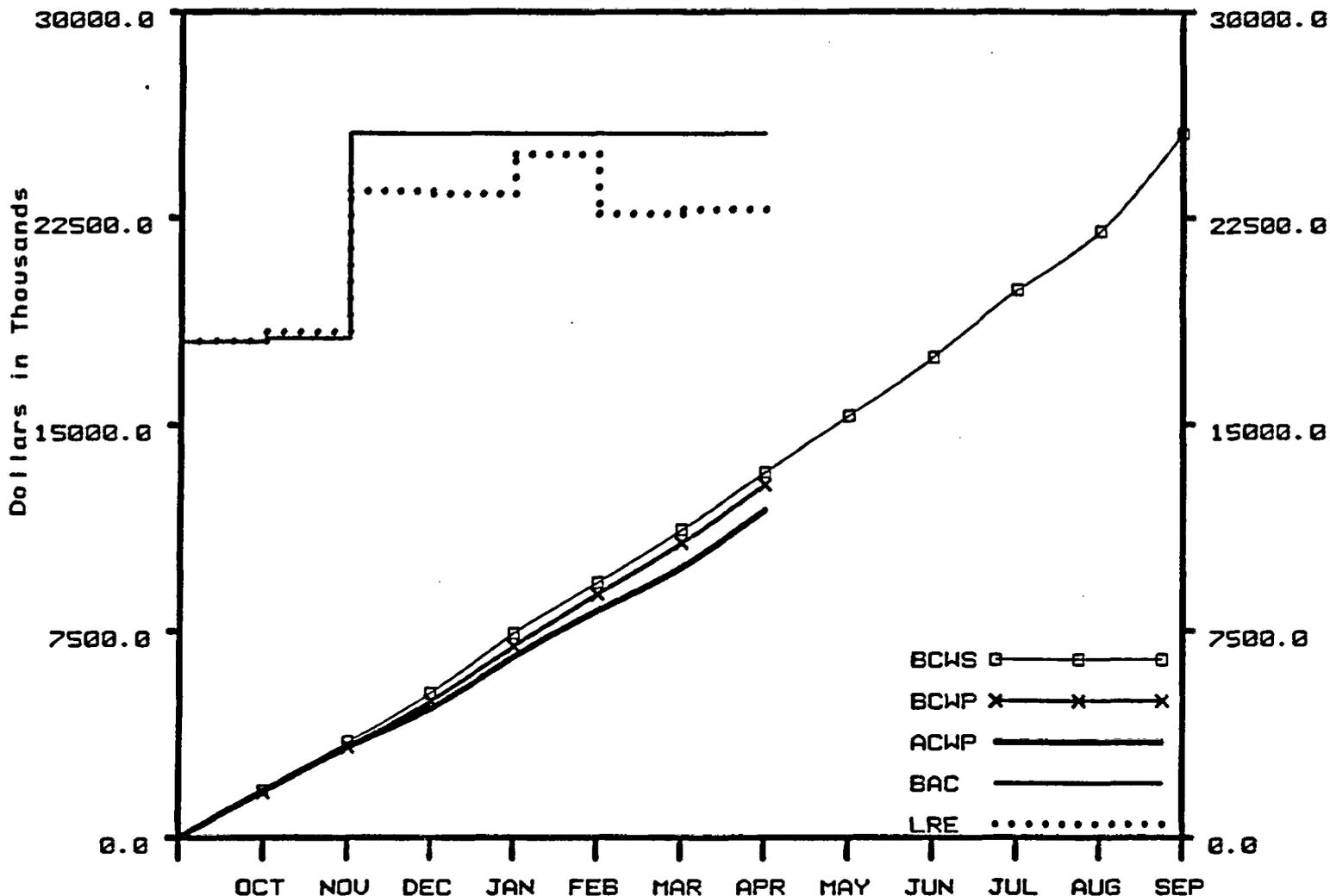
#### PROBLEM AREAS

A significant problem continues concerning formal submissions to WMPO for review and/or approval, WMPO is taking more than three months to reply to requests for approval or nonconformance reports, QAPPs, and technical reports.

#### MILESTONE PROGRESS

SNL Milestone T138, management assessment of QA, was completed.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.9



**PROJECT MANAGEMENT**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	2098.1	13253.9
B. BUDGETED COST OF WORK PERFORMED (BCWP)	2133.9	12807.7
C. ACTUAL COST OF WORK PERFORMED (ACWP)	2080.6	11872.4
D. BUDGET AT COMPLETION (BAC)		25551.0
E. LATEST REVISED ESTIMATE (LRE)		22780.0

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-446.2	-3.37
G. COST VARIANCE (B-C)	935.3	7.30
H. AT COMPLETION VARIANCE (D-E)	2771.0	10.84

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1291 Management and Integration	6,834.430	6,675.901	5,987.552	-158.529	688.349
1292 Project Control	2,212.800	2,186.261	2,429.793	-26.539	-243.532
1293 Quality Assurance	3,653.640	3,392.539	2,902.040	-261.101	490.499
1299 NTS Allocation	553.000	553.007	553.000	.007	.007
129 PROJECT MANAGEMENT	13,253.870	12,807.708	11,872.385	-446.162	935.323

9-6

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O N D J F M A M J J A S													
				O	N	D	J	F	M	A	M	J	J	A	S		
R448	WMPO/ SAIC	1.2.9.1	Final NNWSI Project Management Plan to WMPO/NV and DOE/HQ			△								◇			
R849	WMPO/ SAIC	1.2.9.1	Submit FY 87 Baseline Budget Information and Cost Plans to OGR for Information			▲											
R850	WMPO/ SAIC	1.2.9.1	Approved Revised Project Charter				△				◆						
M712	WMPO SAIC	1.2.9.1	Submit FY 89 Budget to DOE/HQ							▲							
R647	WMPO/ SAIC	1.2.9.1	Licensing Support System Document Collection Procedure to Headquarters for Approval								△						◇ TBD
M725	WMPO/ SAIC	1.2.9.2	Implement Phase II of Earned Value System		△								◇				
R810	WMPO SAIC	1.2.9.1	Submit NNWSI Project Plan to WMPO/NV and DOE/HQ														△
R842	WMPO/ SAIC	1.2.9.1	Implement Document Collection for the Licensing Support System												△		◇ TBD

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

1.2.10 FINANCIAL AND TECHNICAL ISSUES

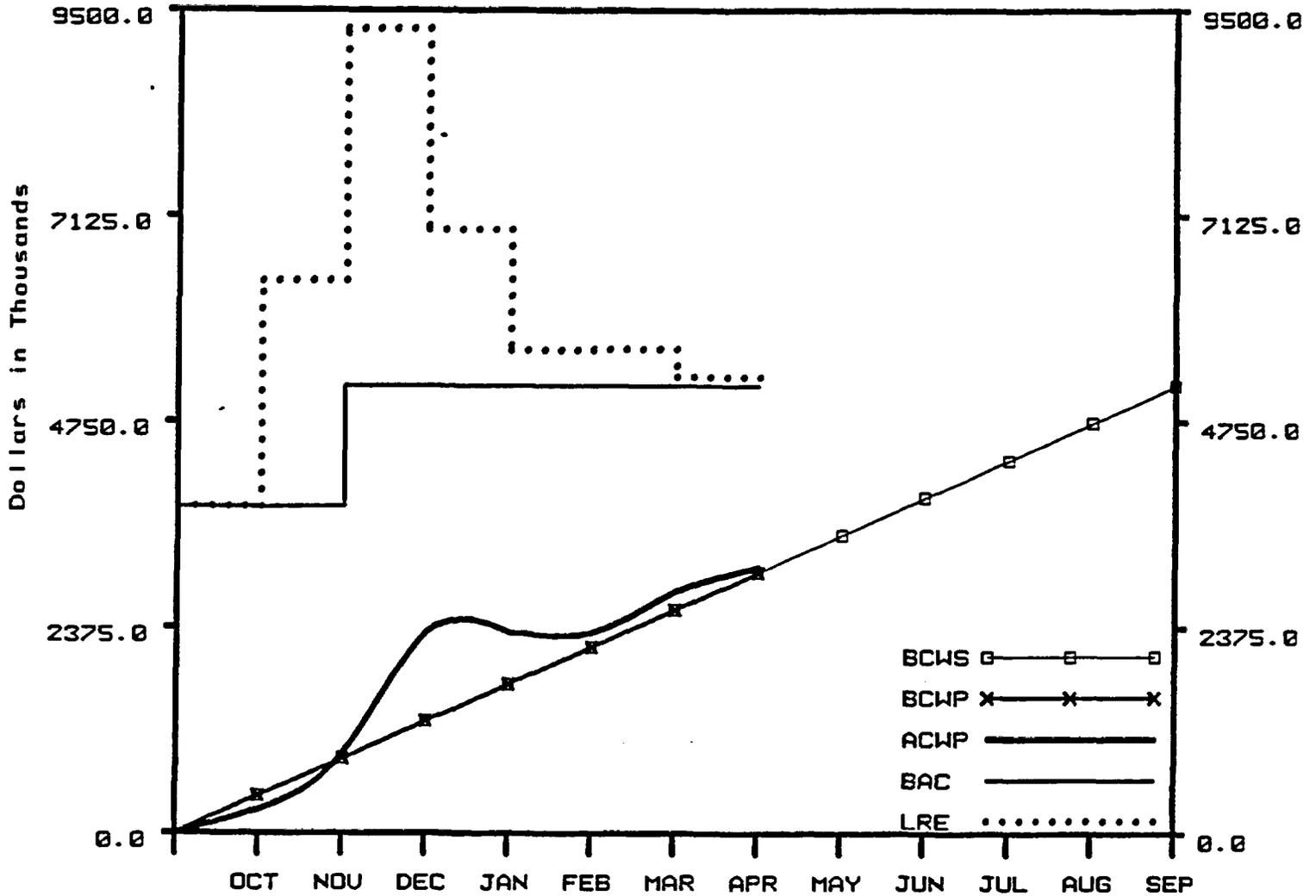
OBJECTIVES

This WBS element includes grant assistance to the State of Nevada.

ACTIVITIES

None to report.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.10



**FINANCIAL & TECHNICAL ASSISTANCE**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	430.0	3010.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	430.0	3010.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	278.9	3068.0
D. BUDGET AT COMPLETION (BAC)		5162.0
E. LATEST REVISED ESTIMATE (LRE)		5261.5

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-58.0	-1.93
H. AT COMPLETION VARIANCE (D-E)	-99.5	-1.93

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
12101 Financial & Technical Assistance	3,010.000	3,009.998	3,067.992	-.002	-57.994
1210 FINANCIAL & TECHNICAL ASSISTANCE	3,010.000	3,009.998	3,067.992	-.002	-57.994

U.S. DEPARTMENT OF ENERGY

**DO  
OR  
WM  
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OGR**



# **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 FISCAL MONTH AND YEAR		SIGNATURE					
MWSI Project				NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS		APR 1987							
LOCATION P O Box 14100 Las Vegas NV 89114								TITLE PROJECT MANAGER					
								Date May 20, 1987					
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	888 000	583 877	626 827	-97 223	-43 151	3,713 608	3,521 435	3,488 991	-192 165	31,444	7,023 000	6,902 488	1,020 548
122 WASTE PACKAGE	884 000	729 599	809 185	-75 381	-159 584	4,682 200	4,648 385	4,123 446	-33 895	524 859	8,535 000	8,168 185	1,366 835
123 SITE INVESTIGATIONS	2,568 500	2,196 008	1,966 633	-364 552	229 375	16,496 978	13,618 972	11,913 381	-2,877 998	1,785 598	29,835 000	22,748 855	7,584 845
124 REPOSITORY INVESTIGATIONS	871 700	1,164 808	1,383 149	185 188	-216 261	5,026 600	5,486 812	5,336 317	488 312	158 595	12,472 000	10,546 412	1,925 588
125 REGULATORY AND INSTITUTIONAL INVESTIGATIONS	549 900	489 157	751 895	-68 743	-262 538	4,482 800	4,088 428	4,727 866	-394 372	-718 632	7,886 000	6,314 585	771 415
126 EXPLORATORY SHAFT INVESTIGATIONS	1,885 550	1,556 488	1,367 842	-129 998	188 819	8,283 818	8,821 221	6,192 737	-1,461 788	628 484	17,378 000	13,238 342	4,138 658
127 TEST FACILITIES	79 678	79 678	81 899	800	-1 938	321 998	311 898	232 121	-18 898	79 889	489 000	383 174	105 826
128 LAND ACQUISITION	16 900	9 800	14 867	-7 900	-5 867	78 500	57 800	52 416	-13 500	4 584	158 000	185 288	44 732
129 PROJECT MANAGEMENT	2,088 888	2,133 988	2,888 567	35 828	53 342	13,253 878	12,887 788	11,872 385	-446 162	835 323	25,551 000	22,778 995	2,771 005
1210 FINANCIAL & TECHNICAL ASSISTANCE	438 888	438 888	278 848	-800	151 852	3,818 888	3,888 888	3,867 992	-802	-57 994	5,182 888	5,261 453	-88 453
12 MWSI - SUBTOTAL	9,878 188	9,374 388	9,441 231	-503 792	-86 883	58,261 548	54,291 888	51,887 847	-4,888 572	3,284 121	115,573 888	95,848 888	19,632 888
UNDISTRIBUTED BUDGET											1,883 888	1,883 888	888
CAPITAL EQUIPMENT								1,821 813			11,845 888	11,845 888	888
MWSI - TOTAL	9,878 188	9,374 388	9,441 231	-503 792	-86 883	58,261 548	54,291 888	52,829 788	-4,888 572	3,284 121	128,511 888	108,878 888	19,632 888

NOTE CAPITAL EQUIPMENT COSTS HAVE A ONE MONTH LAG.  
COSTS REPORTED ARE YTD THROUGH MARCH

1-11

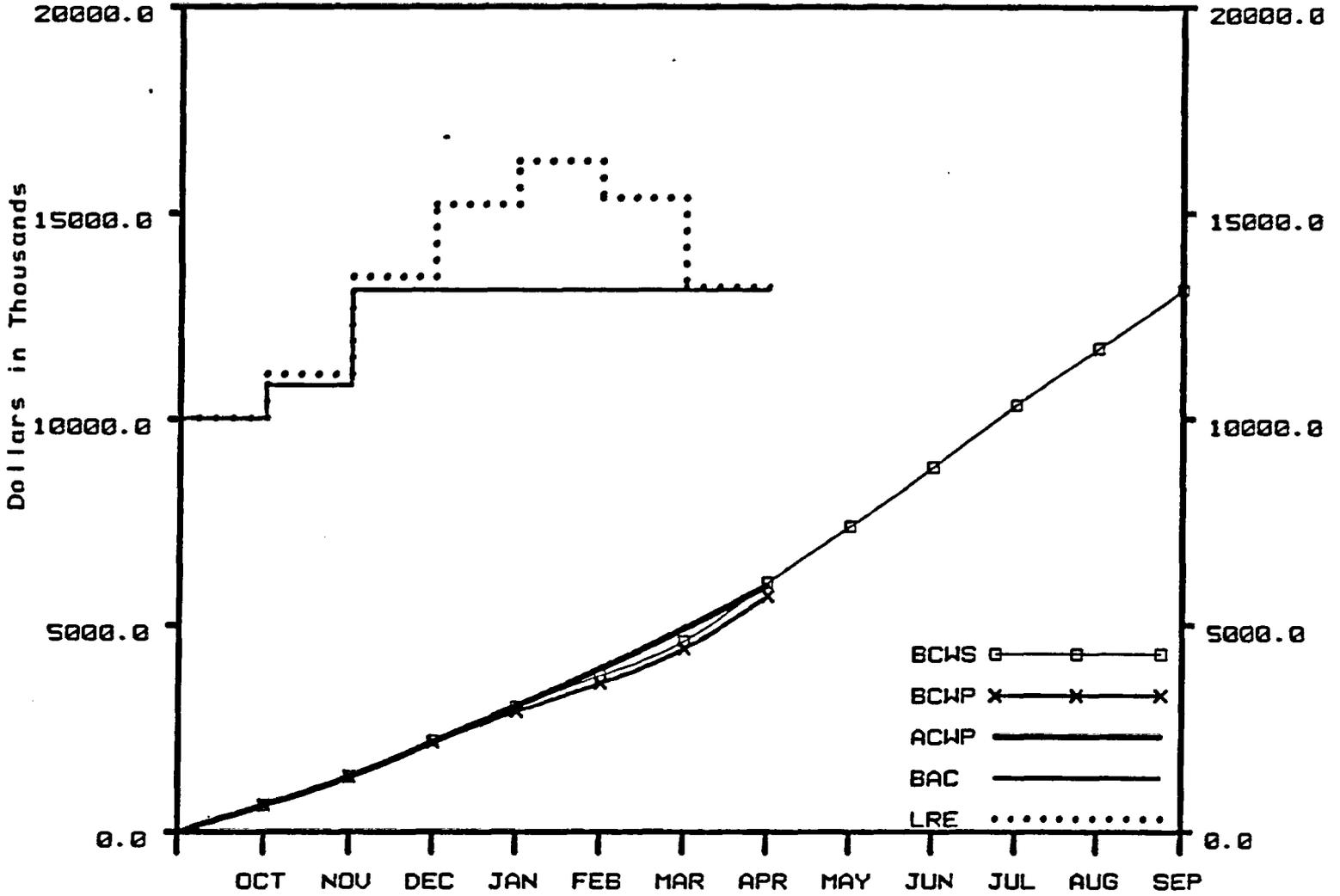


**COST PERFORMANCE REPORT - LEVEL 4  
WORK BREAKDOWN STRUCTURE (FORMAT 1)  
U.S. DEPARTMENT OF ENERGY**

CONTRACTOR		CONTRACT TYPE NO	PROJECT NAME/NUMBER			REPORT FISCAL MONTH AND YEAR					SIGNATURE			
MWSI Project			NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS			APR 1987								
LOCATION													TITLE	
P. O. Box 14100 Las Vegas, NV 89114													PROJECT MANAGER	
													Date May 20, 1987	
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		BUD COST OF WORK SCHEDULED	BUD COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES		BASELINED BUDGET	LATEST REVISED ESTIMATE	VARIANCE	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
127 TEST FACILITIES	70 670	70 670	81 600	000	-1 930	321 990	311 900	232 121	-10 000	70 000	400 000	383 174	105 826	
1201 Land Acquisition	16 000	0 000	14 067	-7 000	-5 067	70 500	57 000	52 416	-13 500	4 504	150 000	105 200	44 732	
120 LAND ACQUISITION	16 000	0 000	14 067	-7 000	-5 067	70 500	57 000	52 416	-13 500	4 504	150 000	105 200	44 732	
1201 Management and Integration	1 002 140	1,133 509	911 582	51 429	221 987	6,834 430	6,675 001	5,097 952	-150 520	800 340	12,315 000	10,726 671	1,588 329	
1202 Project Control	351 000	306 060	300 323	-45 000	-74 263	2,712 000	2,106 281	2,429 793	-26 530	-243 532	5,000 000	4,410 500	-420 500	
1203 Quality Assurance	505 000	615 279	709 663	29 399	-94 384	3,853 640	3,392 530	2,062 040	-261 101	400 400	7,023 000	5,411 823	1,611 177	
1209 NIS Allocation	70 000	70 001	70 000	001	001	553 000	553 007	553 000	007	007	2,223 000	2,223 000	000	
120 PROJECT MANAGEMENT	2,096 000	2,133 000	2,000 567	35 029	53 342	13,253 870	12,007 700	11,872 305	-446 162	835 323	25,551 000	22,770 005	2,771 005	
12101 Financial & Technical Assistance	430 000	430 000	278 048	- 000	151 052	3,010 000	3,000 000	3,067 092	- 002	-57 004	5,162 000	5,261 453	-99 453	
1210 FINANCIAL & TECHNICAL ASSISTANCE	430 000	430 000	278 048	- 000	151 052	3,010 000	3,000 000	3,067 092	- 002	-57 004	5,162 000	5,261 453	-99 453	
12 MWSI - SUBTOTAL	9,878 160	9,374 368	9,441 231	-503 792	-66 863	50,261 540	54,291 968	51,007 047	-4,069 572	3,204 121	115,573 000	95,940 000	19,632 001	
UNDISTRIBUTED BUDGET											1,003 000	1,003 000	000	
CAPITAL EQUIPMENT								1,021 013			11,045 000	11,045 000	000	
MWSI - TOTAL	9,878 160	9,374 368	9,441 231	-503 792	-66 863	50,261 540	54,291 968	52,028 700	-4,069 572	3,204 121	128,511 000	108,078 000	19,632 001	

NOTE CAPITAL EQUIPMENT COSTS HAVE A ONE MONTH LAG COSTS REPORTED ARE YTD THROUGH MARCH.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.A



**LOS ALAMOS - TOTAL**

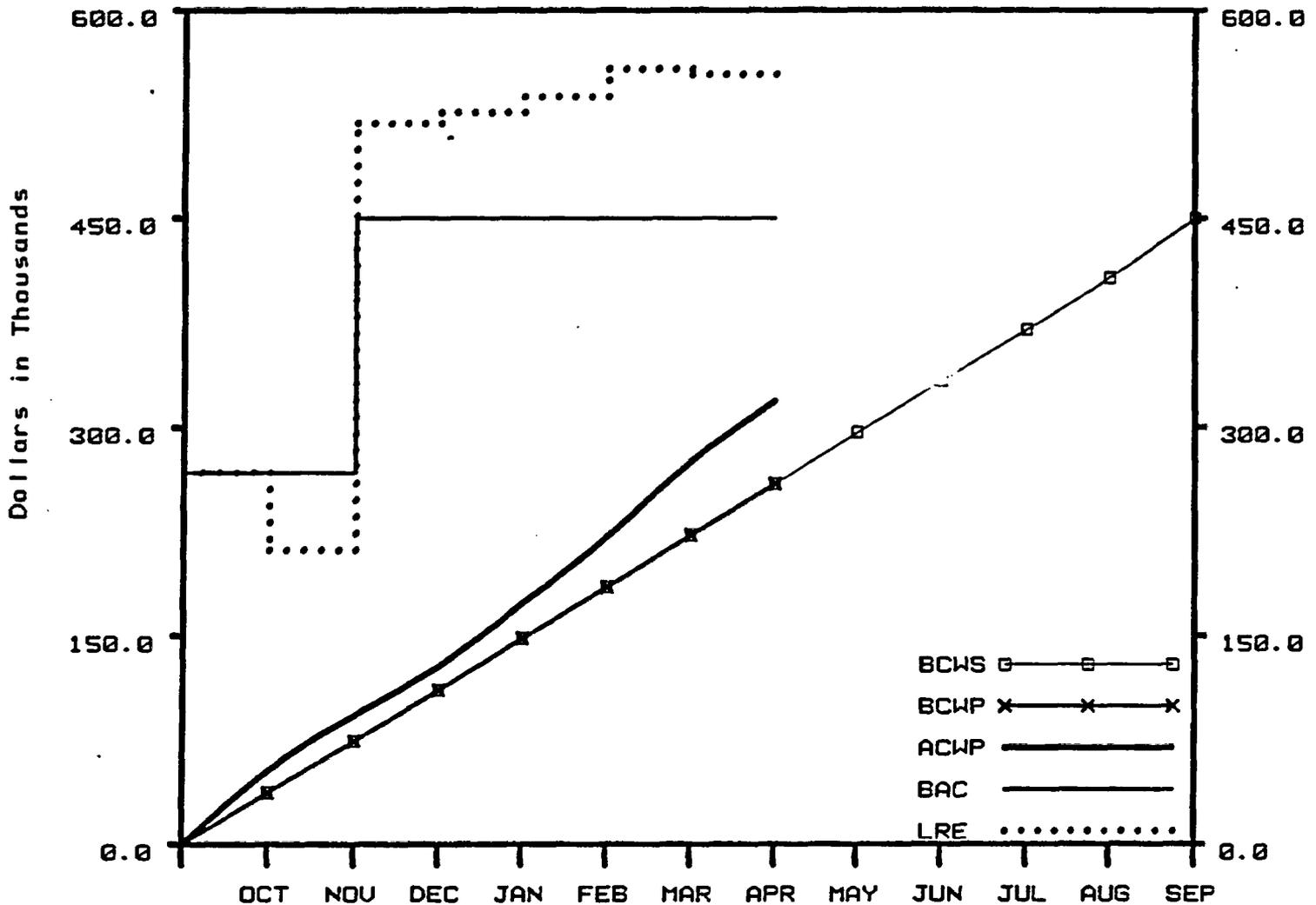
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1419.1	6028.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1281.7	5713.6
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1056.7	5968.3
D. BUDGET AT COMPLETION (BAC)		13128.0
E. LATEST REVISED ESTIMATE (LRE)		13183.1

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-315.0	-5.23
G. COST VARIANCE (B-C)	-254.7	-4.46
H. AT COMPLETION VARIANCE (D-E)	-55.1	-0.42

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.B



LBL - TOTAL

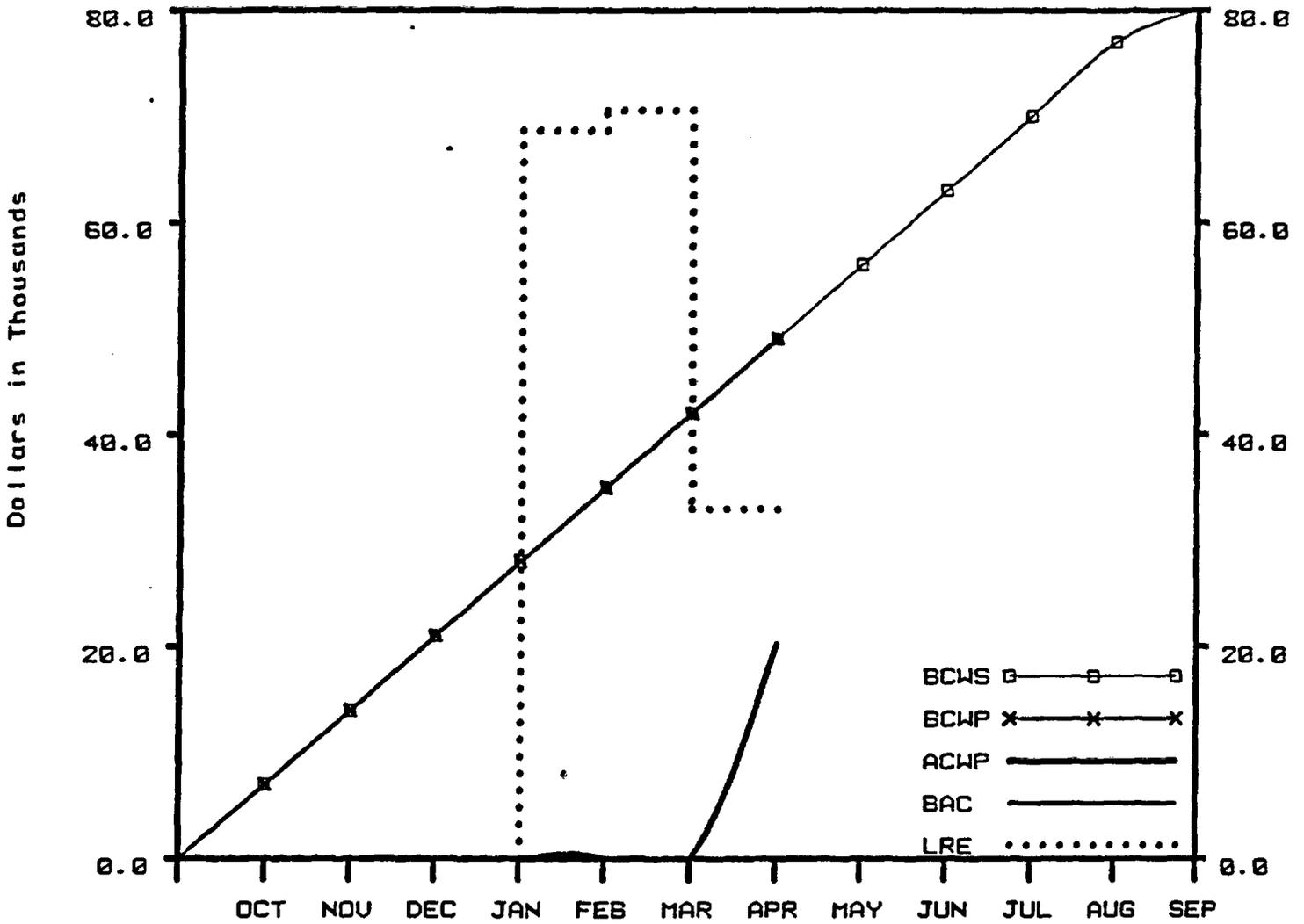
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	37.0	259.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	37.0	259.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	43.5	318.6
D. BUDGET AT COMPLETION (BAC)		450.0
E. LATEST REVISED ESTIMATE (LRE)		553.6

VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-59.6	-23.02
H. AT COMPLETION VARIANCE (D-E)	-103.6	-23.02

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.C

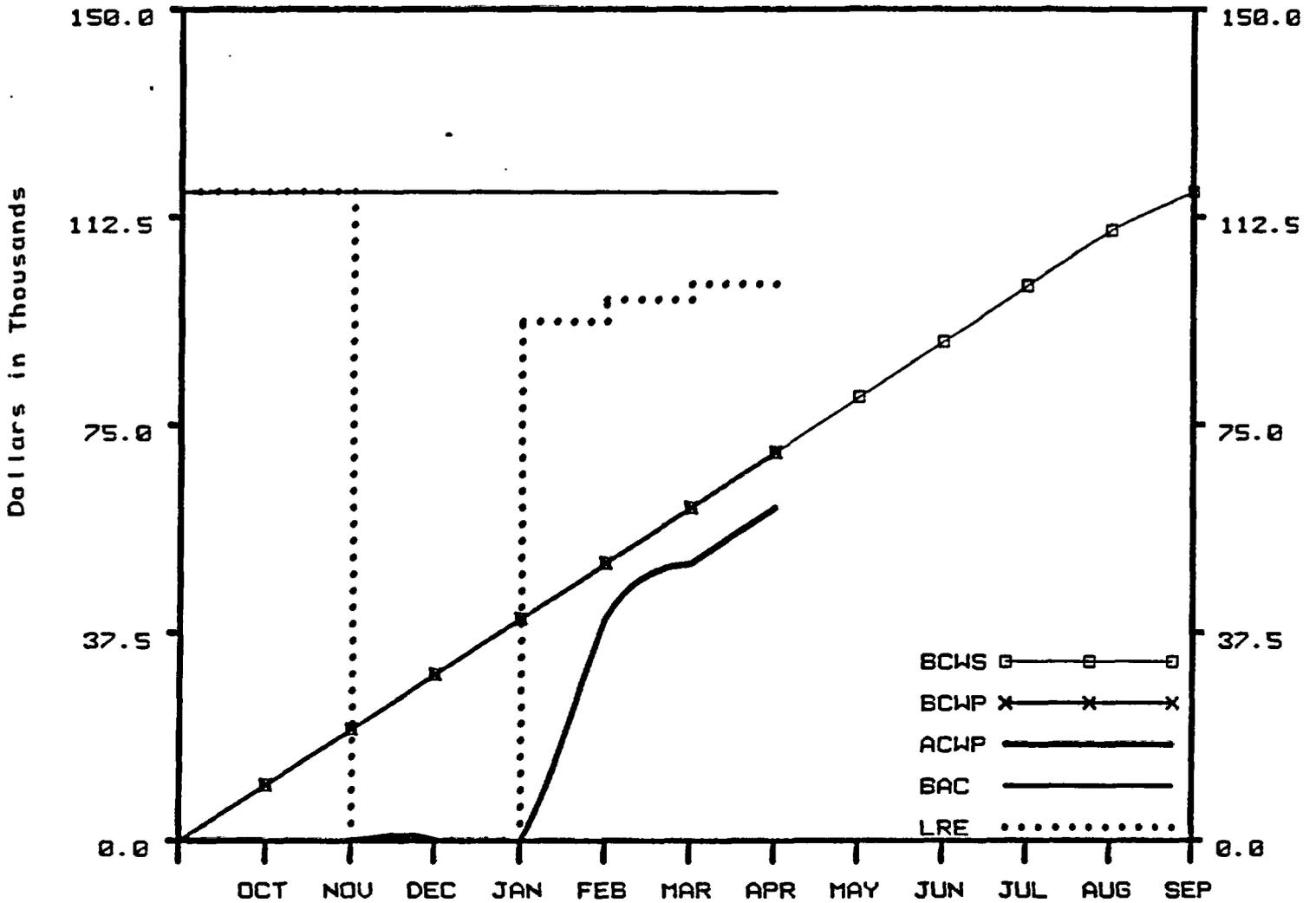


CSC-TOTAL	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	7.0	49.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	7.0	49.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	20.2	20.2
D. BUDGET AT COMPLETION (BAC)		80.0
E. LATEST REVISED ESTIMATE (LRE)		33.0

VARIANCES (Year To Date)	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	28.8	58.81
H. AT COMPLETION VARIANCE (D-E)	47.0	58.81

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.D



**HEDL-TOTAL**

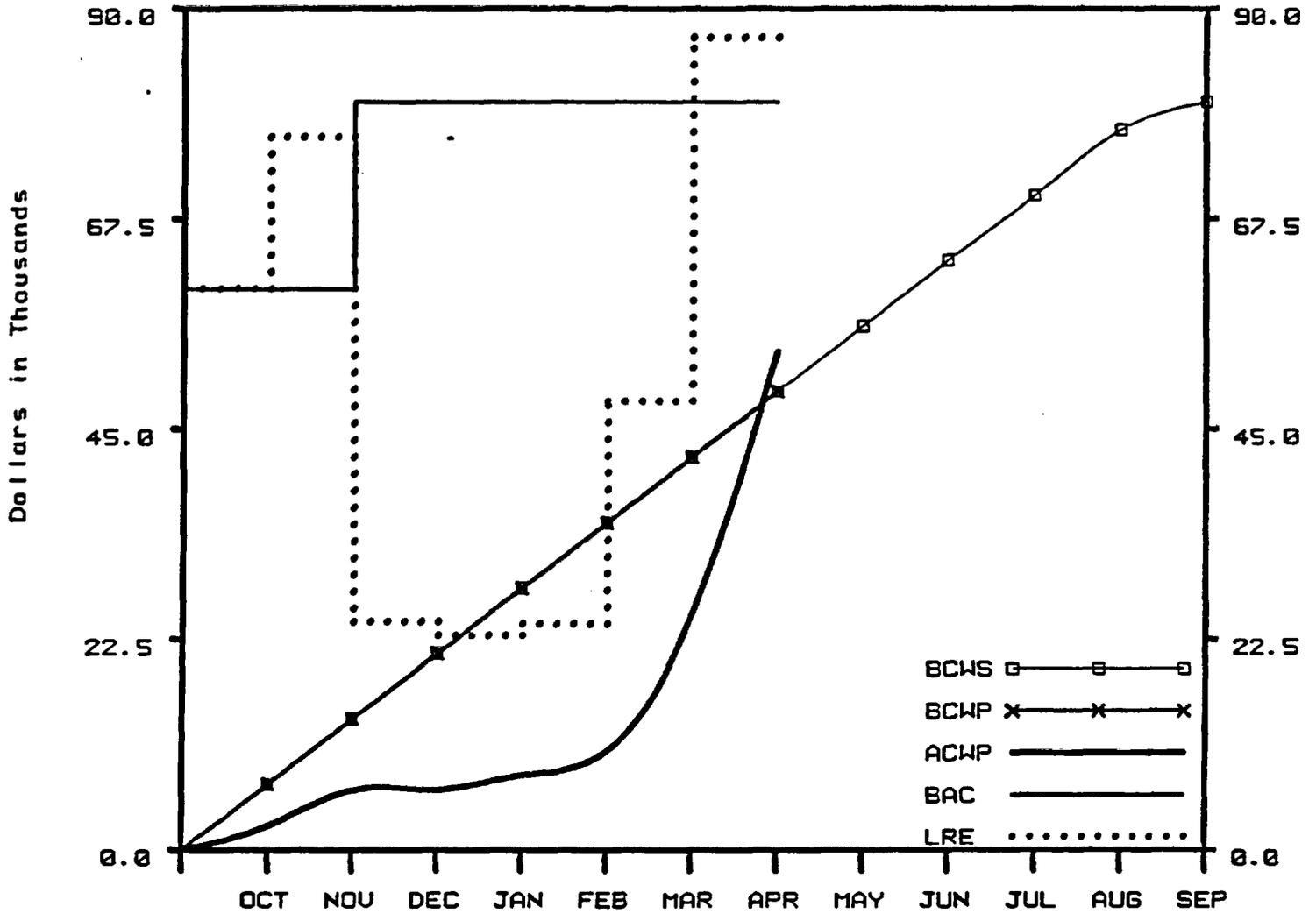
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	10.0	70.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	10.0	70.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	10.0	60.0
D. BUDGET AT COMPLETION (BAC)		117.0
E. LATEST REVISED ESTIMATE (LRE)		100.3

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	10.0	14.29
H. AT COMPLETION VARIANCE (D-E)	16.7	14.29

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.E



**EG&G - TOTAL**

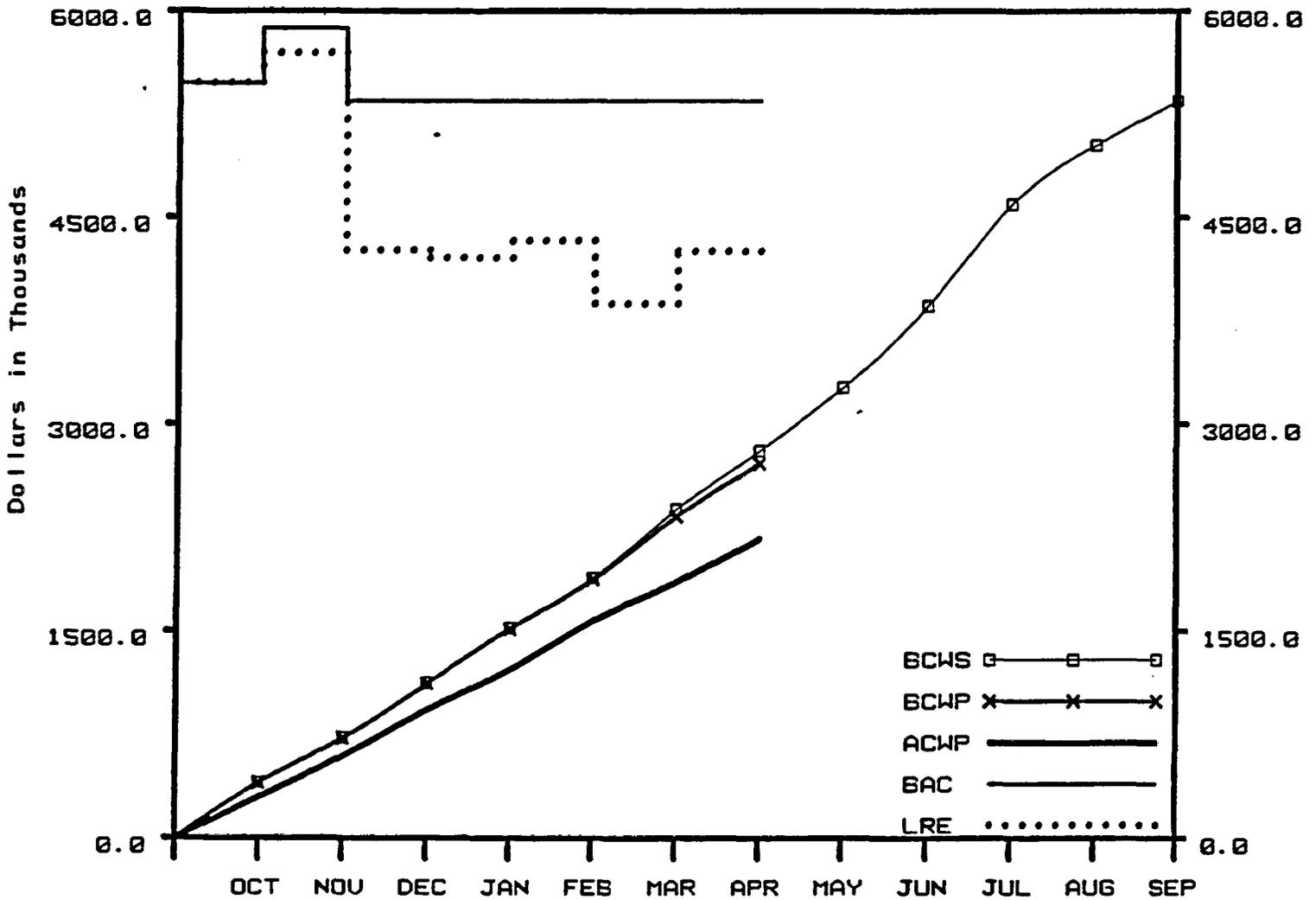
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	7.0	49.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	7.0	49.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	28.1	53.2
D. BUDGET AT COMPLETION (BAC)		80.0
E. LATEST REVISED ESTIMATE (LRE)		86.9

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-4.2	-8.62
H. AT COMPLETION VARIANCE (D-E)	-6.9	-8.62

Remarks:

**NNWSI PROJECT  
COST PERFORMANCE GRAPH FOR APR 1987  
WBS: 1.2.F**



**F&S - TOTAL**

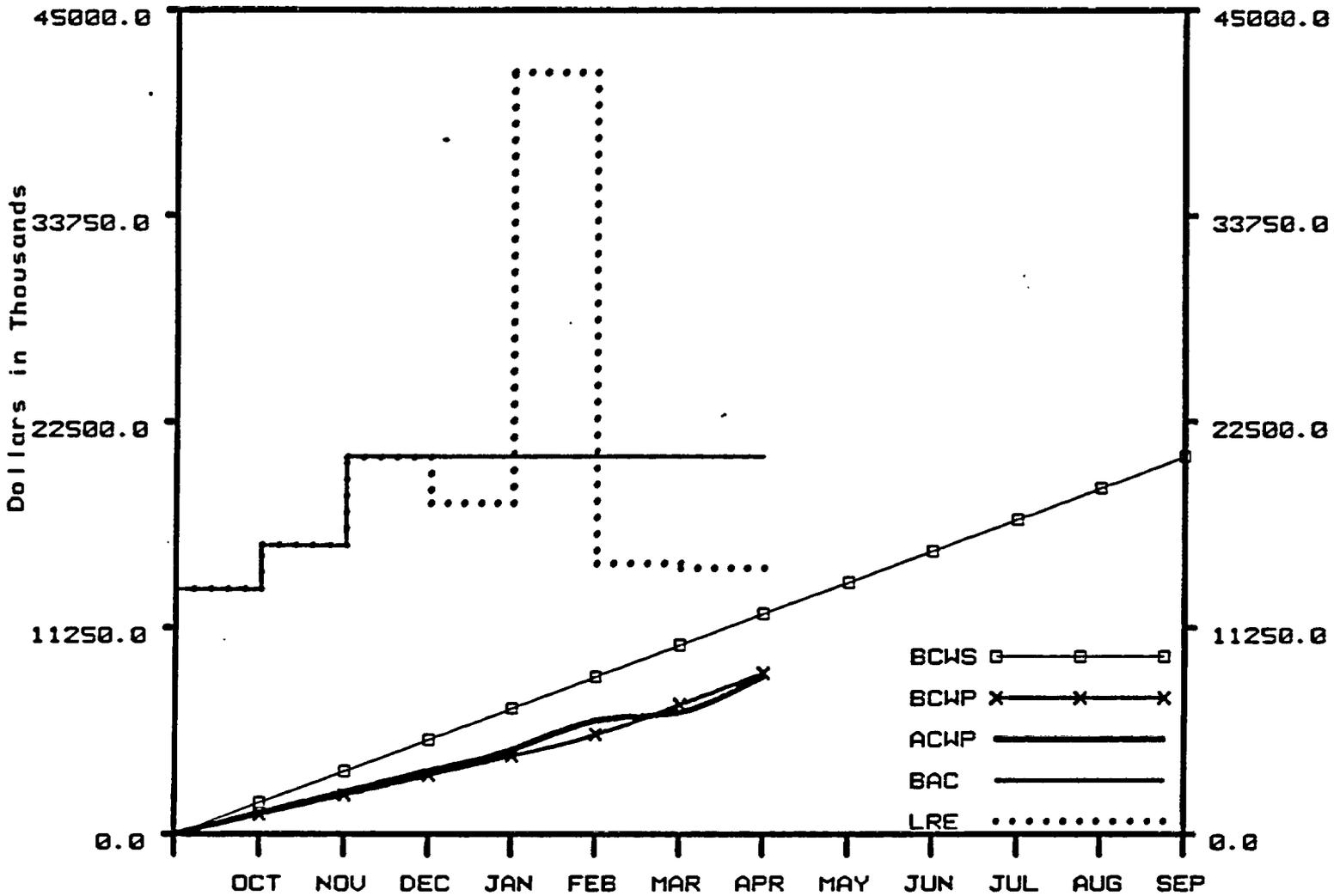
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	424.0	2804.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	383.0	2713.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	311.6	2166.9
D. BUDGET AT COMPLETION (BAC)		5344.0
E. LATEST REVISED ESTIMATE (LRE)		4252.4

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-91.0	-3.25
G. COST VARIANCE (B-C)	546.1	20.13
H. AT COMPLETION VARIANCE (D-E)	1091.6	20.43

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.G



**USGS - TOTAL**

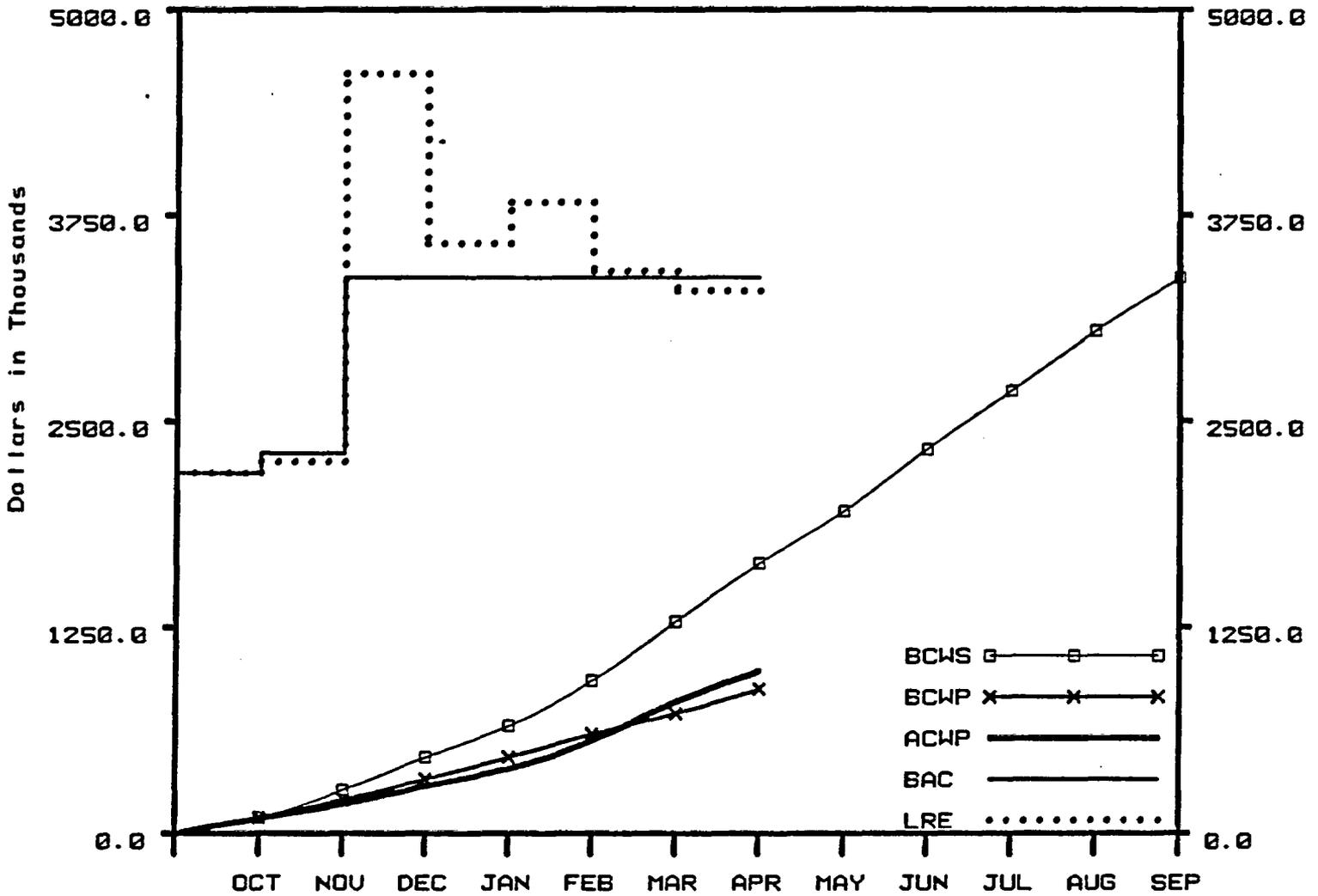
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1715.0	12005.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1703.7	8769.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1953.6	8612.2
D. BUDGET AT COMPLETION (BAC)		20592.0
E. LATEST REVISED ESTIMATE (LRE)		14482.2

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-3235.6	-26.95
G. COST VARIANCE (B-C)	157.1	1.79
H. AT COMPLETION VARIANCE (D-E)	6109.8	29.67

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.H



**H&N - TOTAL**

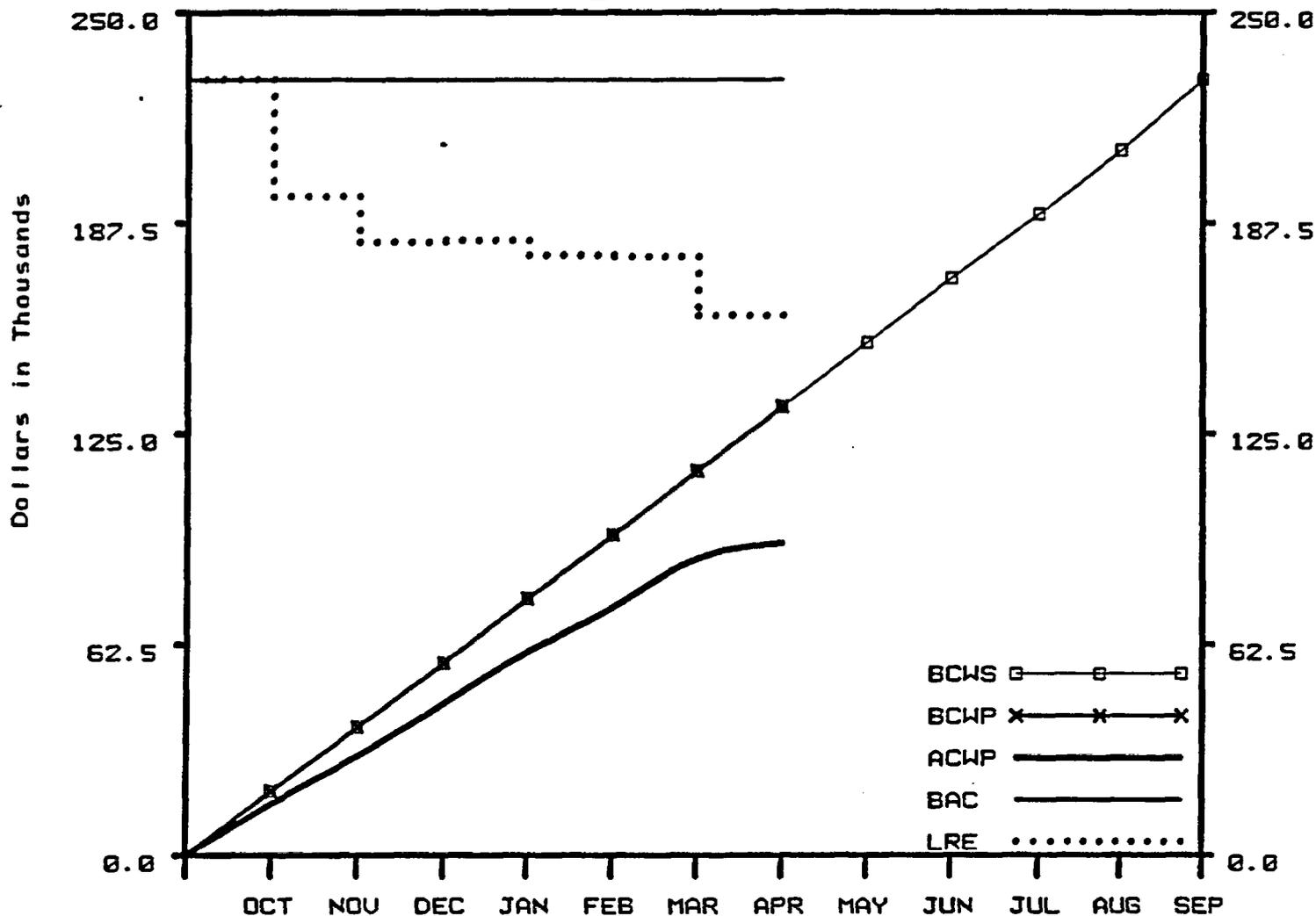
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	353.9	1637.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	146.9	872.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	186.1	981.7
D. BUDGET AT COMPLETION (BAC)		3371.0
E. LATEST REVISED ESTIMATE (LRE)		3288.3

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-765.0	-46.73
G. COST VARIANCE (B-C)	-109.6	-12.56
H. AT COMPLETION VARIANCE (D-E)	82.7	2.45

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2. I



**WSI - TOTAL**

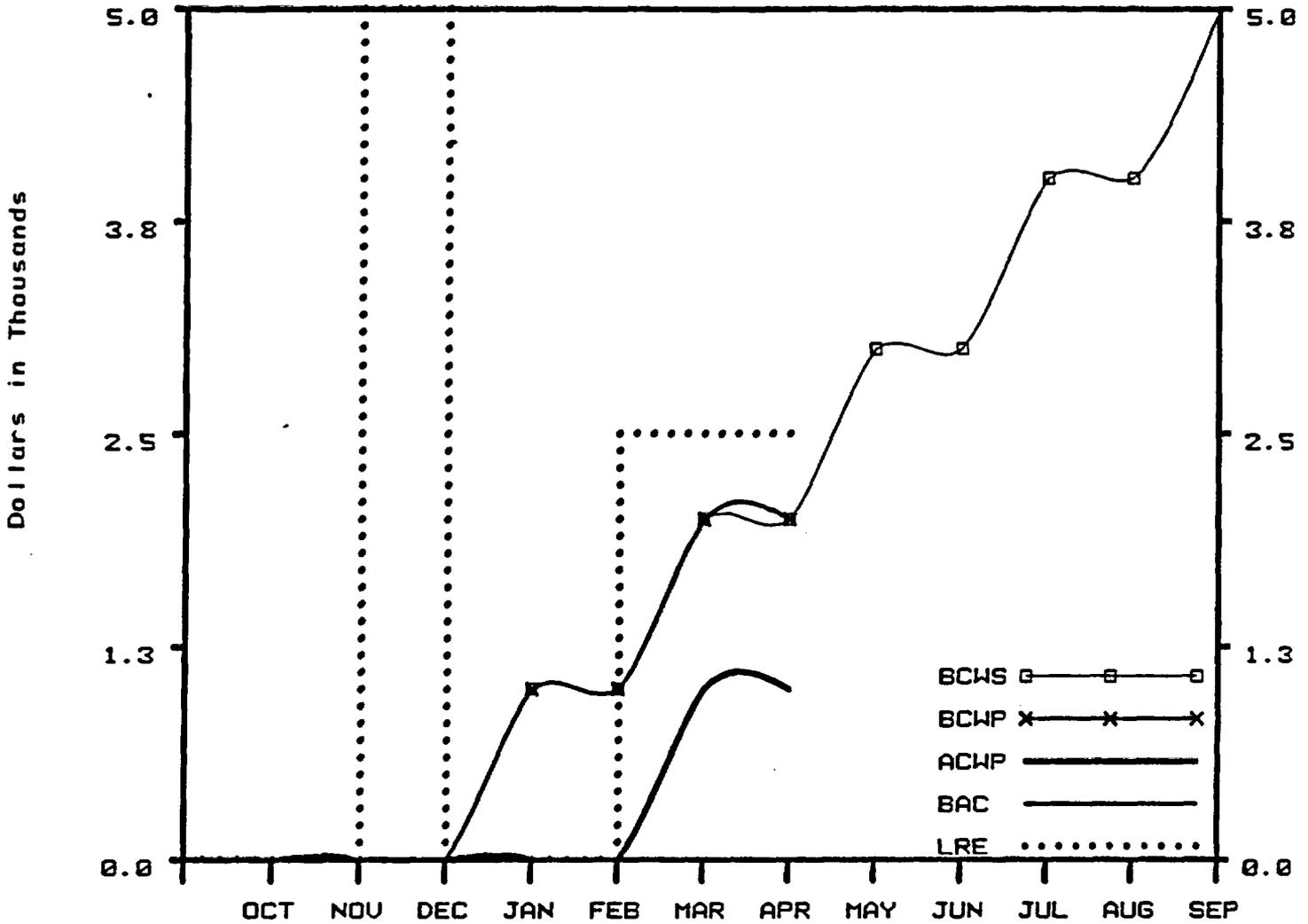
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	19.0	133.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	19.0	133.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	4.6	92.5
D. BUDGET AT COMPLETION (BAC)		230.0
E. LATEST REVISED ESTIMATE (LRE)		159.9

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	40.5	30.47
H. AT COMPLETION VARIANCE (D-E)	70.1	30.47

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.J



**OSTI/TC-TOTAL**

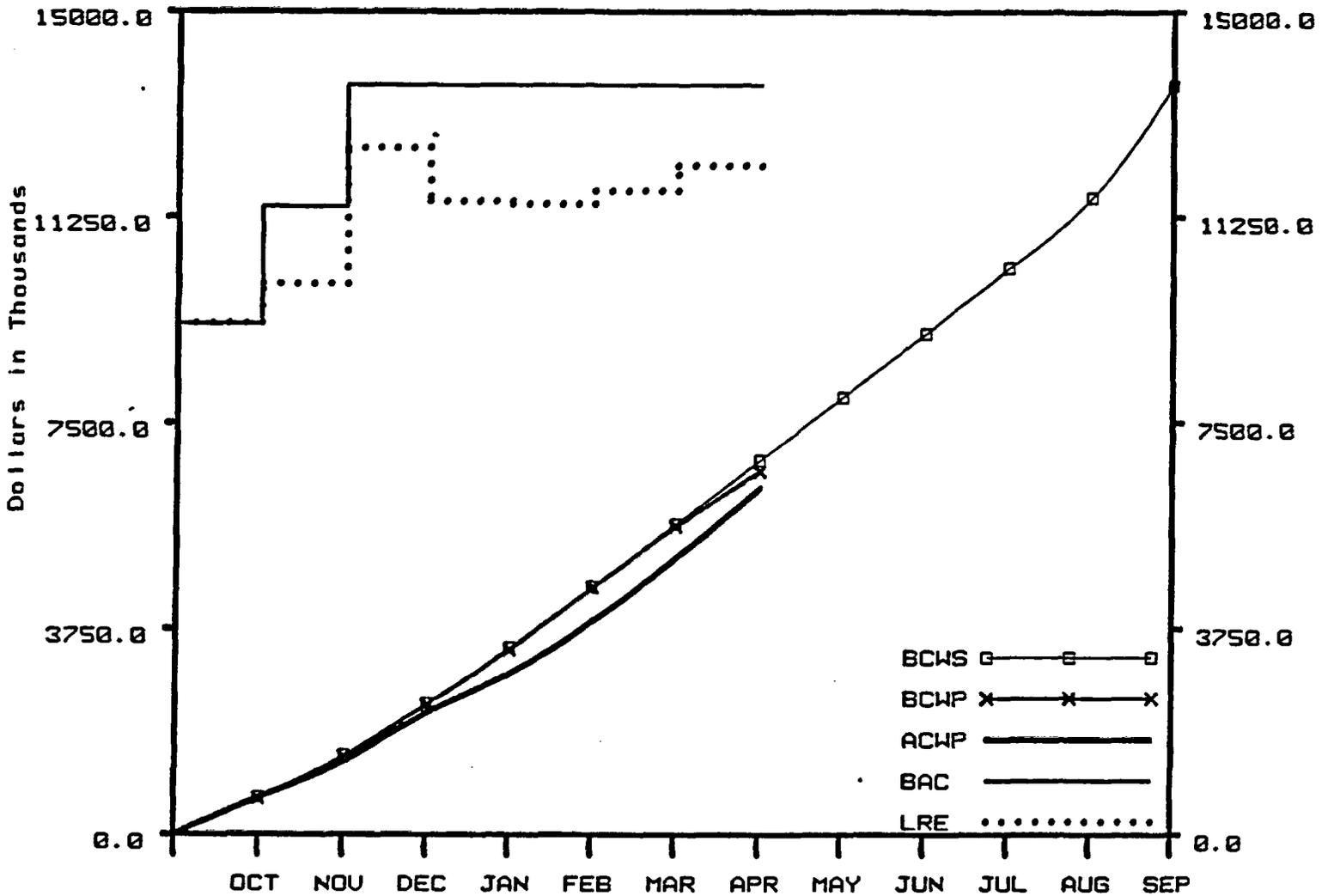
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	0.0	2.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	0.0	2.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	0.0	1.0
D. BUDGET AT COMPLETION (BAC)		5.0
E. LATEST REVISED ESTIMATE (LRE)		2.5

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	1.0	50.00
H. AT COMPLETION VARIANCE (D-E)	2.5	50.00

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.L



**LLNL - TOTAL**

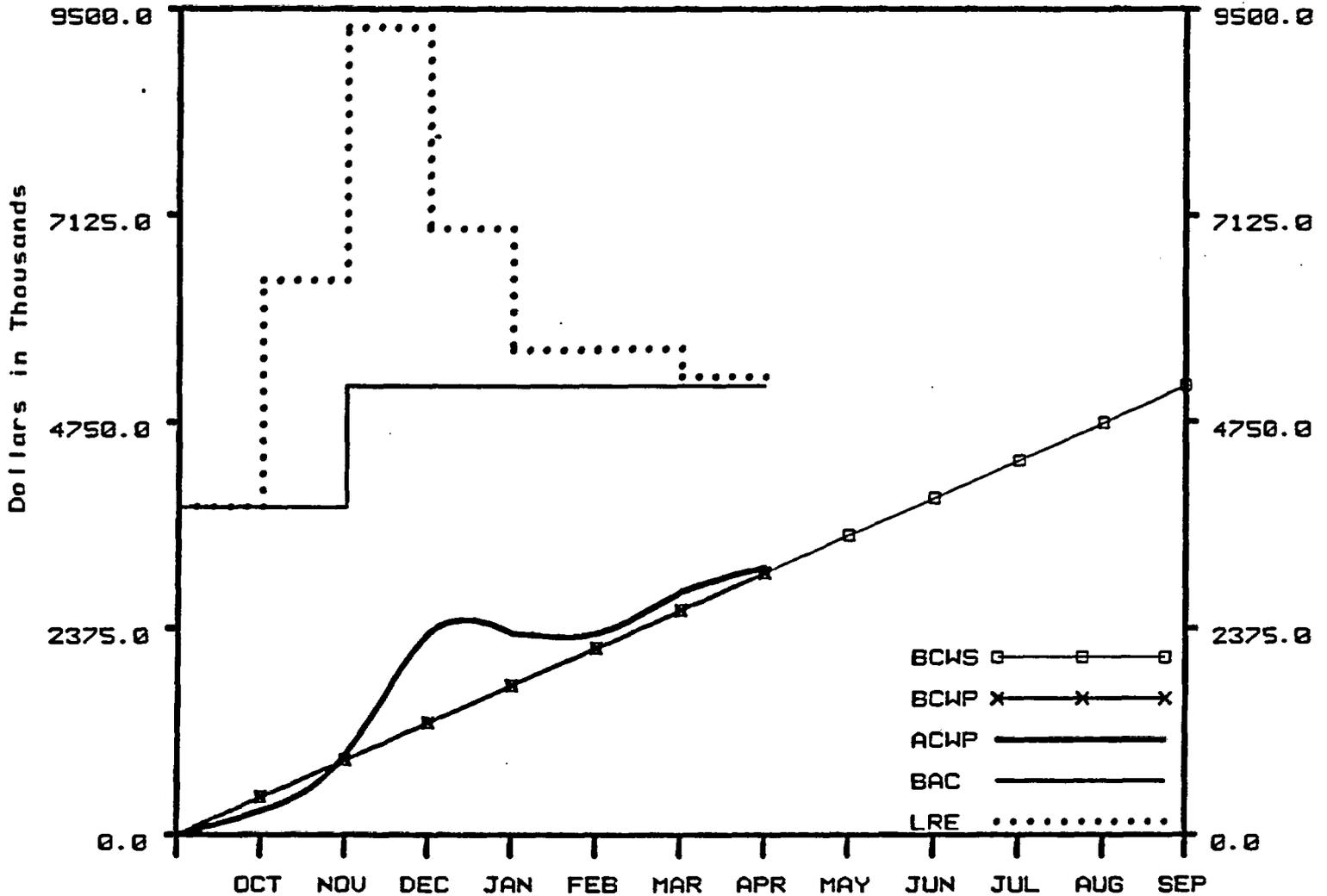
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1154.0	6809.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1001.8	6609.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1265.2	6307.9
D. BUDGET AT COMPLETION (BAC)		13654.0
E. LATEST REVISED ESTIMATE (LRE)		12180.5

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-199.9	-2.94
G. COST VARIANCE (B-C)	301.2	4.56
H. AT COMPLETION VARIANCE (D-E)	1473.5	10.79

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.N



**STATE - TOTAL**

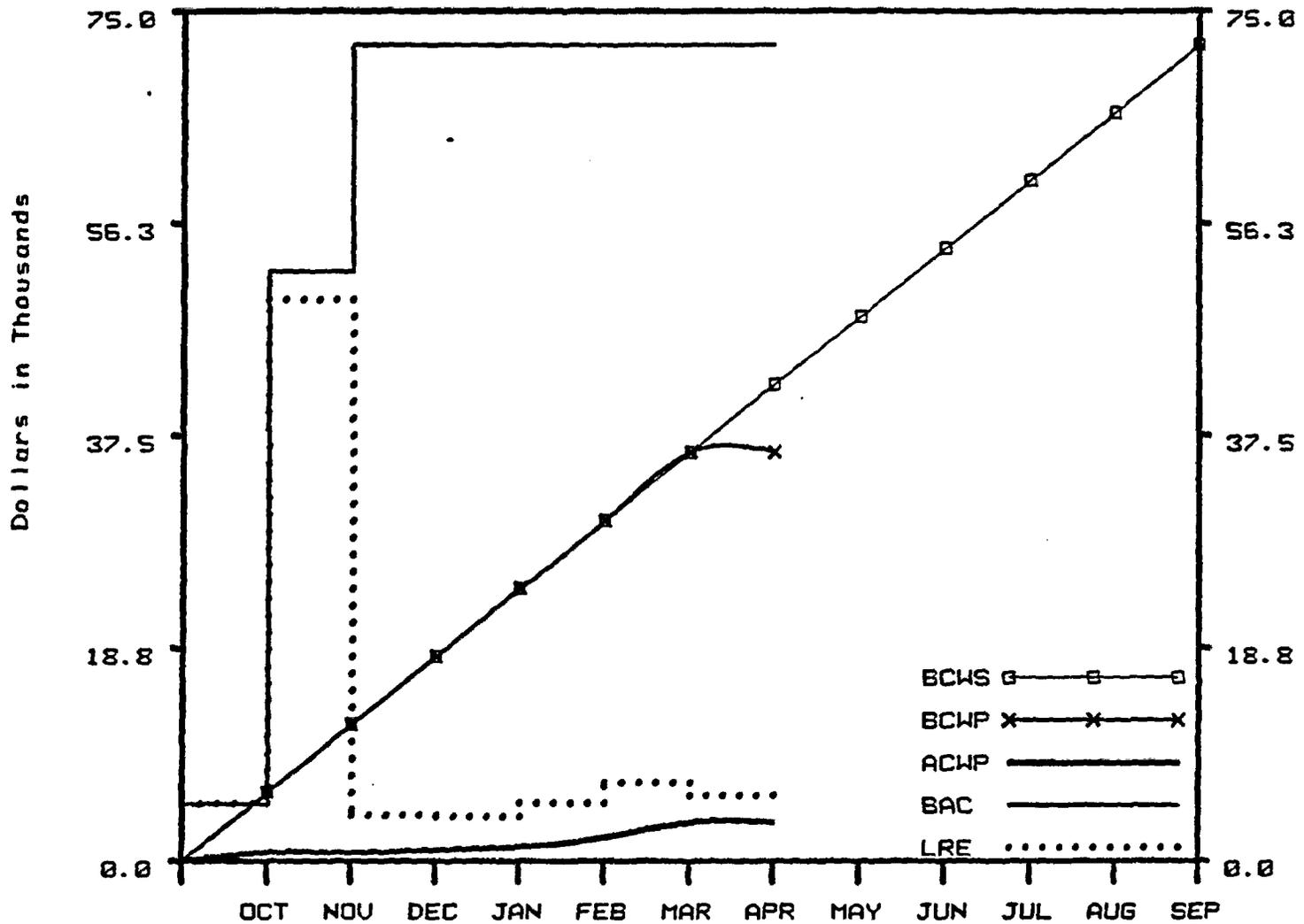
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	430.0	3010.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	430.0	3010.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	278.9	3068.0
D. BUDGET AT COMPLETION (BAC)		5162.0
E. LATEST REVISED ESTIMATE (LRE)		5261.5

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-58.0	-1.93
H. AT COMPLETION VARIANCE (D-E)	-99.5	-1.93

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.P



**PAN AM - TOTAL**

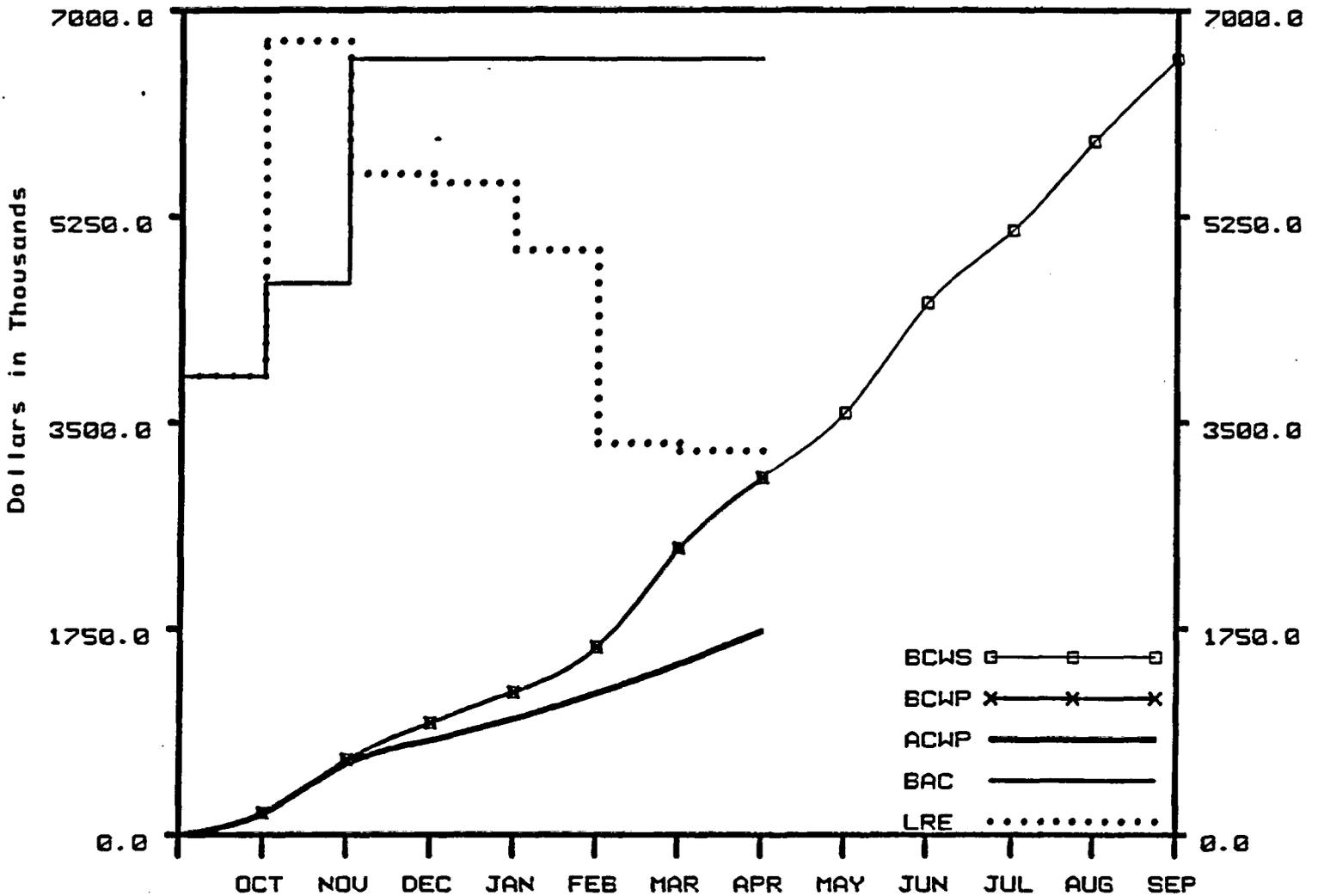
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	6.0	42.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	0.0	36.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	0.0	3.4
D. BUDGET AT COMPLETION (BAC)		72.0
E. LATEST REVISED ESTIMATE (LRE)		5.7

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-6.0	-14.29
G. COST VARIANCE (B-C)	32.6	90.56
H. AT COMPLETION VARIANCE (D-E)	66.3	92.03

Remarks:

**NNWSI PROJECT  
COST PERFORMANCE GRAPH FOR APR 1987  
WBS: 1.2.R**



**REECO - TOTAL**

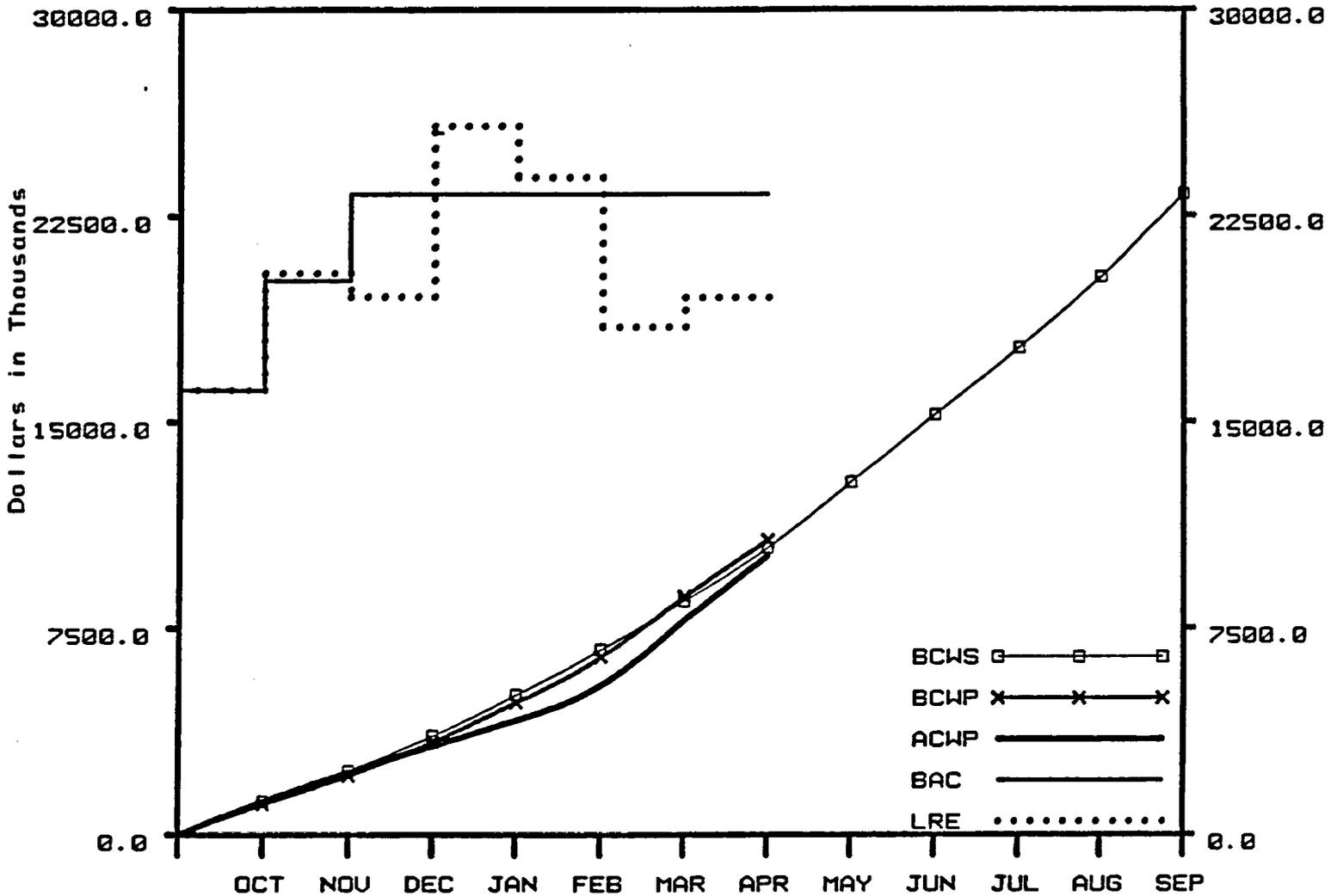
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	600.0	3030.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	600.0	3030.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	276.5	1725.0
D. BUDGET AT COMPLETION (BAC)		6584.0
E. LATEST REVISED ESTIMATE (LRE)		3255.5

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	1305.4	43.08
H. AT COMPLETION VARIANCE (D-E)	3328.5	50.55

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.5



**SNL - TOTAL**

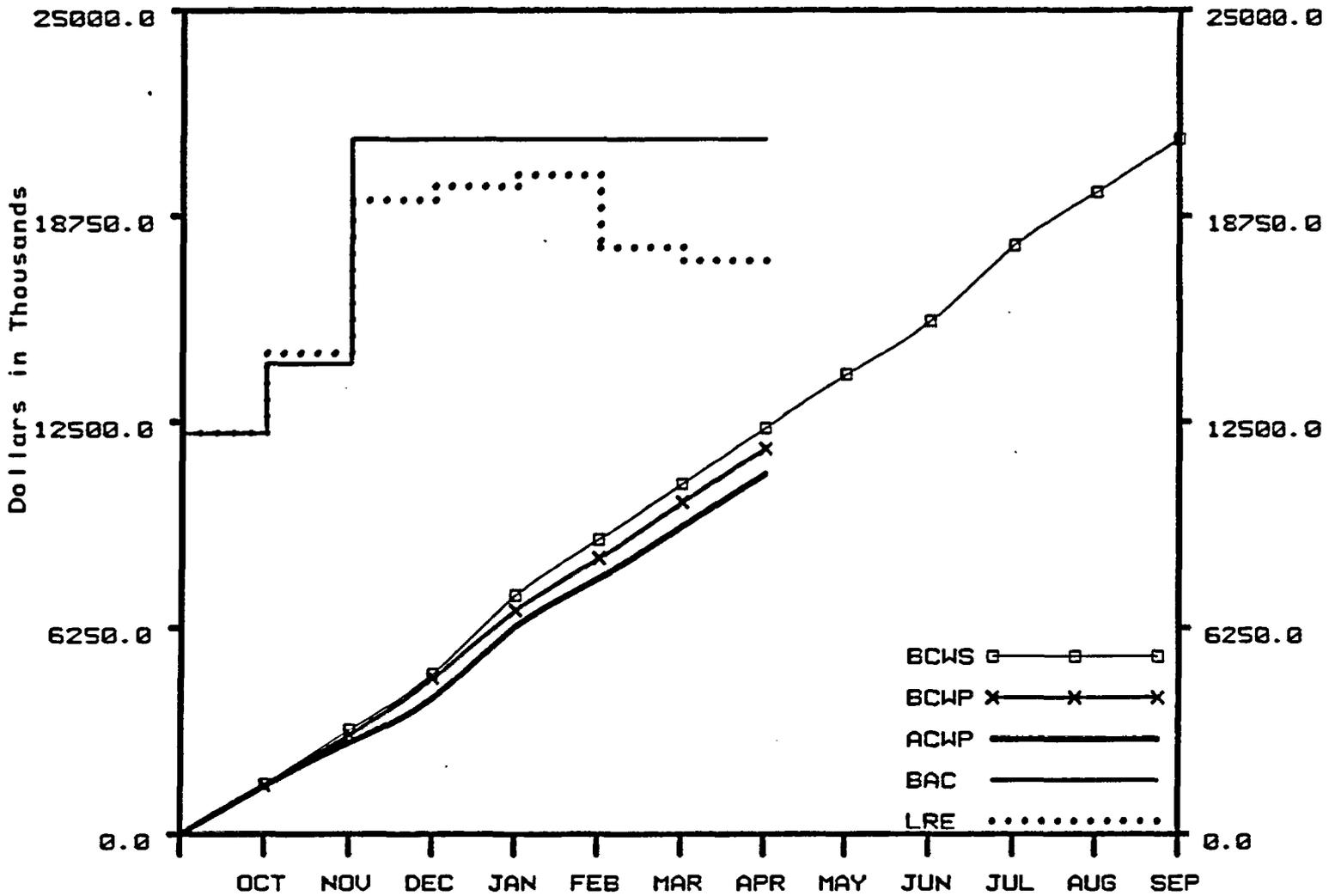
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1925.0	10416.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	2042.9	10685.6
C. ACTUAL COST OF WORK PERFORMED (ACWP)	2345.0	10137.0
D. BUDGET AT COMPLETION (BAC)		23289.0
E. LATEST REVISED ESTIMATE (LRE)		19503.0

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	269.6	2.59
G. COST VARIANCE (B-C)	548.6	5.13
H. AT COMPLETION VARIANCE (D-E)	3786.0	16.26

Remarks:

**NNWSI PROJECT  
COST PERFORMANCE GRAPH FOR APR 1987  
WBS: 1.2.T**



**SAIC - TOTAL**

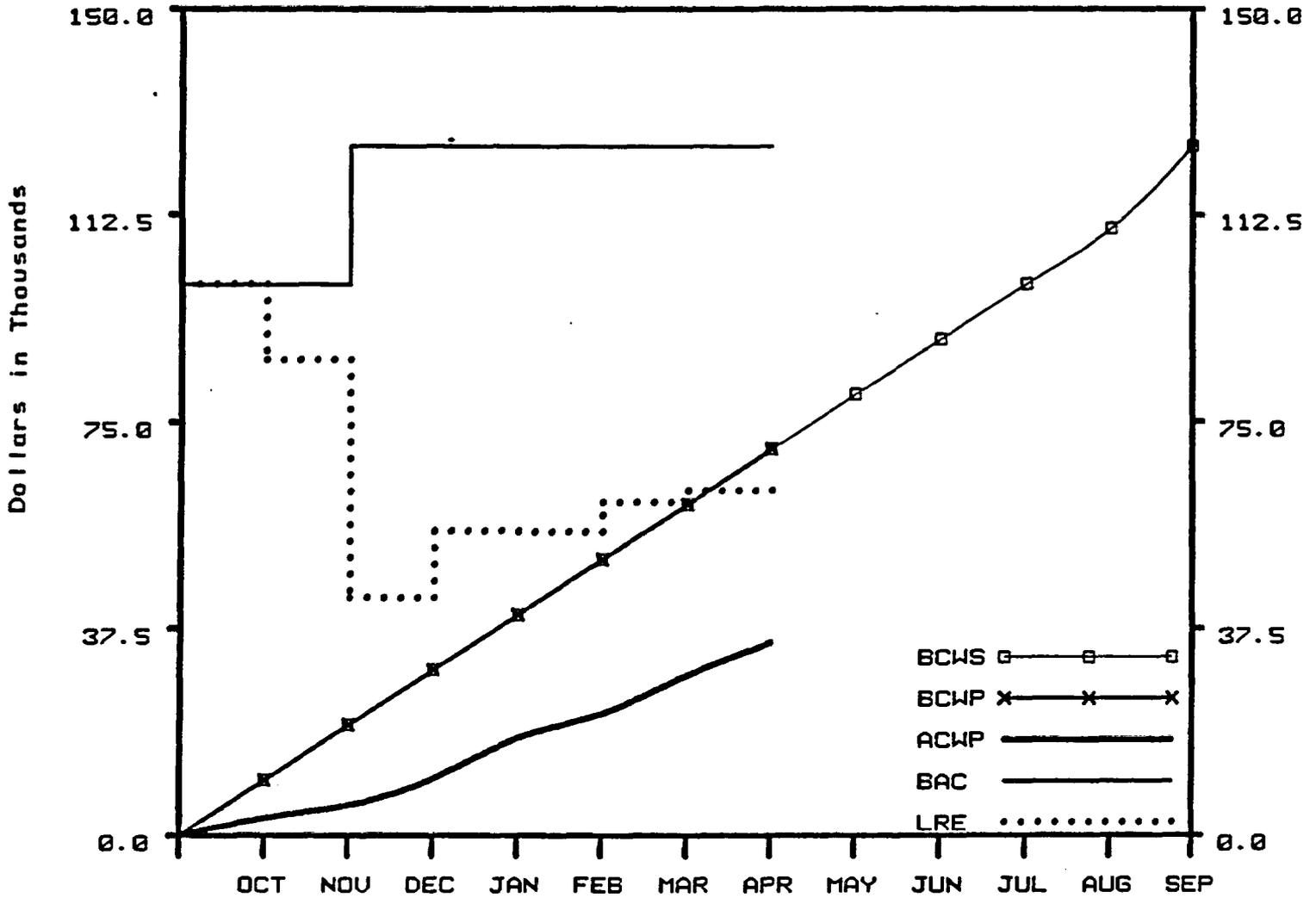
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1682.2	12294.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1615.3	11667.7
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1576.3	10903.9
D. BUDGET AT COMPLETION (BAC)		21067.0
E. LATEST REVISED ESTIMATE (LRE)		17377.1

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-626.7	-5.10
G. COST VARIANCE (B-C)	763.8	6.55
H. AT COMPLETION VARIANCE (D-E)	3689.9	17.52

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.U



**DRI - TOTAL**

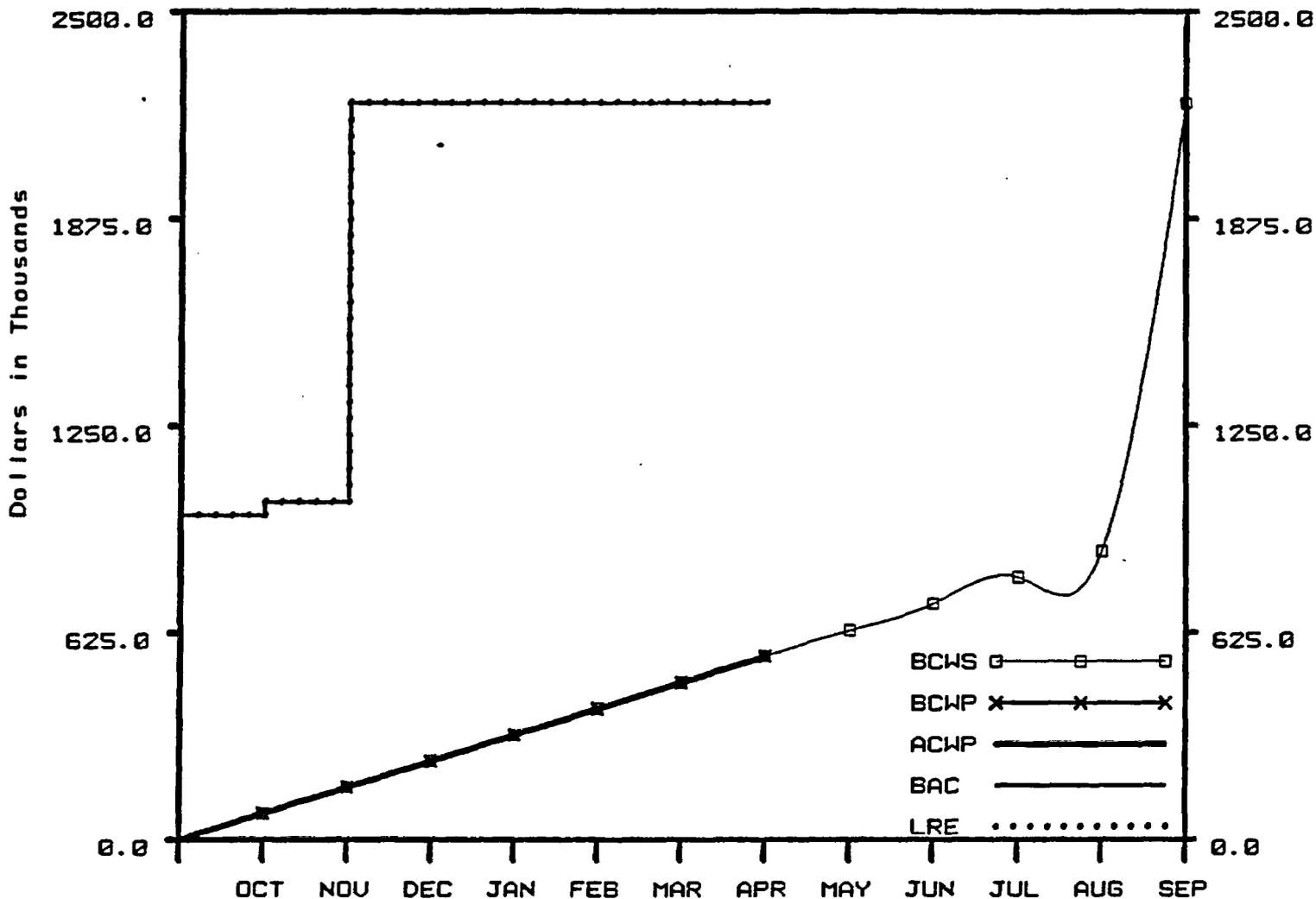
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	10.0	70.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	10.0	70.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	6.0	35.0
D. BUDGET AT COMPLETION (BAC)		125.0
E. LATEST REVISED ESTIMATE (LRE)		62.4

**UARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	35.0	50.06
H. AT COMPLETION VARIANCE (D-E)	62.6	50.06

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.X



**NTS - TOTAL**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	79.0	553.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	79.0	553.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	79.0	553.0
D. BUDGET AT COMPLETION (BAC)		2223.0
E. LATEST REVISED ESTIMATE (LRE)		2223.0

**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:

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS  
MAJOR SYSTEMS ACQUISITION (MSA) MILESTONES  
01 Oct 1986 to 30 Sep 1987

(B)=Baselined  
(P)=Planned

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINE DATE	FORECAST or ACTUAL	(F) (A)
WMPO submits letter report on Studies of Coupled Processes Included in the SCP to OGR for information	1.2.1.1	Robson	1	WMPO	R109 (B)	26 Nov 86	08 Apr 87	(A)
WMPO submits letter report on Studies of Performance Allocation Included in SCP to OGR	1.2.1.1	Robson	1	WMPO/SNL	R108 (B)	16 Feb 87	02 Jul 87	(F)
WMPO submits Annual PASS Program Interaction Letter Report for FY87 to OGR	1.2.1.1	Robson	1	WMPO/SNL	P132 (B)	30 Sep 87	30 Sep 87	(F)
Yucca Mountain Mined Geologic Disposal System (MGDS) Requirements	1.2.1.2.1	Robson	1	WMPO/SNL	M120 (B)	31 Mar 87	29 May 87	(F)
Draft Yucca Mountain Site-Specific Mined Geologic Disposal System (MGDS) Description	1.2.1.2.1	Robson	1	WMPO/SNL	M261 (B)	30 Jun 87	28 Jan 88	(F)
System Engineering Management Plan (SEMP)	1.2.1.2.4	Robson	1	WMPO/SNL	M108 (B)	16 Feb 87	15 Jul 87	(F)
OGR Systems Engineering Review of the MWSSI Project	1.2.1.2.4	Robson	1	WMPO/SNL	R074 (B)	15 Mar 87	15 Jul 87	(F)
WMPO submits hard copy (1987 Annual) version of the Reference Information Base to OGR	1.2.1.3.3	Livingston	1	WMPO/SNL	R092 (B)	29 May 87	29 May 87	(F)
Waste Package Postclosure Compliance Strategy Document	1.2.2.1	Valentine	1	WMPO/LLNL	R003 (B)	30 Jan 87	30 Aug 87	(F)
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	Valentine	1	WMPO/LLNL	M236 (B)	30 Jan 87	31 Jul 87	(F)
Decision Made on Using Packing Material in the Waste Package to Assist in Controlling Radionuclides Release Rate	1.2.2.3.3	Valentine	1	WMPO/LLNL	M257 (B)	30 Jan 87	30 Sep 87	(F)
Revised Draft Waste Package Subsystem Conceptual Design Requirements to DOE/HQ for Review	1.2.2.4	Valentine	1	WMPO/LLNL	M013 (B)	30 Apr 87	31 Aug 87	(F)
Initiate Waste Package Advanced Conceptual Design	1.2.2.4	Valentine	1	WMPO/LLNL	M233 (B)	30 Sep 87	30 Sep 87	(F)
Report on the System Model for Waste Package Performance Analysis	1.2.2.5	Valentine	1	WMPO/LLNL	M276 (B)	31 Oct 86	12 Jan 87	(A)
Report on Long Term Performance Analysis of the Conceptual Waste Package Design	1.2.2.5	Valentine	1	WMPO/LLNL	M260 (B)	30 Apr 87	30 Sep 87	(F)
Submit Report on Evaluation of Natural Resources at Yucca Mountain and Vicinity received to DOE/ HQ for Information	1.2.3.1	Livingston	1	WMPO/SAIC	M895 (B)	31 Jul 87	31 Jul 87	(F)
Recommendation to Proceed With Deep Regional Seismic Survey to OGR for Approval	1.2.3.2.2	Rotert	1	WMPO/USGS	R845 (B)	31 Aug 87	31 Aug 88	(F)

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NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS  
MAJOR SYSTEMS ACQUISITION (MSA) MILESTONES  
01 Oct 1986 to 30 Sep 1987

(B)=Baselined  
(P)=Planned

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINE DATE	FORECAST or ACTUAL	(F) (A)
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	Livingston	1	WMPO/LANL	M325 (B)	26 Nov 86	29 May 87	(F)
Preliminary Report on Sorption Modeling	1.2.3.4.1	Livingston	1	WMPO/LANL	R309 (B)	30 Jan 87	29 May 87	(F)
Final Radiological Monitoring Plan Complete	1.2.3.6.1	Jankus	1	WMPO/SAIC	M897 (B)	27 Feb 87	29 May 87	(F)
Submit Air Quality Monitoring Plan to DOE/IHQ	1.2.3.6.1	Jankus	1	WMPO/SAIC	R327 (B)	30 Apr 87	07 Jul 87	(F)
Begin Air Quality Monitoring	1.2.3.6.1	Blanchard	1	WMPO/SAIC	N345 (B)	30 Sep 87	22 Dec 87	(F)
Submit Working Draft Site Characterization Socioeconomic Monitoring and Mitigation Plan (SMMP)	1.2.3.7	Dixon	1	WMPO/SAIC	R945 (B)	01 Dec 86	21 Nov 86	(A)
Submit Draft Socioeconomic Monitoring and Mitigation Plan to DOE/HQ	1.2.3.7	Dixon	1	WMPO/SAIC	P030 (B)	02 Apr 87	01 Sep 87	(F)
Start Repository Advanced Conceptual Design	1.2.4.1.1	Zvada	1	WMPO/SNL	N430 (B)	30 Sep 87	30 Sep 87	(F)
Initial Subsystem Design Requirement (SDR)	1.2.4.1.2	Skousen	1	WMPO/SNL	N433 (B)	30 Apr 87	03 Aug 87	(F)
Repository Conceptual Design in Support of Site Characterization	1.2.4.1.3	Skousen	1	WMPO/SNL	N432 (B)	27 Feb 87	28 Apr 87	(A)
Report on G-Tunnel Underground Facility (GTUF) Summary	1.2.4.2.1	Skousen	1	WMPO/SNL	M455 (B)	30 Jan 87	01 Apr 87	(A)
Feasibility Analysis of Horizontal Emplacement and Retrieval - Letter Report	1.2.4.2.2	Skousen	1	WMPO/SNL	M295 (B)	30 Nov 86	05 Sep 86	(A)
Initiate Procurement of Development Prototype Boring Machine	1.2.4.2.2	Skousen	1	WMPO/SNL	N427 (B)	30 Nov 86	01 Sep 87	(F)
Horizontal Waste Emplacement Equipment Development Plan	1.2.4.2.2	Skousen	1	WMPO/SNL	N406 (B)	27 Feb 87	30 Jun 87	(F)
Analysis to Evaluate the Effect of the Exploratory Shaft on Repository Performance at Yucca Mountain	1.2.4.2.3	Skousen	1	WMPO/SNL	R036 (B)	27 Feb 87	27 Jul 87	(F)
Prepare "Technical Basis for Performance Goals, Design Requirements and Material Recommendation for the NNWSI Project Repository Sealing Program Report"	1.2.4.2.3	Skousen	1	WMPO/SNL	P404 (B)	31 Mar 87	30 Jun 87	(F)
Final Report on Spent Fuel Rod Consolidation	1.2.4.4	Skousen	1	WMPO/SNL	R267 (B)	31 Dec 86	14 Aug 87	(F)
Submit Retrievability Compliance Strategy Plan to OGR for Review and Comment	1.2.4.4	Skousen	1	WMPO/SNL	R848 (P)	31 Mar 87	31 Dec 87	(F)
Preliminary Study of the Effects of Uncertain Geologic Data on Design of the Underground Facility	1.2.4.6.2	Skousen	1	WMPO/SNL	N457 (B)	27 Feb 87	29 May 87	(F)

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NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS  
MAJOR SYSTEMS ACQUISITION (MSA) MILESTONES  
01 Oct 1986 to 30 Sep 1987

(B)=Baselined  
(P)=Planned

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINE DATE	FORECAST or ACTUAL	(F) (A)
Submit Draft Seismic/ Tectonic Summary Position Paper to WMPO/NV	1.2.5.2 1	Szymanski	1	WMPO/SAIC	R583 (B)	15 Jun 87	30 Jun 87	(F)
Submit Draft Preliminary Plan for Scheduling, Management, and Preparation of Positon Papers to WMPO/NV	1.2.5.2.1	Szymanski	1	WMPO/SAIC	R579 (B)	31 Aug 87	30 Sep 87	(F)
Draft Site Characterization Plan (SCP)	1.2.5.2.2	Clanton	1	WMPO/SAIC	M521 (B)	16 Jan 87	14 Jan 87	(A)
Site Characterization Plan (SCP)	1.2.5.2.2	Clanton	1	WMPO/SAIC	M522 (B)	27 Feb 87	21 Aug 87	(F)
Draft Environmental Field Study Plans Received at HQ for review.	1.2.5.3	Jankus	1	WMPO/SAIC	R798 (B)	30 Jun 87	30 Jun 87	(F)
Environmental Field Study Plans Received at HQ For Baselineing	1.2.5.3	Jankus	1	WMPO/SAIC	R799 (B)	31 Aug 87	31 Aug 87	(F)
Submit Working Draft Environmental Regulatory Compliance Plan to DOE/HQ & State.	1.2.5.3 3	Jankus	1	WMPO/SAIC	R794 (B)	30 Jan 87	06 Mar 87	(A)
Environmental Regulatory Compliance Plan Issued	1.2.5.3.3	Jankus	1	WMPO/SAIC	R795 (B)	31 May 87	01 Sep 87	(F)
Submit Draft II Environmental Monitoring and Mitigation Plan (EMMP) to WMPO/NV	1.2.5.3.4	Jankus	1	WMPO/SAIC	R996 (B)	01 Dec 86	01 Dec 86	(A)
Submit Environmental Monitoring and Mitigation Plan (EMMP) to DOE/HQ	1.2.5.3.4	Jankus	1	WMPO/SAIC	P034 (B)	30 Apr 87	22 Jun 87	(F)
Complete and Sign C&C Agreement with State	1.2.5.4.1	Dixon	1	WMPO	M795 (P)	31 Mar 87	TBD	(F)
Exploratory Shaft Facility (ESF) Subsystems Design Requirements Document	1.2.6.1 1	Irby	1	WMPO/LANL	R241 (B)	30 Dec 86	23 Apr 87	(A)
Submit Prototype Test Plans to DOE/HQ for review and comment	1.2.6.1.1	Irby	1	WMPO/LANL	M105 (B)	27 Feb 87	TBD	(F)
DOE/HQ receives Final FY89 Project Validation Material	1.2.6.1.1	Irby	1	WMPO/SAIC	R841 (B)	13 Mar 87	20 Mar 87	(A)
Start Field Prototype Testing in G-Tunnel	1.2.6.1.1	Irby	1	WMPO/LANL	M282 (B)	30 Mar 87	TBD	(F)
Final ESF Title II Design Requirements Document submitted to DOE/HQ	1.2.6.1.1	Irby	1	WMPO/SAIC	M773 (B)	29 May 87	29 Jul 87	(F)
Exploratory Shaft Title I Design Summary Submitted to WMPO	1.2.6.1.1	Irby	1	WMPO/SAIC	P763 (B)	29 May 87	29 Jul 87	(F)
Complete Exploratory Shaft Readiness Review	1.2.6.1.1	Irby	1	WMPO/LANL	M243 (B)	30 Sep 87	31 Mar 88	(F)
Submit FY 87 Baseline Budget Information and Cost Plans to OGR for Information	1.2.9.1 1	Kunich	1	WMPO/SAIC	R849 (B)	30 Dec 86	22 Dec 86	(A)

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April 1987 Status Report  
Run Date: 01 May 1987

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS  
MAJOR SYSTEMS ACQUISITION (MSA) MILESTONES  
01 Oct 1986 to 30 Sep 1987

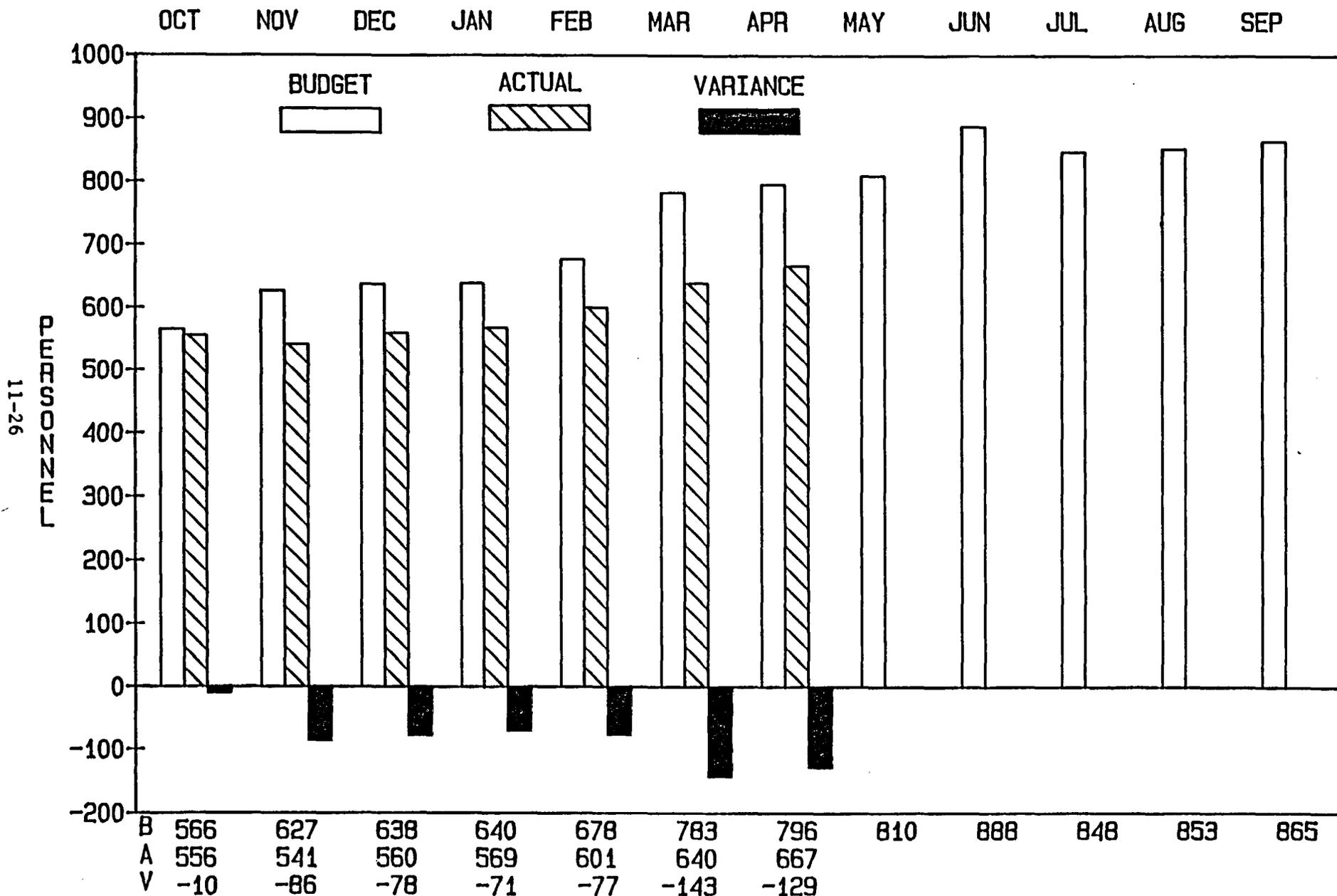
(B)=Baselined  
(P)=Planned

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINE DATE	FORECAST or ACTUAL	(F) (A)
Final NNWSI Project Management Plan to WMPO/NV and DOE/HQ	1.2.9.1.1	Dixon	1	WMPO/SAIC	R448 (B)	30 Dec 86	30 Jun 87	(F)
Approved Revised Project Charter	1.2.9.1.1	Vleth	1	WMPO/SAIC	R850 (B)	30 Jan 87	16 Apr 87	(A)
Submit NNWSI Project Plan to WMPO/NV and DOE/HQ	1.2.9.1.1	Dixon	1	WMPO/SAIC	R810 (B)	30 Sep 87	30 Sep 87	(F)
Submit FY 89 Budget to DOE/HQ	1.2.9.1.2	Dixon	1	WMPO/SAIC	M712 (B)	13 Mar 87	14 Mar 87	(A)
Licensing Support System Document Collection Procedure to Headquarters for Approval	1.2.9.1.4	Hatch	1	WMPO/SAIC	R647 (B)	30 Apr 87	TBD	(F)
Implement Document Collection for the Licensing Support System	1.2.9.1.4	Hatch	1	WMPO/SAIC	R842 (P)	31 Jul 87	TBD	(F)
Implement Phase II of Earned Value System	1.2.9.2	Dixon	1	WMPO/SAIC	M725 (B)	30 Nov 86	04 May 87	(F)

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# NNWSI PROJECT STAFFING\*

## FISCAL YEAR 1987



\*FTEs SHOWN REFLECT INPUT FROM ALL NNWSI PROJECT PARTICIPANTS EXCEPT THE STATE OF NEVADA

PLANNED NNWSI PROJECT FIELD ACTIVITIES  
FOR JUNE

Participant	Activity	Location	Planned	
			Day	Time
LLNL	No scheduled activities			
Los Alamos	No report received			
SAIC	Meteorological monitoring	Yucca Mountain	Field site technicians will maintain stations weekly, 3 days per week.	
USGS	Seismic network monitoring	NTS and Vicinity	Continuous throughout month.	
	Collect precipitation and runoff data	NTS	Following storm events.	
	Water-level monitoring	Wells at Yucca Mountain and Vicinity	June 1-2, 15-16, and 24-30	8-4
	Monitoring of test well USW UZ-1	Test well USW UZ-1	June 8, 19, and 29	8-11 2:30-3:30
	Monitoring of neutron test holes	Yucca Mountain and vicinity	Continuous throughout month	8-4



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

WM DOCKET CONTROL  
CENTRE-

'87 JUL 31 A9:26

Reply to:  
1050 East Flamingo Rd.  
Suite 319  
Las Vegas, Nevada 89119  
Tel: (702) 388-6125  
FTS: 598-6125

TO: Mr. Robert E. Browning, Director  
Division of High-Level Waste Management

FROM: Paul T. Prestholt, Sr. On-Site Licensing Representative

DATE: July 28, 1987

SUBJECT: NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS (NNWSI)  
PROJECT MONTHLY REPORT FOR APRIL 1987

Please find enclosed the above-referenced report.

PTP:nan

cc: J. J. Linehan  
K. Stablein  
S. Wastler

AM Record File	WM Project
122	11
	6/28/87
	X LPDR
RRB MJB	3/11
JOB	
	af



**Department of Energy**

Post Office Box 98518  
Las Vegas, NV 89193-8518

JUL 20 1987

Stephen H. Kale, Associate Director, Geologic Repositories, HQ (RW-20) FORS  
NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS (NNWSI) PROJECT MONTHLY REPORT FOR  
APRIL 1987

Enclosed is the NNWSI Project Monthly Report for April 1987 covering the  
technical activities and status of the NNWSI Project.

  
Mitchell P. Kunich, Acting Director  
Waste Management Project Office

WMPO:WRD-2336

Enclosure:  
NNWSI Project Monthly Report



U.S. DEPARTMENT OF ENERGY

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OGR**



# NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT



## MONTHLY REPORT

APRIL 1987

UNITED STATES DEPARTMENT OF ENERGY  
NEVADA OPERATIONS OFFICE

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT

MONTHLY REPORT

APRIL 1987

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

UNITED STATES DEPARTMENT OF ENERGY  
NEVADA OPERATIONS OFFICE

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## ABSTRACT

### 1.2.1 SYSTEMS

Sections of the Draft Systems Description (SD) document were distributed to Systems Engineering Integration Group (SEIG) members for review. The Sandia National Laboratories (SNL) report entitled "A Cost Estimate of the Yucca Mountain Repository Based on the Site Characterization Plan Conceptual Design" was transmitted to the Waste Management Project Office (WMPO). The Systems Engineering Management Plan (SEMP) was forwarded to WMPO on March 31, 1987. A large-scale base map showing the township/range land grid for the entire Yucca Mountain region was prepared for use in environmental permit activities. Preliminary comparison of the Point Estimate Method (PEM) with the Latin Hypercube method for generating the moments of ground-water travel times has been completed. Two SNL reports, "Proposed Preliminary Definition of the Disturbed-Zone Boundary Appropriate for a Repository at Yucca Mountain" and "Proposed Definition for the Engineered-Barrier System Appropriate for Yucca Mountain" were submitted to WMPO for review. Open-borehole calculations that are the counterpart to the closed-borehole calculations were completed. SNL Milestones M735, incorporate WMPO and TPO comments into letter report on studies of coupled processes and resubmit to WMPO; "A Cost Estimate of the Yucca Mountain Repository Based on the Site Characterization Plan Conceptual Design"; and M107, NNWSI Project position paper describing engineered-barrier system and disturbed-zone boundaries, were completed.

### 1.2.2 WASTE PACKAGE

The vitric tuff alteration experiment was successfully completed. The Series 2, Cycle 5 bare fuel tests were terminated by Lawrence Livermore National Laboratory (LLNL). Visual and microscopic examinations of corrosion specimens were completed by LLNL personnel. Work on Site Characterization Plan (SCP) preparation has delayed progress on other activities in this Work Breakdown (WBS) task.

### 1.2.3 SITE INVESTIGATIONS

The stop-work order issued to the U.S. Geological Survey (USGS) in March 1986 remained in effect through April and almost all site characterization technical activities continued to be suspended. Work on logic diagrams for the SCP continued. USGS data was transmitted to the NNWSI Project records-repository. The USGS Scientific Investigation Planning (SIP) document entitled "Hydraulic and Conservative-tracer Tests in Fractured Rock" was transmitted to WMPO for approval. The USGS manuscript "Radiocarbon Dates V," received WMPO approval and was transmitted to the USGS Regional Hydrologist for approval for publication in the American Journal of Science. A Los Alamos National Laboratory (Los Alamos) paper titled "Infiltration at Yucca

Mountain, Nevada, Traced by  $^{35}\text{Cl}$  was presented at the Fourth International Symposium on Accelerator Mass Spectrometry. A draft of the study plan for the speciation determination subtask was completed. Cores received by Los Alamos from the core library in 1985 are being prepared for batch sorption measurements. The Core Transfer Plan for inventorying and transferring core to the Sample Management Facility (SMF) was completed in draft form. The Science Applications International Corporation (SAIC) report entitled "Population Densities Along Nevada Transportation Routes" was approved by WMPO for publication. Los Alamos Milestone R202, "Preclosure Volcanic Effects: Evaluations for Potential Repository at Yucca Mountain, Nevada," was approved by WMPO. During April Los Alamos milestones R357, "The Kinetics of Silica-Phase Transitions"; R347, update report on fracture flow in saturated tuff; and R346, "FEHMS: A Finite Element Heat-Mass-Stress Code for Coupled Geological Process" were sent to WMPO for review.

#### 1.2.4 REPOSITORY INVESTIGATIONS

The comment resolution draft of the SCP-Conceptual Design Report (CDR) was sent to the Office of Geological Repositories (OGR) and WMPO for review and approval. SNL personnel completed conceptual designs for several components of the vertical and horizontal emplacement/retrieval equipment systems. Repository drift and emplacement borehole layouts have been completed for short horizontal boreholes. SNL received the final draft of the report on fan reversibility prepared by Mine Ventilation Services. Work in this WBS task focused on revising the SCP and SCP-CDR. SNL Milestones N432, repository conceptual design in support of site characterization; P198, incorporate comments from WMPO and OGR into SCP-CDR; P210, prepare design requirements and materials recommendation report; and P218, incorporate WMPO comments into preliminary study of the effects of uncertain geologic data on design to WMPO, have been completed.

#### 1.2.5 REGULATORY AND INSTITUTIONAL INVESTIGATIONS.

SAIC is coordinating the Project's review of the Nuclear Regulatory Commission's (NRC) proposed rulemaking that will define high-level wastes. Reference verification is continuing for the SCP. The list of study plans that will supplement the SCP is being revised and will be distributed for review in May. Major efforts were focussed on resolving review comments on all sections of the SCP. With most Environmental Impact Statement (EIS) efforts rescheduled to begin in 1989, the planning effort to develop environmental field study plans will continue. Department of Energy/Headquarters (DOE/HQ) comments on Draft II of the Environmental Regulatory Compliance Plan (ERCP) were received and are being incorporated. The Revised Draft Environmental Monitoring and Mitigation Plan (EMMP) was sent to WMPO and DOE/HQ for review.

#### 1.2.6 EXPLORATORY SHAFT INVESTIGATIONS

A briefing was given to the NRC and the State of Nevada regarding the proposed relocation of the exploratory shafts and changes in the Exploratory Shaft Facility (ESF) configuration. Review comments from the DOE Safety and

Health Division (SHD) were incorporated into the ESF Safety and Health Program Plan. Drilling requirements for prototype testing were identified. A Reynolds Electrical & Engineering Company (REECO) Occupational Safety Professional reviewed support documentation for the Allis Chalmers Double Drum Hoist that has been proposed for use at the exploratory shafts. A draft copy of the quality assurance level assignments (QALAS) for the Integrated Data System (IDS) was completed. Review comments on the Exploratory Shaft Test Plan (ESTP) were distributed to principal investigators (PIs) for resolution.

#### 1.2.7 TEST FACILITIES

The remaining LLNL Spent Fuel Test-Climax (SFT-C) reports are being prepared for printing.

#### 1.2.8 LAND ACQUISITION

NNWSI Project representatives attended a meeting on "lessons learned" from the Waste Isolation Pilot Project (WIPP) in Albuquerque, New Mexico, and they toured the proposed low-level storage facility.

#### 1.2.9 PROJECT MANAGEMENT

Computer indexing of all WMPO records was completed and a total of 5,193 documents were indexed in preparation for "discovery." Comments from WMPO and Project participants are being incorporated into the Project Management Plan. Approximately 5,000 Los Alamos documents were transferred to the Central Records Facility. The Correspondence Control Facility (CCF) began full operation at SAIC. About 21,000 documents have been indexed in the Information Management System (IMS) Automated Records System (ARS). Of the five audits conducted in FY 86, four remain open and of the 15 audits conducted in FY 85 four remain open. To date, 18 surveillances have been conducted in FY 87 and 58 items or activities monitored and nine standard deficiencies reported. SNL Milestone T138, management assessment of quality assurance, was completed.

APRIL 1987

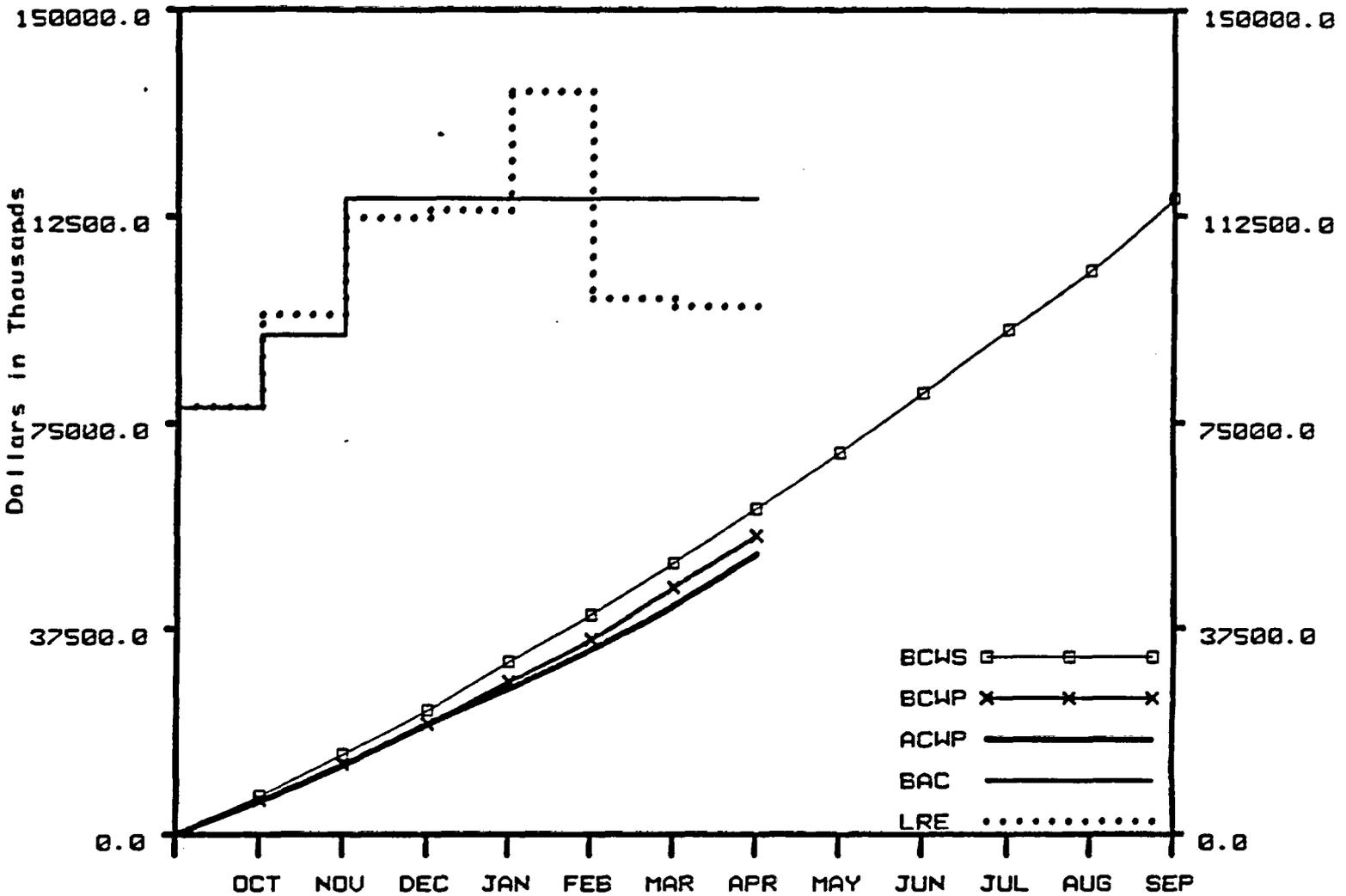
Funding Overview

The month-end estimated costs were \$9,441,231 against a plan of \$9,878,160 resulting in a cost underrun of \$436,929.

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

	<u>Plan</u> <u>(\$000)</u>	<u>Cost</u> <u>(\$000)</u>	<u>Variance</u>	<u>%</u> <u>Variance</u>
WBS 1.2.1 Systems	\$ 3,714	\$ 3,490	\$ 224	6
WBS 1.2.2 Waste Package	4,682	4,124	558	12
WBS 1.2.3 Site	16,497	11,913	4,584	28
WBS 1.2.4 Repository Investigations	5,027	5,336	(309)	(6)
WBS 1.2.5 Regulatory and Institutional Investigations	4,403	4,727	(324)	(7)
WBS 1.2.6 Exploratory Shaft Investigations	8,283	6,193	2,090	25
WBS 1.2.7 Test Facilities	322	232	90	28
WBS 1.2.8 Land Acquisition	70	53	17	24
WBS 1.2.9 Project Management	13,254	11,872	1,382	10
WBS 1.2.10 Financial and Technical Assistance	3,010	3,068	(58)	(2)
	<hr/>	<hr/>	<hr/>	<hr/>
WBS 1.2 NNWSI Project	\$ 59,262	\$ 51,008	\$ 8,254	14

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2



**NNWSI - TOTAL**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	9878.2	59261.5
B. BUDGETED COST OF WORK PERFORMED (BCWP)	9374.4	54292.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	9441.2	51007.8
D. BUDGET AT COMPLETION (BAC)		115573.0
E. LATEST REVISED ESTIMATE (LRE)		96010.9

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-4969.6	-8.39
G. COST VARIANCE (B-C)	3284.1	6.05
H. AT COMPLETION VARIANCE (D-E)	19562.1	16.93

Remarks:

NNWSI PROJECT BUDGET BASELINE

APRIL 1987

<u>Contractors</u>	(\$000) Original FY 87 Funding	(\$000) Current Baselined Budget	(\$000) Change
SNL	\$ 16,148	\$ 23,289	\$ 7,141
LLNL	9,311	13,654	4,343
Los Alamos	10,003	13,128	3,125
USGS	13,333	20,592	7,259
SAIC	12,138	21,067	8,929
REECo	3,889	6,584	2,695
H&N	2,182	3,371	1,189
F&S	5,472	5,344	(128)
WSI	230	230	0
Pan Am	5	72	67
State Grant	3,765	5,162	1,397
DRI	100	125	25
EG&G	60	80	20
LBL	267	450	183
OSTI/TC	0	5	5
HEDL	0	117	117
CSC	0	80	80
NTS Allocation	980	2,223	1,243
Undistributed Budget	1,398	1,893	495
 	<hr/>	<hr/>	<hr/>
SUBTOTAL	\$ 79,281	\$ 117,466	\$ 38,185
CAPITAL EQUIPMENT	\$ 5,081	\$ 11,045	\$ (5,964)
TOTAL	\$ 84,362	\$ 128,511	\$ 44,149

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# 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

##### WBS 1.2.1.2.1 System Description

Sandia National Laboratories (SNL) staff members received a reply to the Nevada Nuclear Waste Storage Investigations (NNWSI) Project's proposal about the structure and content of certain Advanced Conceptual Design (ACD) prerequisites from the Office of Geologic Repositories (OGR). All but one of the Project's requested waivers from the format of the Generic Requirements document were rejected by OGR. Additionally, OGR refused the Project's proposal to add nonlicensing, nonsite selection system requirements in a systematic way during ACD, an approach which would have led to a System Requirements document (SR) for License Application Design that is a completed, allocated set of system requirements. Addition of these other requirements will require input from Science Applications International Corporation (SAIC).

Draft sections of the Systems Description (SD) document were distributed to Systems Engineering Integration Group (SEIG) members for comment.

##### WBS 1.2.1.2.3 Cost Schedule

The SNL report entitled "A Cost Estimate of the Yucca Mountain Repository Based on the Site Characterization Plan Conceptual Design" (SAND85-1964), has been completed and transmitted to the Waste Management Project Office (WMPO) for policy review, satisfying Milestone R058.

##### WBS 1.2.1.2.4 Systems Engineering Integration

A draft charter for the SEIG was presented at the April 14-16, 1987, SEIG meeting in Las Vegas. Based on discussions at this meeting, a revised draft of the SEIG Charter, AP 3.3Q, and the Systems Engineering Management Plan (SEMP) were completed for delivery to WMPO management on April 30, 1987. Other major topics of discussion included: (1) the roles of SEIG and SAIC/licensing in developing Project definitions for regulatory terms, (2) plans for the implementation of the Reference Information Base and its status within SNL, and (3) management of Project interfaces, working groups, and study plans.

The SEIG reviewed all comments received on the SEMP. The SEMP was officially forwarded to WMPO on March 31, 1987, fulfilling Milestone M293.

The SEMP is currently being reviewed by WMPO prior to being sent to Department of Energy/Headquarters (DOE/HQ).

A revised version of the SEMP incorporating comments by the OGR and WMPO staffs and the Technical Project Officers (TPOs) was submitted by SNL for approval by WMPO. Disagreement persists within WMPO regarding the interface between systems engineering and configuration management. This disagreement is encumbering the WMPO approval of the SEMP and is being negotiated by the affected WMPO Branch Chiefs, SAIC, and SNL.

#### WBS 1.2.1.2.5 Configuration Management and Change Control

The Configuration Management Branch (CMB) is attempting to resolve and incorporate the Independent Review Committee (IRC) comments into the NNWSI Project Draft Configuration Management Plan (CMP). The release of this revised document is scheduled for May 1987.

The SAIC CMB added 14 milestones, updated 187 milestones, and completed 25 milestones during April.

The SAIC CMB submitted 52 Cost/Schedule Change Requests (C/SCRs) to the Change Control Board (CCB) where they approved 38 C/SCRs, and deferred 14 C/SCRs.

#### WBS 1.2.1.3.1 Site and Engineering Properties Data Base

Personnel from SNL received candidate information for the Site and Engineering Properties Data Base (SEPDB) with TPO authorization from SAIC (meteorologic data) and the U.S. Geological Survey (USGS) (drillhole data for USW H-1). This information will not be entered until the parameters to be included in the SEPDB are resolved.

#### WBS 1.2.1.3.2 Computer Graphics

SNL staff prepared a large-scale base map showing the township/range land grid for the entire Yucca Mountain region for SAIC environmental permit activities.

#### WBS 1.2.1.3.3 Reference Information Base

Staff members at SNL held a meeting with data base staff for the Salt Repository Project at Battelle Columbus Laboratories on April 3, 1987, to discuss the feasibility of the DM software package for providing on-line computer access to the Reference Information Base (RIB). A presentation was given on April 16 at the SEIG meeting at SAIC in Las Vegas on current RIB status, future plans for managing it, and the interface with the SEIG for review and approval.

#### WBS 1.2.1.3.4 Data Base Computer Support

The Technical Data Base requirements analysis is under way at SNL and substantial progress has been made in the areas of parameter and data specifications for the SEPDB, Milestone R086. SCPPARM data base, which is a comprehensive compilation of parameters identified in Chapter 8 of the Site

Characterization Plan (SCP), is being used in this effort. Implementation plans are now being specified, with emphasis on requirements for interfaces (both system and user) and detailed data organization.

SCPPARM parameter specifications related to SCP Issues 1.1, 1.6, 1.11, and 4.4 have been updated. All SCPPARM parameters are being characterized by a common data category, which will ultimately allow all data requirements supporting design and performance-assessment activities to be correlated to site characterization data.

#### WBS 1.2.1.4.1 Flow and Radionuclide Transport

The report entitled "Hydrologic Modeling of Vertical and Lateral Movement of Partially Saturated Fluid Flow Near a Fault Zone at Yucca Mountain" (SAND87-7070), by Lawrence Berkeley Laboratory (LBL), has been returned to the authors with comments.

Preliminary comparison of the Point Estimate Method (PEM) with the Latin Hypercube method for generating the moments of ground-water travel time has been completed by SNL staff and reported in a technical memo entitled "Preliminary Assessment of the Point Estimate Method for the Moments of Ground-water Travel Time (GWTT)."

#### WBS 1.2.1.4.2 Radionuclide Source Term

Two SNL reports, "Proposed Preliminary Definition of the Disturbed-Zone Boundary Appropriate for a Repository at Yucca Mountain" (SAND86-1955), and "Proposed Definition for the Engineered-Barrier System Appropriate for Yucca Mountain" (SAND86-1954), were submitted to WMPO for review and approval. These reports satisfy Milestone M107.

A formal SNL problem definition memo (PDM) was distributed for the COVE3 heat-pipe problem. Acceptance of task memos (ATMs) were received from the participants, and the PDM was reviewed based upon their comments. An authorization to proceed memo (ATP) and the revised PDM were transmitted to participants.

LBL completed open-borehole calculations that are the counterpart to the closed-borehole calculations detailed in SAND86-7000 ("Effective Continuum Approximations for Modeling Fluid and Heat Flow in Fractured Porous Tuff"), which is presently under review. LBL performed additional calculations to examine space- and time-discretization errors and to study system behavior when fractures are assumed to have parallel-plate characteristics.

#### WBS 1.2.1.4.4 Radionuclide Releases from Total System

SNL NNWSI Project staff participated in the GEOVAL-87 Symposium on verification and validation of geosphere performance assessment models on April 7-10, 1987.

DOE/EQ papers presented at the GEOVAL-87 Symposium suggested a formalized, multi-stage, peer-review process as the focal point for validation activities. If a staged peer-review process is adopted in the U.S. program, it will significantly influence the scheduling of performance assessment

activities done in preparation for license application. Current schedules do not appear to allow for this.

SNL NNWSI Project staff presented the paper "Modeling Severe Discontinuities in the Unsaturated Zone" at the DOE workshop "Hydrologic Behavior of Rock Discontinuities" at Berkeley, CA, on April 22-23.

#### PLANNED WORK

SNL personnel will continue cost estimating plans for the ACD with the understanding that additional guidance is forthcoming.

Drillhole information in the old TUFF data base from Holmes & Narver (H&N) has been compiled by SNL staff members and will be sent to H&N with a request for TPO authorization prior to transfer of this data to the SEPDB.

Rewriting two sections of the SCP will supercede most other Interactive Graphics Information System (IGIS) activities at SNL.

Further major inputs for the SCPPARM data base are expected from SCP authors covering Issues 1.4, 1.5, 1.12, 2.1, 2.2, and 2.3. These inputs are expected to be available on May 1, 1987, when the SCP draft information is due. These inputs will be prepared for project and DOE/HQ review by the end of May. Also, all parameter specifications should be ready for correlation with characterization issues by the end of May. The objective is to provide a set of consistently formatted parameter tables for the SCP, as appropriate for different issues. These tables are major input for the Technical Data Base requirements analysis.

A library of FORTRAN subroutines and functions will be developed by SNL staff on the IGIS VAX-11/750 for hydrogeologic models that use IGIS graphical data. This work is being done to support WBS 1.2.1.4.1, Flow and Radionuclide Transport.

SNL staff members will continue comparison of point-estimate techniques with other methods for generating the moments of GWTT.

A symposium on uncertainties in unsaturated flow is scheduled for June 15-16, 1987, at SNL.

Some of the SNL staff assigned to this WBS element will be involved with the production of the SCP. This work includes revision of the Chapter 8 sections associated with Issue 1.1 and this WBS Element, and the review of other Chapter 8 sections that directly and indirectly affect this WBS element.

#### PROBLEM AREAS

Commitments of key SNL staff normally assigned to the radionuclide releases task to work on the SCP will continue to delay technical work needed to complete milestones within the baselined schedule.

## MILESTONE PROGRESS

SNL Milestone M735, incorporate WMPO and TPO comments into letter report on studies of coupled processes and resubmit to WMPO, has been completed.

SNL Milestone M772, incorporate WMPO and TPO comments into performance studies report and resubmits to WMPO, is to be delayed.

SNL Milestone R109, report on studies of coupled processes included in the SCP, has been delayed.

The new estimated date of completion for SNL Milestone M291, incorporate WMPO comments into Yucca Mountain MGDS System Requirements and resubmit document, is July 31, 1987.

SNL Milestones M120, Yucca Mountain Mined Geologic Disposal System (MGDS) System Requirements submitted to DOE/HQ; M290, incorporate comments from WMPO and TPOs into SAND86-1631; and M769, submit Yucca Mountain site-specific MGDS description to WMPO; will be delayed.

The new estimated date of completion for SNL Milestone P126, establish System Studies Register, is June 15, 1987.

SNL Milestone R058, prepare and submit "A Cost Estimate of the Yucca Mountain Repository Based on the Site Characterization Plan Conceptual Design," SAND85-1964, has been completed.

The new estimated date of completion for SNL Milestone M108, WMPO sends SEMP to OGR for review, is June 15, 1987.

SNL Milestone M074, OGR systems engineering review of the NNWSI Project, has been delayed.

The new estimated date of completion for SNL Milestone R078, revised three-dimensional reference model of the NNWSI Project repository site, is June 30, 1987.

SNL Milestone P631, geostatistical evaluation of alternative drilling programs, has been delayed and the new date of completion is May 30, 1987.

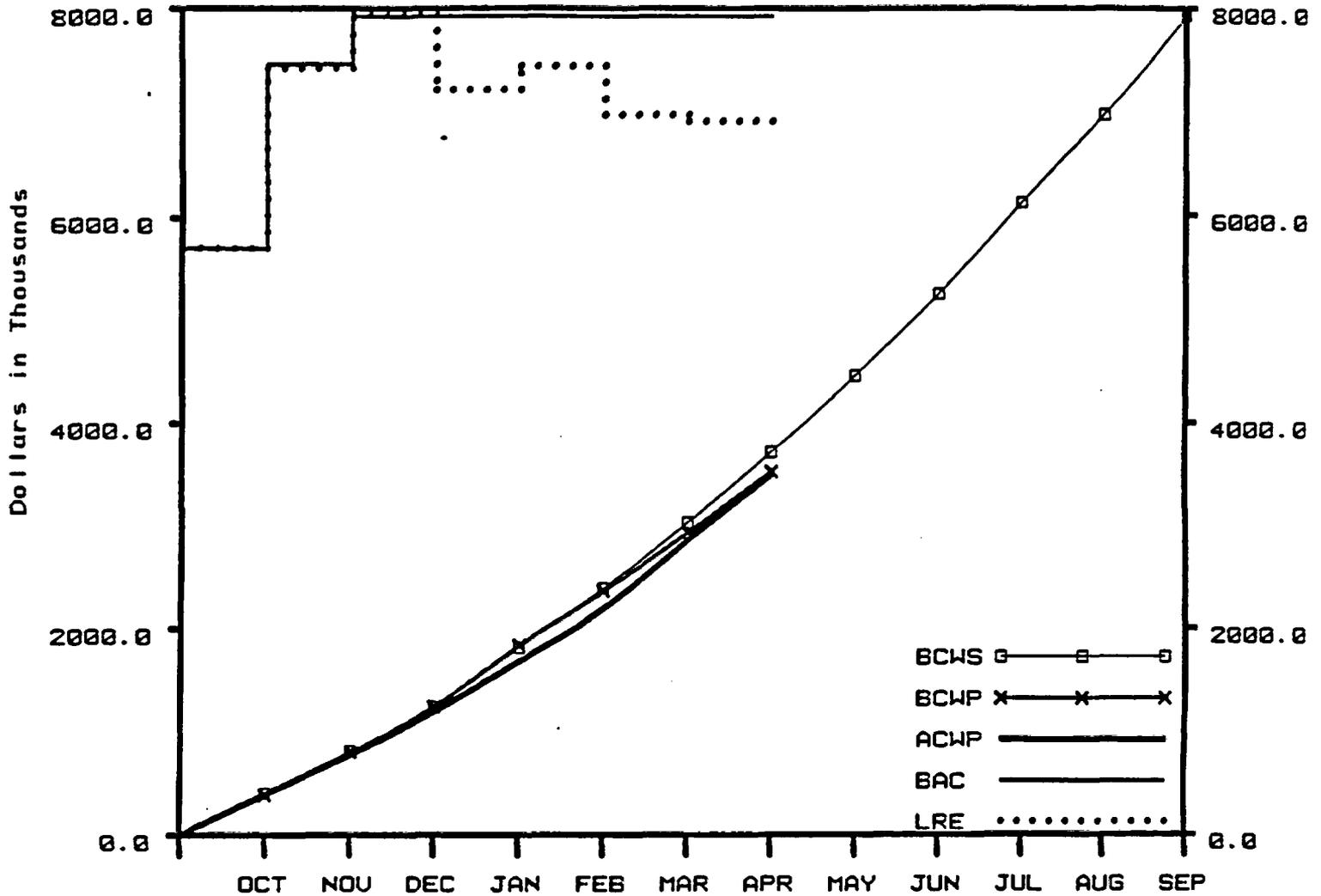
SNL Milestone M763, incorporate WMPO and TPO comments into annual version of RIB has been delayed and the new estimated date of completion is June 15, 1987.

The new estimated date of completion for SNL Milestone R092, hardcopy of 1987 annual versions of RIB sent to OGR for information, is June 15, 1987.

SNL Milestone M107, NNWSI Project position paper describing engineered-barrier system and disturbed-zone boundaries, was completed.

The new estimated date of completion for SNL Milestone M102, prepare and submit "Documentation of the Total System Performance-Assessment Code (TOSPAC) Volume 1: Physical and Mathematical Basis," SAND85-0002, is June 2, 1987.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.1



**SYSTEMS**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	680.9	3713.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	583.7	3521.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	626.8	3490.0
D. BUDGET AT COMPLETION (BAC)		7923.0
E. LATEST REVISED ESTIMATE (LRE)		6902.5

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-192.2	-5.17
G. COST VARIANCE (B-C)	31.4	0.89
H. AT COMPLETION VARIANCE (D-E)	1020.5	12.88

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1211 Systems Management and Integration	217.000	217.000	112.827	.000	104.173
1212 Systems Engineering	1,324.600	1,323.111	1,227.164	-1.489	95.947
1213 Technical Data Base Management	685.000	494.328	508.000	-190.672	-13.672
1214 Total Systems Performance Assessment	1,487.000	1,486.996	1,642.000	-.004	-155.004
121 SYSTEMS	3,713.600	3,521.435	3,489.991	-192.165	31.444

1-7

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
P132	WMPO/ SNL	1.2.1.1	WMPO submits Annual PASS Program Interaction Letter Report for FY 87 to OGR												△
R108	WMPO/ SNL	1.2.1.1	WMPO submits Letter Report on Studies of Performance Allocation Included in SCP to OGR					△				◇			
R109	WMPO	1.2.1.1	WMPO submits Letter Report on Studies of Coupled Processes Included in the SCP to OGR for Information			△				◆					
M120	WMPO/ SNL	1.2.1.2	Yucca Mountain Mined Geologic Disposal System (MGDS) Requirements						△		◇				
M261	WMPO/ SNL	1.2.1.2	Draft Yucca Mountain Site-Specific Mined Geologic Disposal System (MGDS) Description									△			◇
M108	WMPO/ SNL	1.2.1.2	System Engineering Management Plan (SEMP)					△					◇		
R074	WMPO/ SNL	1.2.1.2	OGR Systems Engineering Review of the NNEWSI Project						△				◇		
R092	WMPO/ SNL	1.2.1.3	WMPO Submits Hard Copy (1987 Annual) Version of the Reference Information Base to OGR								△				

◇  
1/88

△ 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 1.2.2.1 MANAGEMENT AND INTEGRATION

During April, the SAIC Engineering staff represented Technical and Management Support Services (T&MSS) at the International Topical Meeting on Remote Systems and Robotics in Hostile Environments, in Pasco, Washington and participated in SCP Chapter 7 Project Overviews Committee (POC) review in Washington, D.C.

#### WBS 1.2.2.2 WASTE PACKAGE ENVIRONMENT

The vitric tuff alteration experiment (DB29) being run for six months at 150°C was successfully completed this month. A fluid sample was collected at day 178 at in situ temperature and pressure and the following day another fluid sample was taken of the quenched solution after breaking down the gold bag reaction cell. These samples were submitted to chemistry for analysis. The solid wafer of glassy tuff was recovered intact, air-dried to constant weight, and stored in a desiccator awaiting scanning electron microscope/electron microprobe (SEM/EMP) analysis.

#### WBS 1.2.2.3.1.1 Waste Form Testing

The Series 2, Cycle 5 bare fuel tests were terminated by Lawrence Livermore National Laboratory (LLNL) staff after 139 days and will not be restarted for additional cycles. Total testing time for the Series 2 bare fuel tests has been 2.7 years. A 55-day sample for the Series 3, cycle 3 tests was also taken. Ceramographic characterization of fuel particles and SEM examination of particles and rinse residues from recent test cycle terminations was initiated. Preparation of the data for the Series 1 chemistry data package was 90 percent completed.

The two-month trial autoclave run at 150°C was completed at LLNL on April 1. As before, about 70 percent of the water had escaped (~175 ml), although there was no indication of the loss prior to opening the vessel. This loss corresponds to a loss of  $5.7 \times 10^{-2}$  cc/sec of water vapor at 100°C and atmospheric pressure, clearly more than the  $10^{-5}$  cc/sec maximum leak rate indicated by helium leak checks made prior to the trial. The leak check procedure will be reviewed again before the next trial.

#### WBS 1.2.2.3.2 Metal Barriers Testing

Visual and microscopic examinations have been completed by LLNL personnel on 37 sectioned corrosion specimens that were exposed in the Westinghouse-Hanford gamma pit in 1985 and 1986. Examinations were made before and after the etch of the polished surfaces with a formic acid-nitric acid solution.

Revision of Information Needs 1.4.1, 1.4.2, and 1.4.3 of the SCP plus some additions and modifications to Issue 1.4 were completed and reviewed by LLNL staff and delivered to SAIC. Some additional material on "uncertainties" in the Metal Barrier part of Chapter 7 was prepared for insertion in a special section (along with similar input from other tasks) in Chapter 7.

Despite the higher priority of the SCP, LLNL staff members made some progress toward completing the Metal Barrier Selection and Testing Scientific Investigation Planning (SIP) document. Twelve specific activities in four areas were identified, and quality assurance levels determinations and rationalizations were discussed. A draft version of the SIP is expected to be completed in early May.

#### WBS 1.2.2.5.1 Performance Assessment

Personnel Qualification Records for performance assessment staff, per LLNL NWMP QA Procedure 21B.0, were updated and submitted to the QA Records Center. Performance assessment staff observed the NNWSI Project QA audit April 27-29 of the Geochemical Modeling Code EQ3/6 Task.

#### PLANNED WORK

Current LLNL work activities will continue in deterministic model and code development, and in methodology development and testing for uncertainty analysis.

#### PROBLEM AREAS

Lack of staff is restricting progress in the other materials task by LLNL.

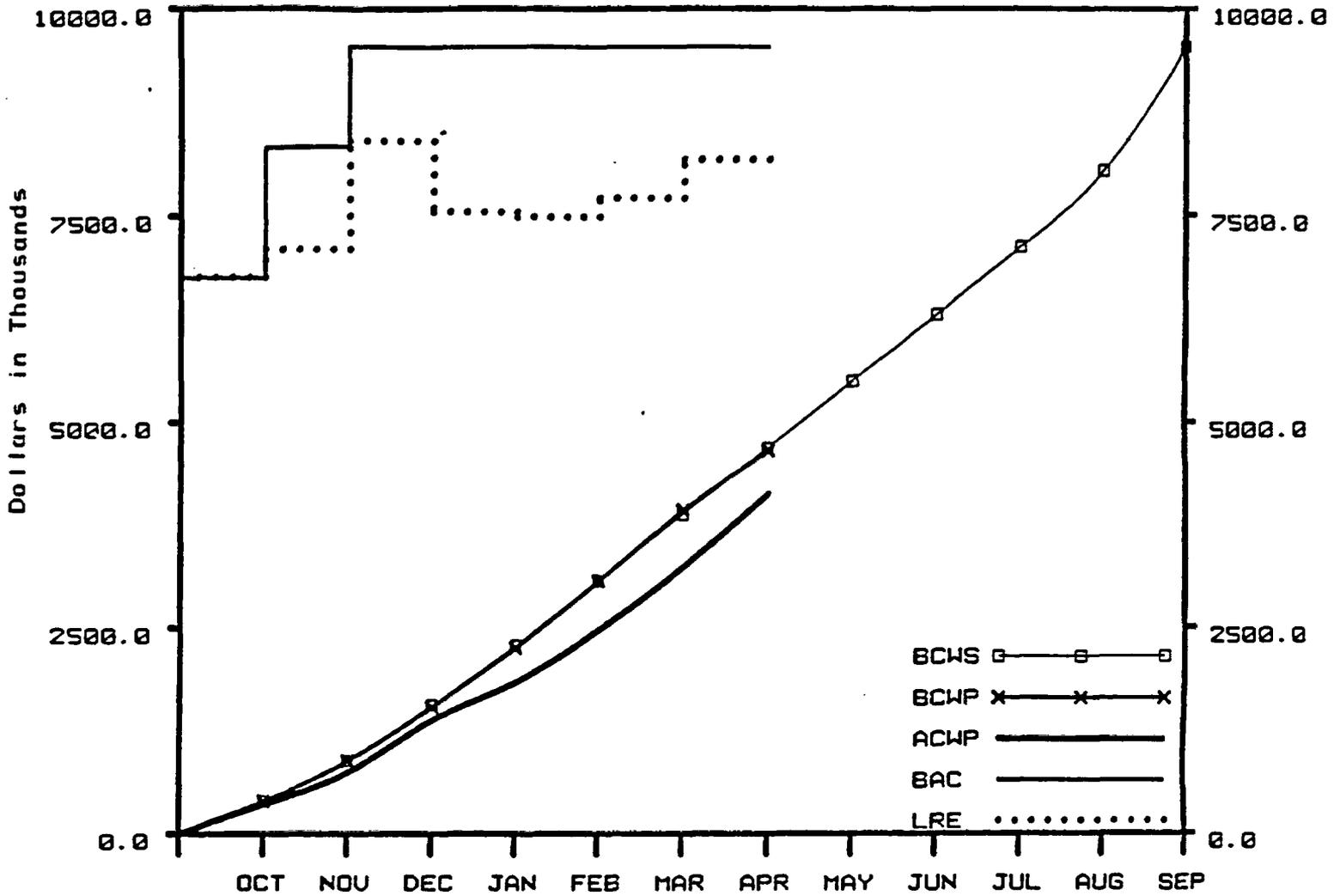
Attendance by LLNL staff members at review meetings for Chapter 8.3.5 of the SCP is causing delays to the writing of the SIP for a portion of this WBS element. The SIP for EQ3/6 (approved earlier this year) covers the laboratory activities to provide data for the EQ3/6 data base. These activities constitute more than half of the work in this WBS element.

Progress by staff members at LLNL in the near-field flow and transport task has been slowed by SCP related activities.

#### MILESTONE PROGRESS

LLNL Milestone M213 has been delayed due to SCP preparation. The new estimated date of completion is May 31, 1987.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.2



**WASTE PACKAGE**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	804.9	4682.2
B. BUDGETED COST OF WORK PERFORMED (BCWP)	729.6	4648.3
C. ACTUAL COST OF WORK PERFORMED (ACWP)	889.1	4123.4
D. BUDGET AT COMPLETION (BAC)		9535.0
E. LATEST REVISED ESTIMATE (LRE)		8168.2

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-33.9	-0.72
G. COST VARIANCE (B-C)	524.9	11.29
H. AT COMPLETION VARIANCE (D-E)	1366.8	14.33

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1221 Management and Integration	418.200	368.200	311.746	-50.000	56.454
1222 Package Environment	585.000	479.400	583.900	-105.600	-104.500
1223 Waste Form & Materials Testing	2,665.000	2,854.705	2,540.700	189.705	314.005
1224 Design, Fabricate, and Prototype Testing	529.000	511.000	228.200	-18.000	282.800
1225 Performance Assessment	485.000	435.000	458.900	-50.000	-23.900
122 WASTE PACKAGE	4,682.200	4,648.305	4,123.446	-33.895	524.859

2-4

MILESTONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION															
				O	N	D	J	F	M	A	M	J	J	A	S			
RO03	WMPO/LLNL	1.2.2.1	Waste Package Postclosure Compliance Strategy Document				△										◇	
M236	WMPO/LLNL	1.2.2.3	Progress Report on the Results of Testing Advanced Conceptual Design Metal Barrier Materials Under Relevant Environ. Conditions for a Tuff Repository				△										◇	
M257	WMPO/LLNL	1.2.2.3	Decision Made on Using Packing Material in the Waste Package to Assist in Controlling Radionuclides Release Rate				△											◇
MO13	WMPO/LLNL	1.2.2.4	Revised Draft Waste Package Subsystem Conceptual Design Requirements to DOE/HQ for Review								△						◇	
M233	WMPO/LLNL	1.2.2.4	Initiate Waste Package Advanced Conceptual Design															△
M260	WMPO/LLNL	1.2.2.5	Report on Long-Term Performance Analysis of the Conceptual Waste Package Design									△						◇
M276	WMPO/LLNL	1.2.2.5	Report on the System Model for Waste Package Performance Analysis	△			◆											

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

## 1.2.3 SITE INVESTIGATIONS

### OBJECTIVE

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

### ACTIVITIES

#### WBS 1.2.3.1 MANAGEMENT AND INTEGRATION

The stop-work order issued to USGS in March 1986 remained in effect through April and almost all site characterization technical activities continued to be suspended. Most Project personnel continued on the preparation of SIPs with their corresponding Quality Assurance Level Assignment Sheets (QALAS) -- a necessary step for resumption of work.

The SAIC Management and Integration staff completed the review of the revised State Grant Proposal and forwarded comments to WMPO. The Site M&I Semiannual Status Report, milestone P804, was also completed.

SAIC staff developed a report which summarizes the planned site characterization activities for the Yucca Mountain Site. Information was extracted from the current version of the SCP, and includes ESF as well as surface activities. The report is intended to support negotiations regarding land access and environmental permitting. When revised to be compatible with the final SCP, the report will be a useful summary of the SCP planned activities.

The SAIC Site M&I Branch is coordinating the technical reviews of SIPs and QALAs submitted by the Project participants.

#### WBS 1.2.3.2.1 Geologic Investigations

##### WBS 1.2.3.2.1.1 Site Geology

USGS staff worked on logic diagrams for Section 1.15 of the SCP. A USGS representative met in Denver on April 6 with personnel from DOE/HQ, SNL, SAIC/Golden, and SAIC/Las Vegas to discuss logic diagrams for the SCP. Spengler served on the Central Regional Geology Branch Promotion Committee April 7-17. For the remainder of the month, Spengler worked on revision of the parameter list for Section 1.15 of the SCP.

SNL NNWSI Project staff participated in planning activities at Yucca Mountain on April 22-24. An assessment of the suitability of the topography for conducting a ground-penetration radar survey was made with SNL Division 7116 staff. Quaternary units to be delineated during forthcoming mapping and trenching activities were visited with an SNL consultant. Lineaments observed on aerial photographs were examined in the field to determine potential suitability as trench sites.

#### WBS 1.2.3.2.2 Geophysical Investigations

##### WBS 1.2.3.2.2.1 Gravity and Magnetic

Personnel at USGS worked on a lead paper which will introduce a special issue of the Journal of Geophysical Research on Radioactive Waste Disposal scheduled for June. Six other papers on that subject have now been accepted, five additional papers emanating from the 1982 American Geophysical Union Fall meeting have already been published in the JGR. D. Ponce worked on the QA procedures for both ground- and aeromagnetic data. R. Harris finished a first draft of a principal facts report on all NTS gravity data and sent it to coauthor D. Healey for additions on the accuracies of data sets obtained under the Weapons program.

#### WBS 1.2.3.2.3 Site Stability

##### WBS 1.2.3.2.3.1 Tectonics and Volcanism

No technical work was reported for the USGS staff involved in Tectonics and Volcanism task. Project staff were engaged in planning, QA activities, SIP and Study Plan preparation.

##### WBS 1.2.3.2.3.2 Isotope Geology

A considerable volume of USGS data for the NNWSI Project records-repository in Las Vegas was submitted. Work continued on preparation of a SIP for tectonics and volcanism while awaiting lifting of the stop-work-order. A report entitled, "Uranium Trend Dating of Fluvial and Fan Deposits in the Beatty Area, Nevada," is being completed and is scheduled for release as a USGS Bulletin, with an estimated October 1987 completion date.

#### WBS 1.2.3.3 HYDROLOGY

#### WBS 1.2.3.3.2 Saturated Zone Hydrology

##### WBS 1.2.3.3.2.2 Fractured-Rock Hydrology

The USGS SIP, "Hydraulic and conservative-tracer tests in fractured rock," (SIP-3332G-01) was transmitted to WMPD for approval.

#### WBS 1.2.3.3.3 Unsaturated Zone Hydrology

USGS Project staff spent most of the month on planning activities for the Exploratory Shaft and on SIP and Study Plan preparation for unsaturated-zone activities.

The USGS manuscript, "Radiocarbon Dates V," which received WMPO review and approval, was transmitted to the USGS Regional Hydrologist for approval for publication in the American Journal of Science.

The following USGS abstracts were transmitted to WMPO for review and approval for presentation at the American Geophysical Union (AGU) Spring meeting, Baltimore, Maryland on May 18-22, 1987:

"Design of Measurement Network to Determine Boundary Conditions for Groundwater Modeling at a Proposed High-Level Radioactive-Waste Repository."

"Preliminary Capillary Hysteresis Simulations in Fractured Rocks."

The following USGS abstract was transmitted to WMPO for review and approval for presentation at the International Conference on Measurement of Soil & Plant Water Status, July 6-10, 1987, at Logan, Utah:

"A Collimated Neutron Probe for Soil-Moisture Measurement."

#### WBS 1.2.3.3.4 Climatology

A USGS representative revised parts of Chapter 5 (Climate) and Chapter 8 (Testing Strategy) of the SCP and completed logic diagrams for performance allocation.

A draft of the USGS report, "Isotope Content and Temperature of Precipitation in Southern Nevada, August 1983 - August 1986," was transmitted to WMPO for review and approval.

#### WBS 1.2.3.4 GEOCHEMISTRY

##### WBS 1.2.3.4.1.2 Natural Isotope Chemistry

A Los Alamos representative met with Hydro Geo Chem personnel in Tucson on April 8 to discuss the chlorine-36 and chloride analysis work to be performed under the current contract during the remainder of this fiscal year. Hydro Geo Chem plans to develop a technique to reduce the mass of tuff necessary for cosmogenic chlorine-36 analyses from 40 kg to a mass as low as 5 kg. This development work should be complete by the end of September.

A Los Alamos paper titled "Infiltration at Yucca Mountain, Nevada, Traced by  $^{36}\text{Cl}$ " was presented at the Fourth International Symposium on Accelerator Mass Spectrometry, which was held in Ontario, Canada, from April 26 through May 1. One of the meeting participants who expressed more than a passing interest in this presentation was a representative from Mifflin & Associates, Las Vegas, Nevada. This company is a consultant for the State of Nevada in areas of high-level nuclear waste disposal. The representative requested a reprint of previously published work concerning chlorine-36 measurements at Yucca Mountain.

#### WBS 1.2.3.4.1.4 Solubility Determination

A first draft of the study plan was completed by Los Alamos personnel for the speciation determination subtask. This document is currently undergoing revisions. Work was also begun on the preparation of the study plan for the colloid formation, characterization, and stability subtask.

#### WBS 1.2.3.4.1.5 Sorption and Precipitation

Revisions to Chapter 8.3 of the SCP were completed by Los Alamos staff.

Los Alamos personnel are preparing three cores received from the core library late in 1985 for batch sorption measurements using nickel, americium, and neptunium with various ground waters.

#### WBS 1.2.3.4.1.7 Retardation Sensitivity Analysis

A revised draft of Los Alamos Milestone R343, "Preliminary Geochemical/Geophysical Model of Yucca Mountain," was delivered to the WMPO on April 30, 1987.

Los Alamos staff revised Section 8.3.1.3.7, Investigation 1.14.7, of the SCP and responded to SCP Comment Response Forms and updated the milestone list for FY 88-92.

#### WBS 1.2.3.4.1.8 Reactive Tracer Testing

Two 55-gallon drums of J-13 water were shipped, received, logged, and stored for experiment use by Los Alamos staff. Forty gallons of that water are being stored in refrigerators at 4°C for archival purposes. Water samples (250 mL each) from the two drums were sent to a Chemical and Laser Science Group (CLS-1) for analysis.

#### WBS 1.2.3.4.2.3 Mineralogy of Transport Pathways

In April, x-ray diffraction (XRD) studies of clay minerals from drillhole UE-25p#1 were completed by Los Alamos staff. These clays are being studied to understand the causes, timing, and extent of hydrothermal alteration in the northern part of Yucca Mountain. The results of these studies will be included in a milestone report (R567).

### WBS 1.2.3.5 DRILLING

#### WBS 1.2.3.5.1 Core Library

REECo staff completed Title II design for Warehouse I and transmitted it for internal REECo review on April 28, 1987. Title I drawings and a budget estimate for Warehouse II were prepared and submitted to the WMPO for review. The subsequent review meeting was held on April 22, 1987.

REECo personnel provided electric and maintenance support on active monitoring hole No. USW UZ-1.

SAIC staff completed the Core Transfer Plan for inventorying and transferring core to the Sample Management Facility (SMF) in draft form.

#### WBS 1.2.3.5.2 Drilling, Construction, Engineering

USGS test hole USW U-28 remained at a temporary depth of 58 feet, as all drilling continued to be suspended under the stop-work order.

#### WBS 1.2.3.6.1 Environmental Survey

Operation of the meteorological monitoring program continues to function well with very high data recovery. SCP Chapter 5.0 was revised by SAIC staff, and DOE/HQ comments were resolved.

Five Environmental Radiological Monitoring Technical Procedures were issued by SAIC staff to support implementation of the Preliminary Site Characterization Radiological Monitoring Plan.

A draft of the Environmental Pathways Analysis Scoping Study for the Yucca Mountain site is in internal SAIC review. This document supports the Radiological Monitoring Plan for the selection of media to be monitored.

"Population Densities Along Nevada Transportation Routes" (DOE/NV/10270-12, SAIC-86-8005) was approved by WMPO for publication. The topical report documents the methodology utilized by the Nevada Nuclear Waste Storage Investigations Project in the final Environmental Assessment to estimate population density along Nevada transportation routes and the fraction of each Nevada route in urban, suburban, and rural population zones.

#### PLANNED WORK

SAIC SMF Title II design work on warehouses #1 and #2 is scheduled for completion on May 15; construction will begin on warehouse #2 around July 1, with planned completion in September; construction on warehouse #1 is scheduled to begin in October 1987.

A status report will be prepared on the progress of the SMF, and a presentation will be made by SAIC staff to the TPOs at the May TPO meeting.

Los Alamos staff members will continue organizing clinoptilolite solubility and cristobalite-to-quartz conversion kinetics experiments. Work will also start on the writing of a conceptual model for mineral alteration in Yucca Mountain.

A Los Alamos representative will present a paper entitled "Modeling Tracer Diffusion in Unsaturated Porous Media, Both Fractured and Unfractured" at the AGU Spring Meeting, Baltimore, May 30. This paper, based on Milestone R314, will be submitted for publication in a special issue of the Journal of Contaminant Hydrology.

A survey to determine the feasibility of using ground-penetrating radar to locate faults will be conducted by SNL staff members at the surface facility site east of Exile Hill. This geophysical technique has been used with some

success at the WIPP site. If successful at Yucca Mountain, a radar survey would provide an expedient and efficient way to locate trenches to study faults.

H&N staff will complete Title I design for modifications to Building 4215 in Area 25.

#### PROBLEM AREAS

A lack of core availability both for examination and sampling will cause a delay in Los Alamos Milestone R623. This same lack of core availability will soon impact all studies of fracture mineralogy. The erionite study mentioned above is limited to the interval specified because that is the interval already sampled and available.

The lack of a format for Study Plans continues to be a problem for USGS Project investigators involved in their preparation.

#### MILESTONE PROGRESS

SNL Milestone P499, study plan for conduct of geologic field studies for NNWSI Project repository preclosure facilities, is being redefined.

Los Alamos Milestone R202, "Preclosure Volcanic Effects: Evaluations for Potential Repository at Yucca Mountain, Nevada," was approved by WMPO on April 9, 1987.

Los Alamos Milestone R357, "The Kinetics of Silica-Phase Transitions" was sent to WMPO on April 21, 1987.

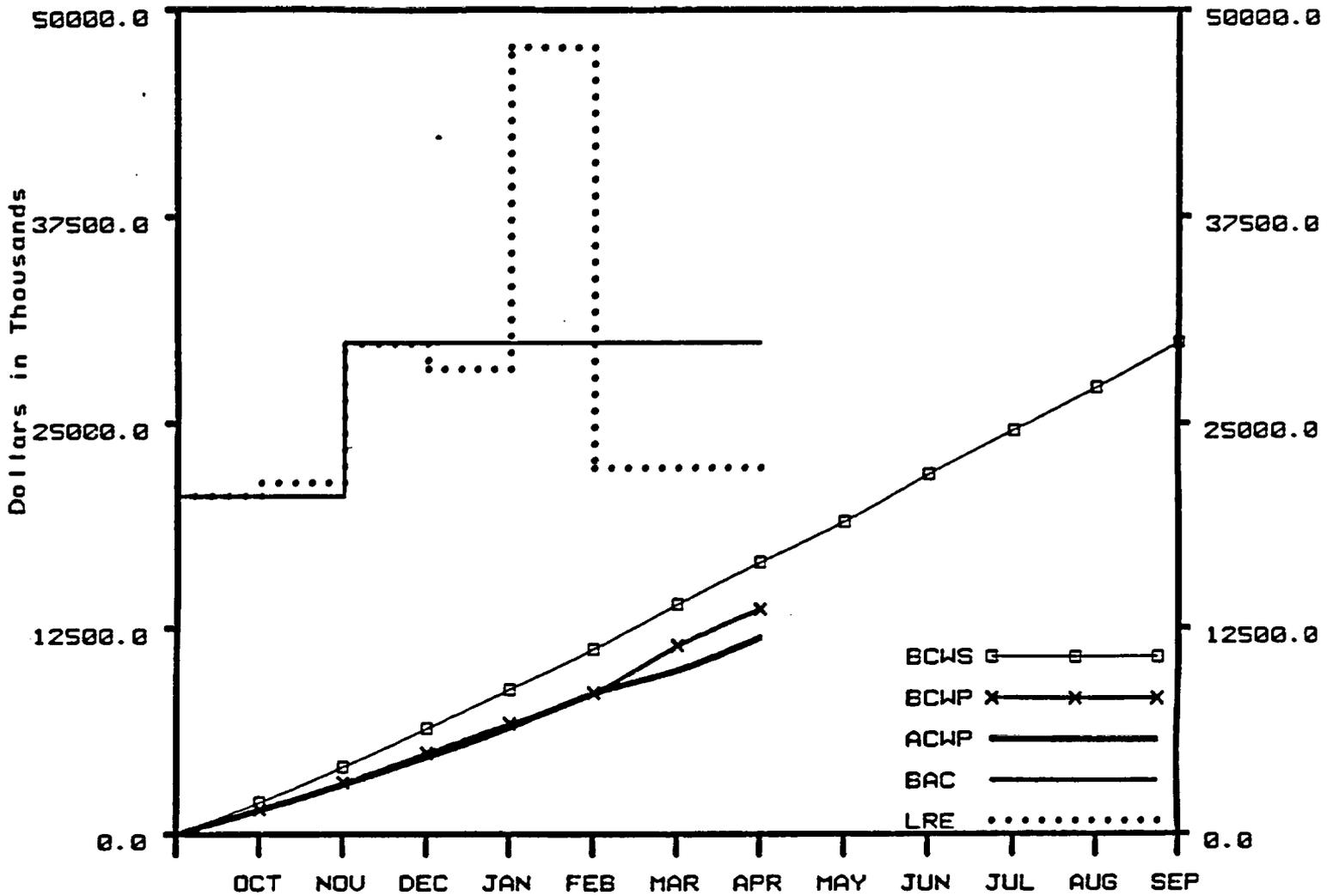
Los Alamos Milestone R347, update report on fracture flow in saturated tuff, was sent to WMPO on April 21, 1987.

Los Alamos Milestone R346, "FEHMS: A Finite Element Heat-Mass-Stress Code for Coupled Geological Process" was sent to WMPO on April 6, 1987.

LLNL Milestone C304, EQ3/6 Code Release, has been delayed and the new estimated date of completion is May 30, 1987.

LLNL Milestones C319, Interim Report on Modeling Sorption with EQ3/6; and M343, complete Draft MCRT User's Manual, have been delayed and the new estimated date of completion is May 30, 1987.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.3



**SITE INVESTIGATIONS**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	2560.6	16497.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	2196.0	13619.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1966.6	11913.4
D. BUDGET AT COMPLETION (BAC)		29835.0
E. LATEST REVISED ESTIMATE (LRE)		22240.1

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-2878.0	-17.45
G. COST VARIANCE (B-C)	1705.6	12.52
H. AT COMPLETION VARIANCE (D-E)	7594.9	25.46

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1231 Management & Integration	3,345.000	3,013.645	2,122.913	-331.355	890.732
1232 Geology	2,826.900	1,624.920	1,461.459	-1,201.980	163.461
1233 Hydrology	3,815.000	3,273.320	2,753.452	-541.680	519.868
1234 Geochemistry	3,209.800	3,126.500	3,162.000	-83.300	-35.500
1235 Drilling	1,594.470	1,154.870	927.186	-439.600	227.684
1236 Environment	806.400	723.202	630.414	-83.198	92.788
1237 Socioeconomic	450.400	315.515	386.757	-134.885	-71.242
1238 Geochemical Modeling Code EQ3/6	449.000	387.000	469.200	-62.000	-82.200
1239 Deferred Site Close Out	.000	.000	.000	.000	.000
123 SITE INVESTIGATIONS	16,496.970	13,618.972	11,913.381	-2,877.998	1,705.590

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
RB45	WMPO/ USGS	1.2.3.2	Recommendation to Proceed with Deep Regional Seismic Survey to OGR for Approval												△	◇ 8/88
M325	WMPO/ LANL	1.2.3.4	Report on Geochemistry Simulation of Yucca Mountain Using Best Available Data on Mineralogy, Water Chemistry, Flow Rates and Crack Statistics		△						◇					
R309	WMPO/ LANL	1.2.3.4	Preliminary Report on Sorption Modeling				△				◇					
M895	WMPO/ SAIC	1.2.3.1	Submit Report on Evaluation of Natural Resources at YM and Vicinity received to DOE/HQ for Information											△		
M897	WMPO/ SAIC	1.2.3.6	Final Radiological Monitoring Plan Complete					△			◇					
R327	WMPO/ SAIC	1.2.3.6	Submit Air Quality Monitoring Plan to DOE/HQ							△				◇		
N345	WMPO/ SAIC	1.2.3.6	Begin Air Quality Monitoring												△	◇ 12/87
R945	WMPO/ SAIC	1.2.3.7	Submit Working Draft Site Characterization Socioeconomic Monitoring and Mitigation Plan (SMMP)		◇	△										
P030	WMPO/ SAIC	1.2.3.7	Submit Draft Socioeconomic Monitoring and Mitigation Plan to DOE/HQ							△					◇	

△ 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

During April, the SAIC Engineering staff revised LAD/AE selection schedule and submitted to WMPO for review, and reviewed and commented on SCP Glossary.

##### WBS 1.2.4.1.1 Management

The DOE/HQ position on the content of the ACD is under review at SNL. The basis for the review is a memorandum dated January 21, 1987, from OGR. Review comments and budget estimates are being prepared for WMPO. These estimates will identify the funding required to support the work described in Stein's memorandum.

##### WBS 1.2.4.1.2 Basis for Design

Bechtel National, Inc., (BNI) has submitted two draft sections of the Repository Design Requirements (RDR) document, and Parsons Brinckerhoff Quade & Douglas has submitted one section. Work is now underway at SNL to review and edit these and other sections of the RDR. Efforts are being made to provide consistency with DOE/HQ guidance for this document and to develop design requirements at a level of detail consistent with the SR and the state of design development.

##### WBS 1.2.4.1.3 Major Design Deliverables

SNL staff sent the comment resolution draft of the SCP-CDR to ORG and WMPO for their review and approval on April 3, 1987. This transmittal completes Milestone P198, which is a precursor to level 1 Milestone N432.

Work on the Repository Design Plan (RDP) has started again after the interruption caused by redirection of SNL effort to the SCP-CDR. Comments on the initial draft of the RDP from Los Alamos, LLNL, WMPO, and SAIC are being cataloged and addressed.

#### WBS 1.2.4.1.4 Engineering Design Support: Special Studies

The SNL report entitled "Impact on Costs and Schedules of Using a Monitored Retrievable Storage Facility in Conjunction with a Repository in Tuff at Yucca Mountain" (SAND85-7112) has been sent to WMPO for policy review.

#### WBS 1.2.4.2.1.1 Rock Mass Analysis

The report entitled "Numerical Analyses for the G-Tunnel Small Diameter Heater Experiment" (SAND85-7115), by RE, SPEC Inc., has completed all reviews and is being prepared for printing.

#### WBS 1.2.4.2.1.2 Field Testing

The following two SNL conference papers were approved by WMPO for publication at the 28th U.S. Symposium on Rock Mechanics: "Analysis of Drift Convergence Phenomena from G-Tunnel Welded Tuff Mining Evaluations," and "Development of Diamond-Tipped Chain-Saws for Slot Cutting in Welded Tuff."

#### WBS 1.2.4.2.1.3 Laboratory Properties

Efforts by SNL staff under this WBS task have been directed toward revising Section 8.3.1.15 of the SCP and preparing reports that are SCP references. The status of these reports is as follows:

"Uniaxial and Triaxial Compression Tests Series on the Topopah Spring Member from USW G-2, Yucca Mountain, Nevada" (SAND85-0762) is being prepared for printing.

"Bulk, Thermal, and Mechanical Properties of the Topopah Spring Member of the Paintbrush Tuff, Yucca mountain, Nevada" (SAND85-07620) is being revised to incorporate peer review comments. All technical comments have been addressed. The remaining revisions will be made after a more detailed statistical analysis of the data is completed.

SAND87-0115, which comprises two previously unpublished memoranda containing material which is referenced in the SCP, is being prepared for printing.

SCP Section 8.3.1.15 was submitted to SAIC for production on April 13.

In addition, SAND86-0177, "Rock Joint Compliance Studies," is being prepared for printing. Two Technical Procedures were approved covering vacuum saturation and oven drying of laboratory test samples. Eleven other Technical procedures, covering topics related to mechanical testing and X-ray diffraction, are in various stages of review. Experiment Procedure EP-0002, discussing mechanical testing at higher temperatures and low strain rates, is in final review.

#### WBS 1.2.4.2.1.4 Water-Migration Analysis

Comments made by an GU reviewer are being resolved on a paper presented at the last AGU meeting. The paper, "Measuring and Modeling Water Imbibition into Tuff" (SAND86-1757C), discussed results of a simplistic laboratory

experiment and comparison of the experimental results with predictions made using the computer code TOSPAC.

The SNL paper entitled "Drying of an Initially Saturated Fractured Volcanic Tuff" (SAND87-0293C), is in the peer review and comment resolution stage.

#### WBS 1.2.4.2.2 Equipment Engineering and Instrument Development

SNL staff members completed negotiations for a contract with the Robbins Co. that will produce conceptual designs for borehole drilling equipment and off-normal core drill retrieval equipment. It is anticipated that the contract will be placed in the near future. The results of this work will be used in an ongoing emplacement option study being conducted at SNL.

Conceptual designs for several components of the vertical and horizontal emplacement/retrieval equipment systems have been completed by SNL personnel. These designs will be used to assess feasibility and differences in technology required for several different borehole lengths.

Repository drift and emplacement borehole layouts have been completed by Parsons Brinckerhoff Quade & Douglas for short horizontal boreholes. Drift stability analyses have been completed for the new layouts.

#### WBS 1.2.4.2.3.1 Seal Performance Requirements

The SNL report satisfying Milestone P210, "Technical Basis for Performance Goals, Design Requirements, and Material Recommendations for the NNWSI Repository Sealing Program" has been completed and was submitted to WMPO for policy review.

The SNL report entitled "Analysis to Evaluate the Effect of the Exploratory Shaft on Repository Performance at Yucca Mountain" (SAND85-05598, Milestone P212), is undergoing peer review.

Efforts by SNL staff during April have also been directed toward SCP activities. In particular, Chapter 5 of the SCP-CDR and Section 8.3.3 of the SCP were modified. This causes a redirection of personnel which impacts work in the sealing program.

#### WBS 1.2.4.2.3.3 Seal Concepts Development

The SNL report entitled "Modification of Rock Mass Permeability in a Zone Surrounding a Shaft in Fractured, Welded Tuff" (SAND86-7001), has been published, satisfying Milestone R037.

#### WBS 1.2.4.3.2 Surface Facilities

The SNL letter report entitled "Design Margin Philosophy for Use in the NNWSI Project" (SLTR86-1018) has been issued.

The design review comments on the BNI task entitled "Conceptualization of Improvements to Waste Handling Facilities" are being resolved by BNI after a discussion between SNL and BNI.

A change order revising the scope of work being performed by BNI to reflect more pre-ACD studies rather than the initiation of ACD as was originally planned has been approved by SNL management.

#### WBS 1.2.4.3.3 Shaft/Ramps

The ESF Hoisting Study and the second volume of the structural Design Study are currently being reviewed by SNL staff members.

Personnel from Parsons Brinckerhoff Quade and Douglas met with WMPO to examine a used mine hoist proposed for installation at the ESF.

#### WBS 1.2.4.3.4 Underground Excavations

A preliminary list of the parameters needed from the lateral exploratory drifts to support the Repository design has been developed. These parameters will be compared with the parameters identified in the exploratory shaft test plan to determine if they have already been identified.

A brief presentation of the design of the underground facilities was given to the Babcock and Wilcox personnel who are now under contract to LLNL to provide waste package design services.

SNL letter report SLTR87-4001, on the sizing of the Exploratory Shaft Facility lateral exploration drifts, has been released.

#### WBS 1.2.4.3.5 Underground Service System

The final draft of the report on fan reversibility has been received from Mine Ventilation Services. The report is being reviewed and will be published as an SNL report.

The SNL report on operator radiation dose for emplacement and retrieval of spent fuel has been released for publication after incorporation of changes based on comments received from WMPO.

#### WBS 1.2.4.4 OPERATIONS AND MAINTENANCE

OGR comments on the December 24, 1986, draft of the report entitled "OGR Repository-Specific Rod Consolidation Study - Effect on Costs, Schedules, and Operations at the Yucca Mountain Repository" (SAND86-2357) were received in late March 1987. The principal author of the report met with WMPO staff members on April 9, 1987, to develop a strategy for responding to OGR and WMPO comments. It was decided that at-reactor fuel consolidation will not be considered, for two reasons: first, the resulting waste emplacement schedules would be inconsistent with those in the SCP and the NNWSI Project reports, and second, at-reactor consolidation proliferates the number of container loadings that must be considered -- for only a 1 percent effect on the number of disposal containers required.

#### WBS 1.2.4.6.1 Repository Performance Code Development and Certification

The SNL reports entitled "NNWSI Unit Evaluation at Yucca Mountain, Nevada Test Site: Near Field Thermal and Mechanical Calculations Using the SANDIA-ADINA Code" (SAND83-0030); and "NNWSI Unit Evaluation at Yucca Mountain, Nevada Test Site: Near Field Mechanical Calculations Using a Continuum Jointed Rock Model in the JAC Code" (SAND83-0070), have completed policy review at WMPO and are undergoing final assembly for printing.

#### WBS 1.2.4.6.2 Design Analysis

During April 1987, SNL staff continued work on Section 8.3.2.2 of the SCP. Specifically, the text of Chapter 8 of the SCP was revised to be consistent with the new performance allocation tables for Issue 1.11, and the sections on milestones and activities and schedules were rewritten. Section 8.3.2.2 was also checked against Section 6.4.2 to assure consistency.

A list of publications of thermal, mechanical, and thermomechanical geotechnical design analyses was prepared by SNL personnel for use in reviewing manuscripts being prepared for publication and for identifying candidate analyses for the RIB.

Work is progressing on SNL SCP references. Two have returned from WMPO, three are at WMPO for review, and two are in line review.

#### WBS 1.2.4.6.3 Preclosure Safety Analysis

SNL staff members are continuing the rewrite of the issue resolution strategy sections of the SCP for Issues 2.1, 2.2, 2.3, and 2.7. Preliminary drafts for the rewrites of Issues 2.1 and 2.2 have been completed.

BNI has issued a draft of the report entitled "Preclosure Radiological Safety Analysis for Normal Conditions of the Yucca Mountain Repository" (SAND87-7073) for SNL review and comment.

More review and comment by SNL personnel on the SCP-CDR was performed with special attention to sections concerning items important to safety and waste isolation.

#### PLANNED WORK

Since Chapter 8 of the SCP-CDR will be directly affected by comments and changes to SCP Section 6.4, Chapter 8 of the SCP-CDR will be reviewed by SNL management after DOE has completed its review of Section 6.4.

Los Alamos and LLNL input on the Exploratory Shaft Facility (ESF) and the waste package will be required for the RDP. SNL will cooperate with these labs to facilitate integrating their input into the draft RDP.

Work on the exploratory shaft performance analysis will continue at SNL. Additional requirements to work on the SCP are anticipated.

A meeting is being planned to discuss the impact of the requirements of the repository sealing program on the repository. The goal of this meeting is to

present the new proposed requirements to the design architect/engineer so that the impact on the underground facility can be determined.

During May, the major emphasis of work by staff at SNL will be the SCP and SCP-CDR references for those documents and upon contract administration.

#### PROBLEM AREAS

The ACP Plan guidance given for the RDR requires extensive revision of the current SDR document. Given the resource conflicts with the Project activities, it appears that delivery of the RDR to DOE by the end of May is unlikely.

The BNI contract is due to expire October 1, 1987. If the ACD is to be initiated by this date, as is presently planned by DOE/HQ, the work scope for ACD should be finalized very soon and negotiation of BNI's contract extension with the new work scope initiated as soon as possible.

#### MILESTONE PROGRESS

SNL Milestones N430, Start ACD; and P195, SNL informs WMPO that repository ACD activities are ready to start, have been delayed and the new estimated date of completion is May 30, 1988.

SNL Milestone N432, repository conceptual design in support of site characterization, has been completed.

SNL Milestone N434, Repository Design Plan (RDP), including preclosure performance-assessment information, is being reassessed.

SNL Milestone P198, incorporate comments from WMPO and OGR into SCP-CDR, was completed.

SNL Milestone M434, report on G-tunnel mining evaluation, has been delayed and the new estimated date of completion is July 1, 1987.

SNL Milestones N406, horizontal waste emplacement equipment development plan, and N427, initiate procurement of development prototype boring machine, will be delayed.

SNL Milestone P156, incorporate WMPO and TPO comments into SAND84-2197, "A Recommendation for the Horizontal Emplacement of Radioactive Waste in Tuff, Basalt, and Granite," has been dropped.

SNL Milestone P210, prepare design requirements and materials recommendation report, has been completed.

The new estimated date of completion for SNL Milestone R211, WMPO reviews the technical basis for performance goals, design requirements, and materials recommendations for seals and sends comments to SNL, is May 30, 1987.

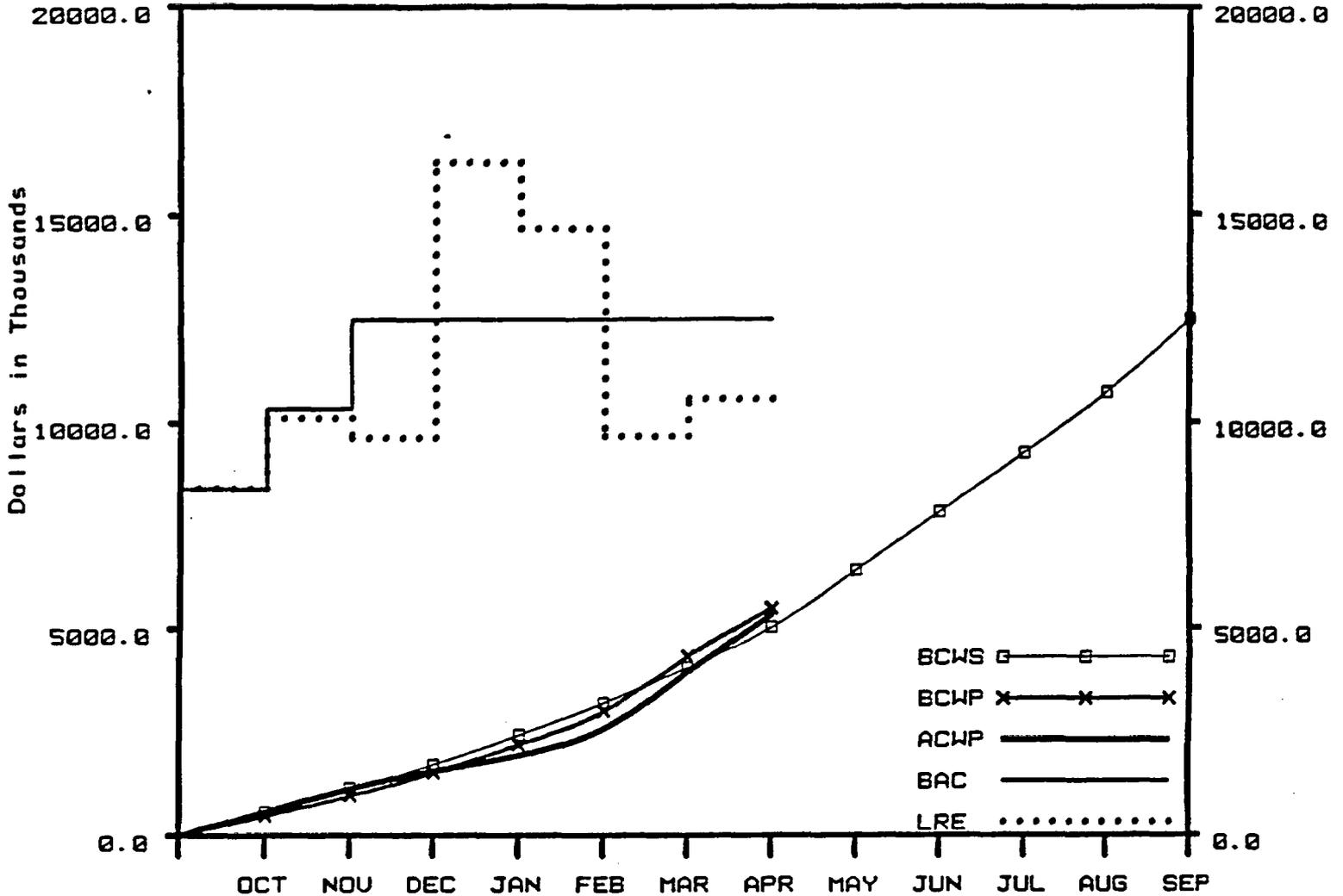
SNL Milestone P213, WMPO reviews the report on ES performance analysis to evaluate the effect of ES on repository performance assessment and returns to SNL, has been delayed and the new estimated date of completion is June 20, 1987.

SNL Milestone P129, prepare and submit "Report on the Welded Tuff Mining Demonstration Performed at the G-Tunnel Facility on the NTS," SAND86-7009, has been delayed and the new estimated date of completion is June 30, 1987.

SNL Milestone P218, incorporate WMPO comments into preliminary study of the effects of uncertain geologic data on design of the underground facility and resubmit to WMPO, has been completed.

SNL Milestone P159, radiological safety analysis for normal conditions of NNWSI Project Repository--ACD guidance, is in peer review.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.4



**REPOSITORY INVESTIGATIONS**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	971.7	5026.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1166.9	5486.9
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1383.1	5336.3
D. BUDGET AT COMPLETION (BAC)		12472.0
E. LATEST REVISED ESTIMATE (LRE)		10546.4

**VIARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VIARIANCE (B-A)	460.3	9.16
G. COST VIARIANCE (B-C)	150.6	2.74
H. AT COMPLETION VIARIANCE (D-E)	1925.6	15.44

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1241 Management and Integration	1,497.600	1,984.000	2,172.317	486.480	-188.237
1242 Development and Testing	1,952.000	1,925.832	1,849.000	-26.168	76.832
1243 Facilities	597.000	597.001	654.000	.001	-56.999
1244 Operations and Maintenance	268.000	268.000	251.000	-.000	17.000
1245 Decommissioning	46.000	46.000	2.000	-.000	44.000
1246 Repository Performance Assessment	666.000	666.000	408.000	-.000	258.000
124 REPOSITORY INVESTIGATIONS	5,026.600	5,486.912	5,336.317	460.312	150.595

MILESTONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S
N430	WMPO/ SNL	1.2.4.1	Start Repository Advanced Conceptual Design												△
N433	WMPO/ SNL	1.2.4.1	Initial Subsystem Design Requirement (SDR)							△				◇	
N432	WMPO/ SNL	1.2.4.1	Repository Conceptual Design in Support of Site Characterization					△		◆					
M455	WMPO/ SNL	1.2.4.2	Report on G-Tunnel Underground Facility (GTUF) Summary				△			◆					
M295	WMPO/ SNL	1.2.4.2	Feasibility Analysis of Horizontal Emplacement and Retrieval - Letter Report		△										◆ 9/86
N406	WMPO/ SNL	1.2.4.2	Horizontal Waste Emplacement Equipment Development Plan					△						◇	
P404	WMPO/ SNL	1.2.4.2	Prepare "Technical Basis for Performance Goals, Design Requirements and Material Recommendation for the NNWSI Project Repository Sealing Program Report"						△				◇		
N427	WMPO/ SNL	1.2.4.2	Initiate Procurement of Development Prototype Boring Machine		△										◇
R036	WMPO/ SNL	1.2.4.2	Analysis to Evaluate the Effect of the Exploratory Shaft on Repository Performance at Yucca Mountain					△						◇	
R848	WMPO	1.2.4.4	Submit Retrievability Compliance Strategy Plan to OGR for Review and Comment						△						◇
R267	WMPO/ SNL	1.2.4.4	Final Report on Spent Fuel Rod Consolidation			△									◇
N457	WMPO	1.2.4.6	Preliminary Study of the Effects of Uncertain Geologic Data on Design of the Underground Facility					△			◇				

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

◇  
12/87

## 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 1.2.5.1 MANAGEMENT AND INTEGRATION

Members of the SAIC staff conducted several SCP Working Group-related activities including interface activities with HQ concerning Study Plan preparation and review guidance and changing the baselined OCRWM Common Issues Hierarchy.

#### WBS 1.2.5.2.1 Regulatory Interaction

On April 14, 1987, the eighth quarterly update of the NNWSI Project data catalog was submitted to WMPO by SNL staff; fulfilling Milestone R198.

The NRC announced a proposed rulemaking that will define high-level wastes. The SAIC Licensing Branch is coordinating the Project's review. Headquarters requested comments by April 10 and the Project requested an extension to June 1. The extension should not affect the Program's comments because the NRC intends to extend the rulemaking's comment period by 60 days.

#### WBS 1.2.5.2.2 Site Characterization Plan

During the first two weeks of April, comment resolution meetings were held on SCP Chapters 1 through 7, except 6. Chapters 1 and 7 had a fair number of comments. Comment resolution for Chapter 6 is scheduled for May 12-13, 1987. Revisions to Chapters 1-7, except 6, as a result of these meetings were completed and those chapters are currently in production.

Work continues on SCP Section 8.3 revisions resulting from comment resolution meetings (in February) on this section. Logic diagrams and parameter tables are being developed for each test program in Section 8.3 to link parameters called for by performance and design issues to parameters provided by the test programs (old characterization issues). The freeze-text date for Section 8.3 input was May 1. Comment resolution meetings on the new text are scheduled for the first two weeks of June. A Project integration review of Section 8.3 input is to be held the end of May and first week of June in parallel with the HQ review.

The SCP Glossary has been distributed for internal review at SAIC. Project-sensitive words have been defined and will be sent to WMPO for approval following this review. A meeting was held with SNL to ensure consistency of terms with the CDR.

Reference verification is continuing on the data and design chapters as well as Chapter 8. A meeting is expected to be held with Project participants to help expedite the reference verification process.

Work is continuing on development of Section 8.5, Schedules, Milestones, and Decision Points. A task force has been formed to review information to be included in the section and to provide any additional information necessary.

A new numbering system to be used in the SCP for test program studies and activities has been developed. The new system is consistent with HQ guidance requesting that study plans correspond exactly with the studies that are now presented under the investigations of Section 8.3. Changes to text, in terms of the new numbering system will be the responsibility of SAIC technical and production personnel during the production period prior to the second HQ review.

The list of study plans that will supplement the SCP is being revised and will be distributed for review in early May. A study plan meeting was held April 22, 1987, to discuss the approach inputting together the study plans and the Project review progress for them. The Project is concerned about the HQ guidance for study plan preparation and review which is currently a 34 week process.

Staff members at SNL have revised text and performance allocation tables, logic diagrams, and other descriptive figures with supporting text were created in response to the DOE/HQ review of SCP Section 8.3. Ninety percent of all revised text, figures, and tables for 12 issues sections and 10 non-issues sections was submitted to SAIC by May 1, 1987. The remaining materials will be submitted during the week of May 8.

USGS staff members completed revisions to Chapter 1 of the SCP in response to the assembled document review; a first draft of guidelines for activity and study plans was completed as a basis for discussion at the upcoming TPO meeting.

SAIC/Golden Regulatory and Compliance staff continues to provide management and technical support in the development and coordination of the USGS input to the NNWSI Project SCP. Work activity this month continued to center on the following task:

1. Coordination and development of geohydrology, saturated, and unsaturated zone testing strategies, site/design/performance allocation tables, and logic diagrams. This information was prepared to support the resolution of the appropriate Information Needs of the SCP Issues Hierarchy.
2. Coordination and development of the Study Plan for Site Unsaturated Zone Percolation-Exploratory Shaft studies. Study Plan activities by SAIC/ Golden staff include compilation of appropriate text,

tables, and figures from the SCP, SIP, and ESTP source documents. Specifically, the study plan is composed of eight exploratory shaft hydrologic activity descriptions. Each activity description follows a format similar to the SCP i.e., objectives, rationale, description of selected and alternative tests and analysis, methods, applications of results, schedules, milestones, and resource requirements.

3. Development and coordination of testing strategies for climatology and rock characteristics sections. This effort included performance allocation workshops with representatives of USGS, SNL, and DOE/HQ, text preparation (with some interim review by DOE/HQ), site/design/performance allocation tables, and logic diagrams. The effort was aimed at supporting resolution of appropriate needs in SCP issues hierarchy.

Major efforts by LLNL personnel were focused on resolving review comments for all sections of the SCP, and in generating a marked-up version of the sections for the May 1, 1987, freeze-text date. Comment resolution workshops on Chapter 7 held at HQ were attended by LLNL representatives. Comments were responded to and revisions to Chapter 7, including reference verification, were completed. The text was transmitted to SAIC prior to the May deadline.

Comment response revisions to Sections 8.3.4, 8.3.5.9, and 8.3.5.10 were completed by LLNL staff members. Comment resolution meetings were held at HQ for 8.3.4, 8.3.5.9, and 8.3.5.10. Mark-up text was produced and submitted before the May deadline.

The reference verification task for Chapter 4 of the SCP was completed by Los Alamos staff members this month. All verifications and text revisions as a result of the verification process were made to Chapter 4. Furthermore, all hard copies of references have been sent to SAIC for the SCP library for Chapter 4. At this time, Los Alamos participants are assuming that hard copies of references cited in Section 8.3.1.3 of the SCP are at the SAIC library.

#### WBS 1.2.5.3.2 Environmental Impact Statement

With most EIS efforts rescheduled to begin in 1989, the planning effort to develop environmental field study plans will continue in this WBS category. In the environmental planning meeting with DOE/HQ and the other Project Office in Washington, D.C., on March 17 through 19, 1987, a common format and outline for the environmental study plans was developed. The outline was transmitted this month to the environmental principal investigators conducting monitoring programs described in the Environmental Monitoring and Mitigation Plan. Draft study plans are due to DOE/HQ on July 7, 1987.

#### WBS 1.2.5.3.3 Environmental Regulatory Interactions

DOE/HQ comments on Draft II of the Environmental Regulatory Compliance Plan (ERCP) were received by SAIC on April 10, 1987. Draft II is due to HQ on June 1, 1987. The ERCP is scheduled for release to the States and Tribes on September 1, 1987.

#### WBS 1.2.5.3.4 Environmental Monitoring and Mitigation

The Revised Draft Environmental Monitoring and Mitigation Plan (EMMP) was sent to WMPO and DOE/HQ to satisfy SAIC Milestone T137 for April 7, 1987.

#### WBS 1.2.5.4.1 INSTITUTIONAL STUDIES

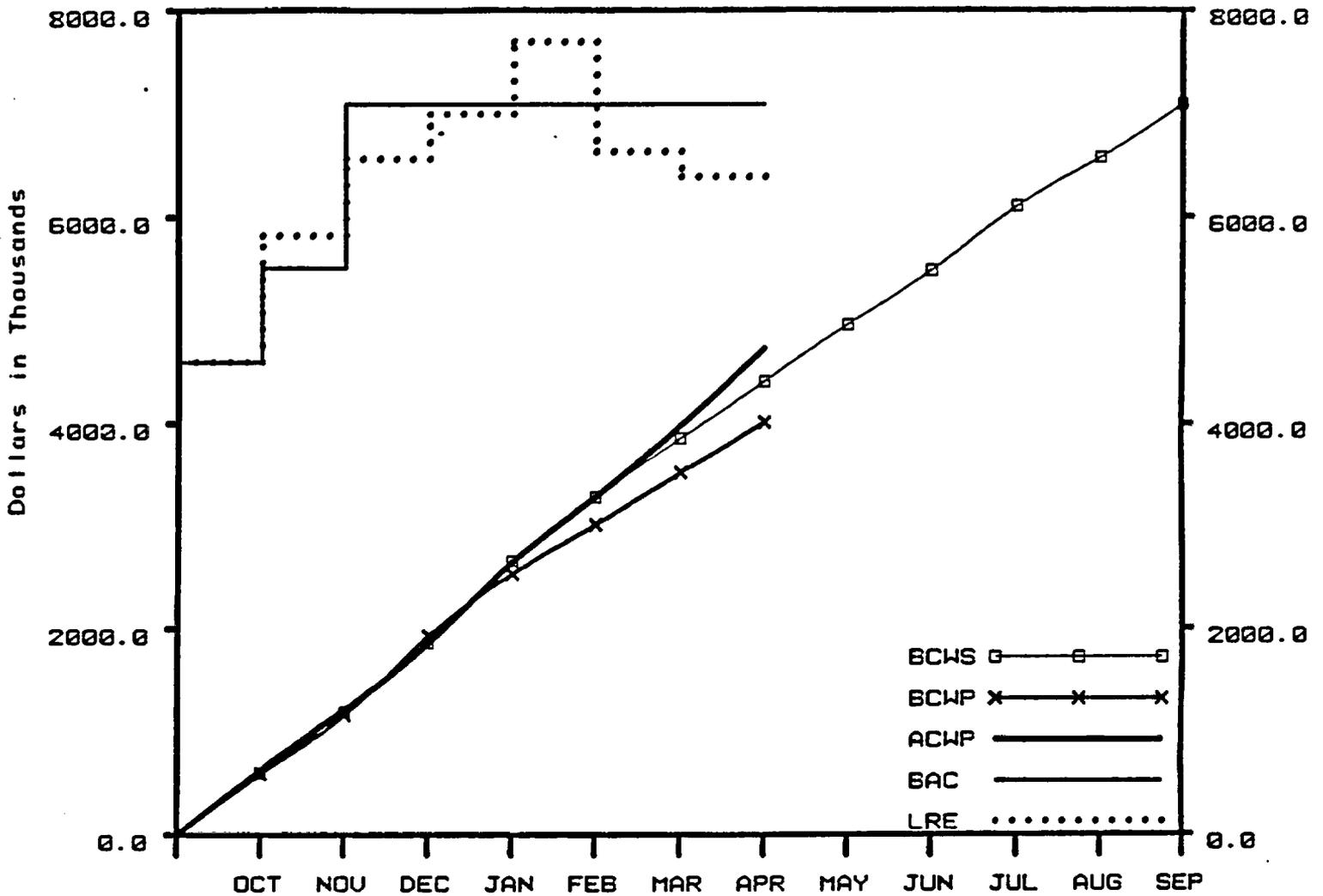
SAIC Institutional Branch staff reviewed and commented on the DOE/HQ draft "Report on the U.S. Secretary of Energy's Efforts to Comply with the Consultation and Cooperation Provisions of the Nuclear Waste Policy Act of 1982."

#### PLANNED WORK

Los Alamos personnel will continue work on the SCP to revise the geochemistry overview section, revise parameters tables, produce logic diagrams, and draft a section (1.14.7.2) proposing possible geochemical field test activities. These items must be completed by May 11 so that production time will not impact the Project review of Chapter 8 to be held at the end of May.

Study Plan efforts will be initiated by USGS staff for paleohydrology program activities under SCP Investigation 1.16.2 (effects of future climate on hydrologic characteristics); unsaturated zone exploratory shaft activities under SCP Investigation 1.13.2; surface-base zone activities under 1.13.2; and unsaturated-zone infiltration studies under 1.13.2. Additional support work will be conducted to support the Study Plan development for exploratory shaft geologic testing under SCP Investigation 1.15.2.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.5



**REGULATORY AND INSTITUTIONAL INVESTIGATIONS**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	549.9	4402.8
B. BUDGETED COST OF WORK PERFORMED (BCWP)	489.2	4008.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	751.7	4727.1
D. BUDGET AT COMPLETION (BAC)		7086.0
E. LATEST REVISED ESTIMATE (LRE)		6384.6

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-394.4	-8.96
G. COST VARIANCE (B-C)	-718.6	-17.93
H. AT COMPLETION VARIANCE (D-E)	701.4	9.90

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1251 Management and Integration	389.400	370.400	238.297	-19.000	132.103
1252 Licensing	3,413.200	3,130.412	4,002.658	-282.788	-872.246
1253 Environmental Compliance	321.300	228.715	282.266	-92.585	-53.551
1254 Communication and Liaison	278.900	278.901	203.840	.001	75.061
1255 Technology and Financial Assistance	.000	.000	.000	.000	.000
125 REGULATORY AND INSTITUTIONAL INVESTIGATIONS	4,402.800	4,008.428	4,727.060	-394.372	-718.632

MILESTONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	N	D	J	F	M	A	M	J	J	A	S	
R579	WMPO/SAIC	1.2.5.2	Submit Draft Preliminary Plan for Scheduling, Management, and Preparation of Position Papers to WMPO/NV												△	◇
R583	WMPO/SAIC	1.2.5.2	Submit Draft Seismic/Tectonic Summary Position Paper to WMPO/NV										△			
M521	WMPO/SAIC	1.2.5.2	Draft Site Characterization Plan (SCP)				▲									
M522	WMPO/SAIC	1.2.5.2	Site Characterization Plan (SCP)					△								◇
R798	WMPO/SAIC	1.2.5.3	Draft Environmental Field Study Plans Received at HQ for Review										△			
R799	WMPO/SAIC	1.2.5.3	Environmental Field Study Plans Received at HQ for Baselineing												△	
R794	WMPO/SAIC	1.2.5.3	Submit Working Draft Environmental Regulatory Compliance Plan to DOE/HQ and State				△		◆							
R795	WMPO/SAIC	1.2.5.3	Environmental Regulatory Compliance Plan Issued									△				◇
R996	WMPO/SAIC	1.2.5.3	Submit Draft II Environmental Monitoring and Mitigation Plan (EMMP) to WMPO/NV				▲									
P034	WMPO/SAIC	1.2.5.3	Submit Environmental Monitoring and Mitigation Plan (EMMP) to DOE/HQ							△			◇			
M795	WMPO	1.2.5.4	Complete and Sign C&C Agreement with State						△							◇

◇ TBD

△ 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

#### 1.2.6.1 MANAGEMENT AND INTEGRATION

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

Representatives from USGS actively participated in a briefing for the NRC and State of Nevada regarding proposed relocation of the shafts (ES-1, ES-2) and changes in the ESF configuration, on April 14-15, in Las Vegas,

The Technical Interface Control Study is on hold at H&N pending a meeting with WMPO and other Project participants on the Project Interface Control Procedure.

Staff members at REECo sent an ESF Shaft-Sinking Subcontract procurement schedule to WMPO and other Project participants for review and comments.

F&S staff completed the design verification, interdisciplinary check and delivered the following studies to WMPO for review and comment; (1) Dust Abatement Study (#7), (2) Hoisting Study (#5), and (3) Structural Design Study (#11), Part II.

##### WBS 1.2.6.1.2 Quality Assurance

During April, the SAIC Engineering staff issued 115 Level II QALAS to WMPO, defined SAIC space requirements in the A/E building, and reviewed the hoist duty for ES-1 and ES-2 with REECo.

The draft technical procedure entitled "Calibration, Preparation, Installation, and Operation of the Sinco/Terraetrics Model 6-CSLT(R) Waste Isolation Extensometer," by SAIC is undergoing SNL review.

Personnel at REECo received review comments on the NNWSI Project ESF Safety and Health Program Plan from the NV Safety & Health Division (SHD) and incorporated them into the plan. SHD/NV was advised by letter of the disposition of submitted review comments.

A package of support documentation for the Allis Chalmers Double Drum Hoist #IM 19800 was reviewed by a REECo Occupational Safety Professional IV. The submitted comments indicate that the hoist appears to meet current NTS standards.

#### WBS 1.2.6.2.1 Site and Roads

Comments were received at H&N from WMPO on Special Study #1, Surface Site Layout, on April 10, 1987. Comments are being resolved and Study is being revised. Revisions should be completed by May 15, 1987.

#### WBS 1.2.6.2.2 Utilities & Communications

H&N Study #5, Waste Treatment, was submitted to WMPO for review March 13, 1987.

#### WBS 1.2.6.3.1 Buildings

Staff members at H&N received comments from WMPO on Special Study #3, Area 25 A/E Building, on April 10, 1987. Revisions are in progress and should be completed by May 11, 1987.

#### WBS 1.2.6.8.2 Project Operations

Staff members at REECo reviewed design and performance requirements for 1500 HP Allis Chalmers hoist as presented by WMPO. Electrical/mechanical condition of hoist and application to shaft sinking and level development at ESF was also discussed.

#### WBS 1.2.6.9 TESTING

##### WBS 1.2.6.9.1 Exploratory Shaft Test Plan

Exploratory shaft test plan (ESTP) committee members and principal investigators (PIs) for prototype testing toured G-Tunnel to evaluate proposed test locations and to begin to integrate activities related to prototype testing.

Review comments on the ESTP have been distributed to PIs for response. PIs are preparing to meet with the Peer Review Committee to discuss and resolve comments in early May 1987.

Drilling requirements for prototype testing were identified, and SCP Chapter 8.4 was revised by Los Alamos personnel.

##### WBS 1.2.6.9.3 Exploratory Shaft Integrated Data System

A review was completed by Los Alamos of the EG&G Quality Assurance Program Plan (QAPP) for the ESF Integrated Data System (IDS). The QAPP was approved.

Los Alamos staff completed a draft copy of the quality assurance level assignments (QALAs) for the IDS. A meeting was held on Tuesday, April 28, in Los Alamos to discuss the IDS QALAs with EG&G personnel.

#### WBS 1.2.6.9.4 Prototype Testing

##### WBS 1.2.6.9.4.1 Prototype Geologic Testing

The U.S. Bureau of Reclamation (USBR) reported that (1) the shaft mapping platform design was completed and construction is underway, (2) initial work on the study plan was begun, (3) the strike rail goniometer design was completed and construction is underway, (4) a contract for photogrammetry testing with VEXEL Corporation is underway, and (5) design and construction considerations for the ESF were reviewed by the geology and engineering staffs.

##### WBS 1.2.6.9.4.2 Prototype Hydrologic Testing

USBR staff completed draft Draft Technical Procedures (DTPs) for (1) Blast Effects on Instrumentation and (2) Prototype Intact Fracture Sampling Methods (Field). The SIP for the Mining Demonstration Room (MDR) is 80 percent complete after major revision in plan objectives and emphasis. The DTP for the MDR is 50 percent complete. Work continued on design of the instrumentation packer system for Drill Hole Instrumentation. The G-Tunnel Prototype Integration meeting was attended to discuss time and space requirements and scheduling. The Timeline prototype testing schedule was delivered to SAIC/Las Vegas for incorporation into the main Project schedule. The engineering and geology staff reviewed the ESF design and construction considerations package. A sample table for developing outlines for ES SIPs was filled out using Bulk Permeability Room instrumentation as an example.

Drilling requirements for prototype testing were delivered to USGS for transmittal to Los Alamos.

#### PLANNED WORK

Thermal Stress Prototype Testing activities will be initiated by SNL staff.

Los Alamos staff will write a study plan for the exploratory shaft diffusion test.

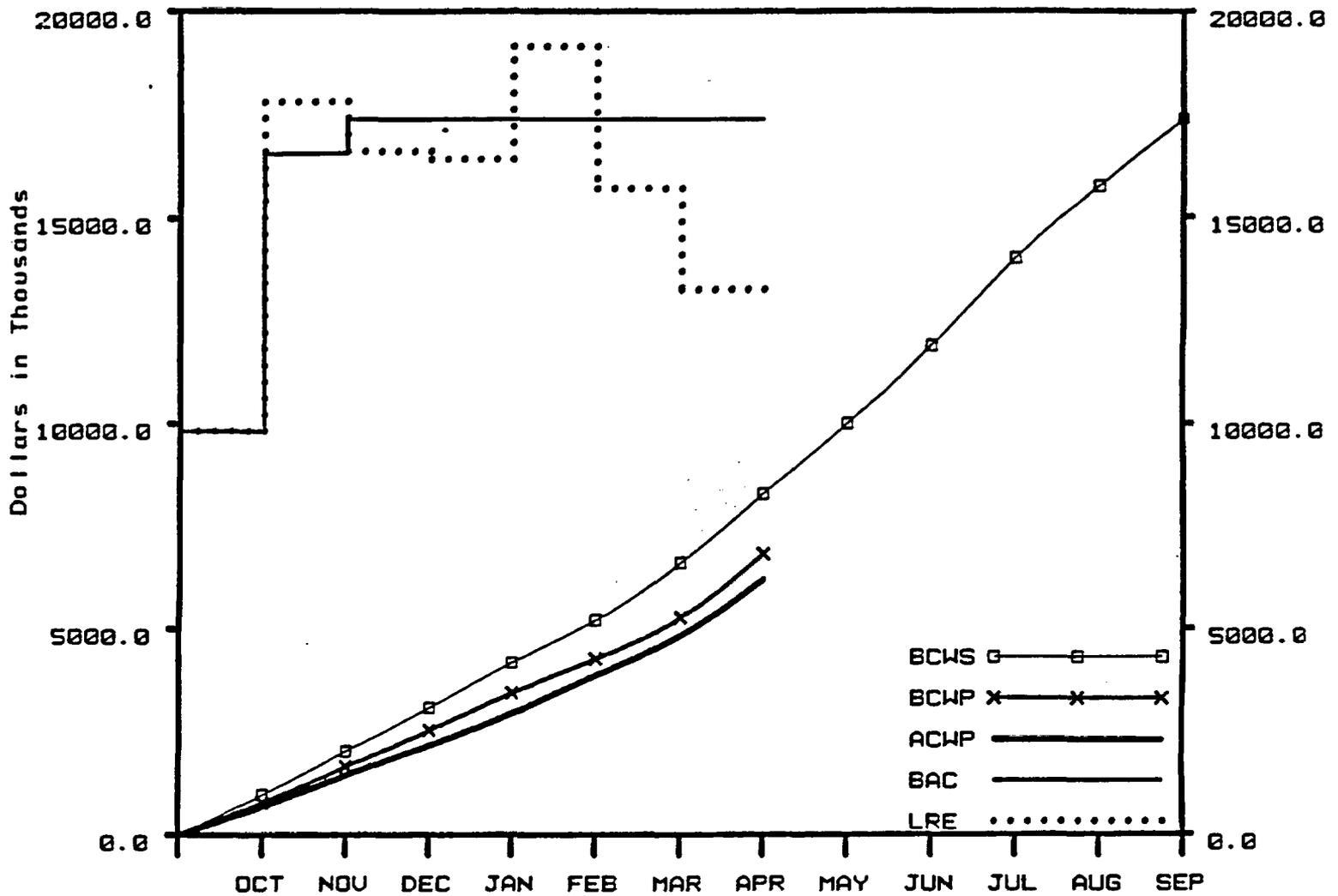
H&N staff will complete Special Study #2, Environmental Permitting Requirements, and a revised mock-up for Title I ESF Surface design.

REECO staff will conduct further review of mine hoist documentation to determine QA Level II compliance. This may require a trip to Denver, Colorado, to research additional reports and certifications.

#### PROBLEM AREAS

The SIP for prototype testing of geologic mapping was approved by WMPO in March and the criteria letter has been sent to Los Alamos but USGS still does not have approval to begin work.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.6



### EXPLORATORY SHAFT INVESTIGATIONS

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1685.6	8283.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1556.5	6821.2
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1367.8	6192.7
D. BUDGET AT COMPLETION (BAC)		17370.0
E. LATEST REVISED ESTIMATE (LRE)		13239.3

### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-1461.8	-17.65
G. COST VARIANCE (B-C)	628.5	9.21
H. AT COMPLETION VARIANCE (D-E)	4130.7	23.78

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1261 Management and Integration	2,819,430	2,581,280	2,532,527	-238,150	48,753
1262 Site Preparation	113,800	53,300	62,800	-60,500	-9,500
1263 Surface Facilities	68,900	39,200	33,900	-29,700	5,300
1264 First Shaft	139,000	139,000	94,972	-.000	44,028
1265 Second Shaft	62,000	62,000	43,630	-.000	18,370
1266 Subsurface Excavations	187,000	187,000	189,101	.000	-2,101
1267 Underground Service Systems	363,900	261,480	153,392	-102,420	108,088
1268 Operations	15,000	15,000	7,000	.000	8,000
1269 Testing	4,513,980	3,482,961	3,075,415	-1,031,019	407,546
126 EXPLORATORY SHAFT INVESTIGATIONS	8,283,010	6,821,221	6,192,737	-1,461,789	628,484

6-5

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION													
				O	N	D	J	F	M	A	M	J	J	A	S	
M105	WMPO/ LANL	1.2.6.1	Submit Prototype Test Plans to DOE/HQ for Review and Comment					△								
M243	WMPO/ LANL	1.2.6.1	Complete Exploratory Shaft Readiness Review													△
R841	WMPO/ SAIC	1.2.6.1	DOE/HQ Receives Final FY 89 Project Validation Material						▲							
M282	WMPO/ LANL	1.2.6.1	Start Field Prototype Testing in G-Tunnel					△								
R241	WMPO/ LANL	1.2.6.1	Exploratory Shaft Facility (ESF) Subsystems Design Requirements Document			△				◆						
M773	WMPO/ SAIC	1.2.6.1	Final ESF Title II Design Requirements Document Submitted To DOE/HQ									△		◇		
P763	WMPO/ SAIC	1.2.6.1	Exploratory Shaft Title I Design Summary Submitted to WMPO									△		◇		

◇ TBD  
◇ 3/88  
◇ TBD

△ 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.

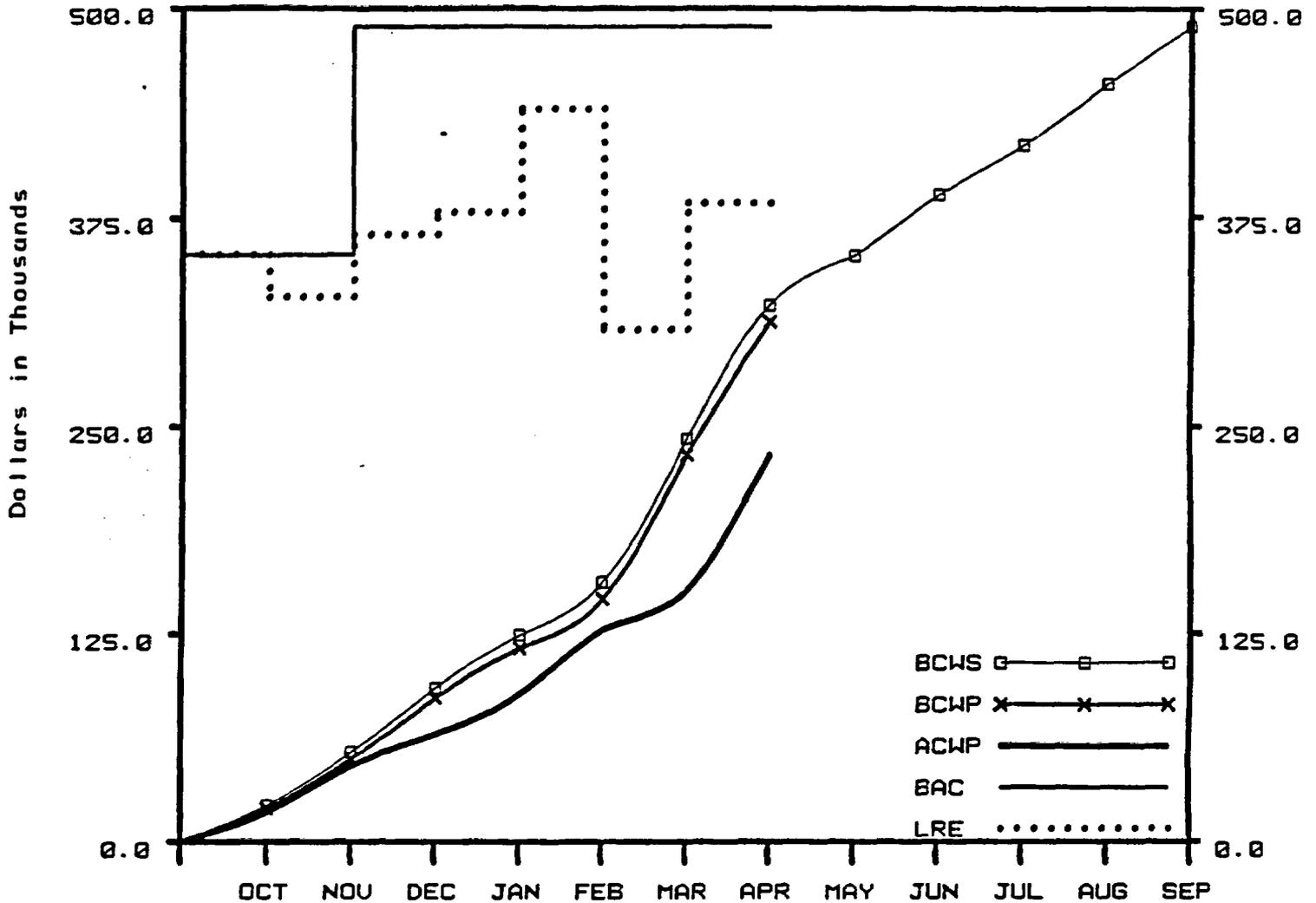
### ACTIVITIES

#### WBS 1.2.7.2.1 Spent Fuel Test

The remaining LLNL Spent Fuel Test-Climax (SFT-C) reports are in various stages of completion for printing as follows;

1. The final report (UCRL-537020) is in final review and layout. Estimated distribution is July 31, 1987.
2. The executive summary (UCRL-53762) is in TID for minor changes. Distribution should be in May 1987.
3. The report on post-test thermal analyses (UCRL-53728) has been delayed from printing because of problems with some of the figures.
4. The geomechanics report is in final editing.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.7



**TEST FACILITIES**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	79.7	322.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	79.7	312.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	81.6	232.1
D. BUDGET AT COMPLETION (BAC)		489.0
E. LATEST REVISED ESTIMATE (LRE)		383.2

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-10.0	-3.11
G. COST VARIANCE (B-C)	79.9	25.60
H. AT COMPLETION VARIANCE (D-E)	105.8	21.64

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1271 Management and Integration	.000	.000	.000	.000	.000
1272 Testing	321.990	311.990	232.121	-10.000	79.869
1273 New Facility Acquisitions	.000	.000	.000	.000	.000
127 TEST FACILITIES	321.990	311.990	232.121	-10.000	79.869

## 1.2.8 LAND ACQUISITION

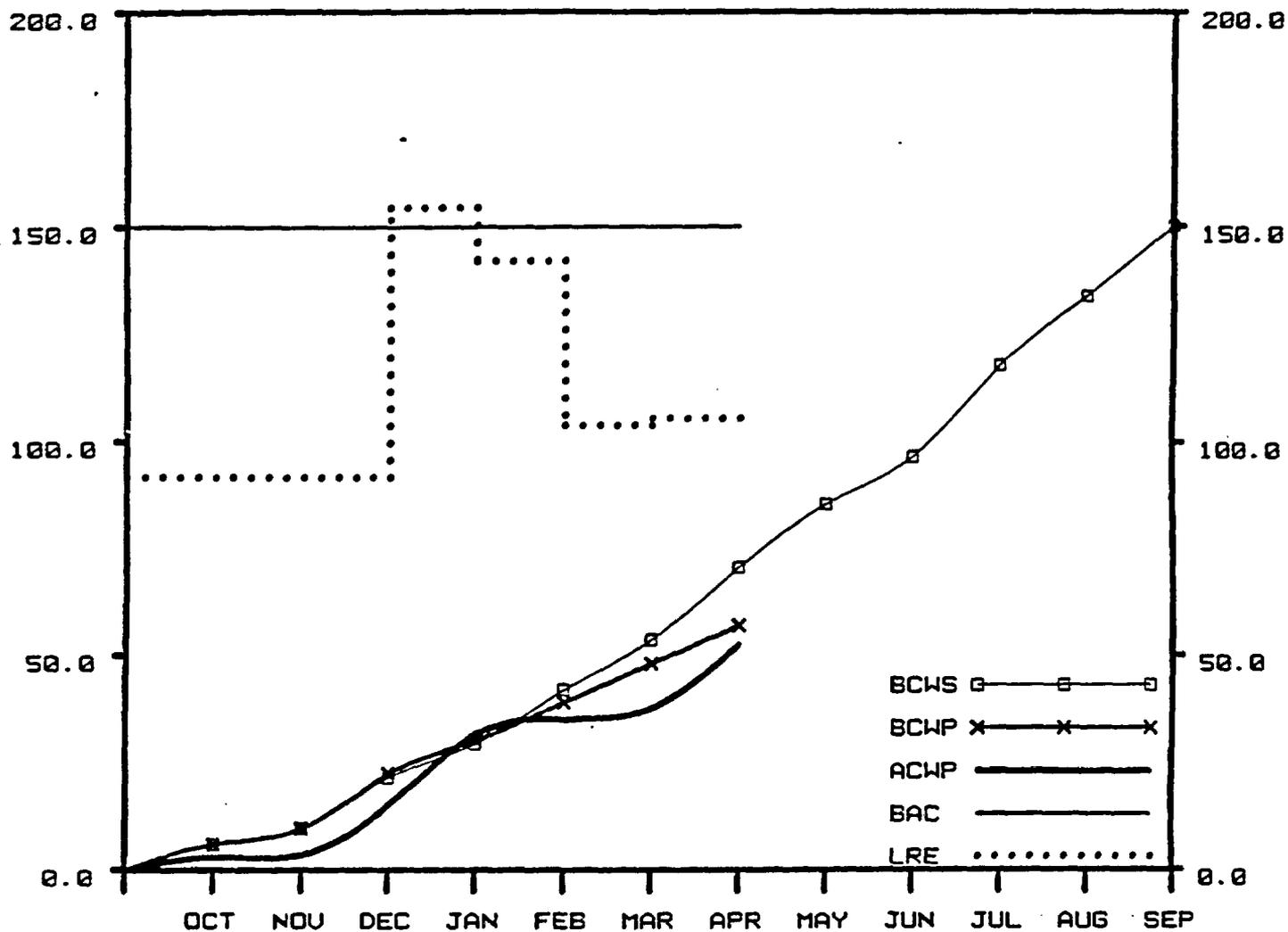
### OBJECTIVE

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

Activities during the month of April included a meeting on "Lessons Learned" from the Waste Isolation Pilot Project (WIPP) in Albuquerque, N.M., and a tour of the proposed low-level storage facility. Completed an initial draft Plan of Development and distributed internally at SAIC for comments. SAIC staff participated with DOE/NV, Nellis AFB, and BLM representatives in an organizational meeting on the development of a Range Management Plan for the Nellis range. The range is directly adjacent to the Yucca Mountain area (a portion of the Yucca Mountain area is within the Nellis range) and management plans may effect the Yucca Mountain area.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.8



### LAND ACQUISITION

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	16.9	70.5
B. BUDGETED COST OF WORK PERFORMED (BCWP)	9.0	57.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	14.9	52.4
D. BUDGET AT COMPLETION (BAC)		150.0
E. LATEST REVISED ESTIMATE (LRE)		105.3

### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-13.5	-19.15
G. COST VARIANCE (B-C)	4.6	8.04
H. AT COMPLETION VARIANCE (D-E)	44.7	29.82

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1281 Land Acquisition	70.500	57.000	52.416	-13.500	4.584
128 LAND ACQUISITION	70.500	57.000	52.416	-13.500	4.584

## 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

On April 3, 1987, F&S submitted Special Study #5, ESF Hoisting System, to WMPO and designated participants for review and comment.

On April 7, 1987, F&S submitted Special Study #7, ESF Dust Abatement, to WMPO and designated participants for review and comment.

Staff at F&S submitted Revision No. 1 to Special Study #1, ESF Development, to WMPO for approval and acceptance and Special Study #11, ESF Structural Design Part II, was submitted for review and comment.

The H&N Project Management Plan was completed and submitted to WMPO on April 24, 1987.

#### WBS 1.2.9.1.1 Project Management

The Project Management Plan comments received from Project participants and WMPO are being incorporated and resolved internally at SAIC. The Plan will be updated to include the new Mission Plan schedule, current Project thinking on Systems Engineering Management and Configuration Management, new schedules, and most current Performance Measurement approach. The scheduled delivery date is June 30, 1987, to WMPO for DOE/NV and WMPO approval.

REECo staff expedited computer indexing of all WMPO records during April to meet a requirement from DOE/HQ to be prepared for "discovery" associated with suits against the DOE. A total of 5,193 documents were entered in the computer.

#### WBS 1.2.9.1.4 Records Management

Approximately 5,000 Los Alamos documents, consisting of 13 cartridges of microfilm, have been copied, indexed, and transferred to the Central Records Facility in Nevada.

The Correspondence Control Facility at SAIC began full operation.

Approximately 21,000 documents have been indexed in the SAIC Information Management System (IMS) Automated Records System (ARS).

Automated Records System, Version 1 to support to the IMS was installed on SAIC/T&MSS computer.

Purchase orders for the IMS Bridge Program equipment were approved by DOE and issued.

A review of LSS Commitments Tracking Subsystem Responsibilities and Procedures and LSS Issues Tracking Subsystem Responsibilities and Procedures was completed by members of the SAIC Information Management Section.

Attorneys for the State of Nevada received instruction on the use of the ARS data base and were provided approximately 5,000 pages of information for their review.

Although quality Level I and II records are being processed, they have not been entered into the Quality Assurance records software, REVELATION, because of a computer hardware malfunction. This problem is being corrected by the SNL Records Management staff with technical assistance from SAIC.

Plans are being made to identify and ultimately retrieve SNL environmental assessment documents for anticipated discovery activities through WMPO.

Records management activities by SAIC/Golden centered around changing records documentation requirements and devising a mechanism to qualify and incorporate pre-1980 records and data into the Project records.

Information is being gathered by REECO staff relating to the Discovery Process For Pending Litigation (WMPO Action 87-1470) for submission to WMPO by May 4, 1987.

H&N staff began work on identification and segregation of any records that might relate to environmental assessment or site selection. H&N has identified approximately 500 documents consisting of about 2,000 pages.

#### WBS 1.2.9.2 PROJECT CONTROL

Modifications to the milestone list, developed for and presented as the input to Chapter 8.5 of the SCP, were finalized by SAIC/Golden and submitted to the USGS. This action completes the input to satisfy Action Item 87-1428T.

A list was compiled by SAIC/Golden which contained all the 1987 and 1988 USGS milestones needing criteria and distributed to the appropriate USGS personnel. Criteria for these milestones were obtained and will be submitted to SAIC/Las Vegas in response to Action Items 87-1417T and 87-1418T.

SAIC personnel completed graphical and tabular comparisons of NNWSI Project budget history and SCP/Site Characterization costs to assist the WMPO in the GAO audit.

#### WBS 1.2.9.3 QUALITY ASSURANCE

An SNL contract with MAC Technical Services (MACTEC) for QA auditing services was initiated by means of a letter contract. Initial coordination took place between SNL and MACTEC in order to complete familiarization of MACTEC

personnel, to verify Lead Auditor qualifications, and to plan and prepare for an internal QA audit of SNL NNWSI Project Department and two audits of two contractors.

An internal REECo surveillance of the training organization was performed and no findings or observations were reported. The training program complied with 568-DOC-115, QAPP.

REECo completed a draft of QAPP 568-DOC-115, Revision 5, and issued it for internal review and comment.

QASC completed the verification process for corrective and preventive actions for NCR WMPO-009. This NCR is now closed. All QALAS have been formally approved by WMPO.

Corrective action in regard to WMPO NRCs -035 and -042, and WMPO CAR-87-001 has been completed. WMPO has been requested by T&MSS QA to close these documents.

On April 22, 1987, QA issued NCR SAIC-017 to the Computer Services branch in regard to violating QA requirements during the procurement of QA Level I computer equipment.

SAIC QA staff participated in a meeting with DOE/HQ to resolve comments on Chapter 8.6 of the SCP.

The second WMPO audit for FY 87 was conducted at Lawrence Livermore National Laboratory (LLNL) on April 27 thru May 1, 1987. The Holmes & Narver, Inc. Audit 87-2, has been rescheduled for September and the audit of SAIC/T&MSS (87-4), has been rescheduled for the month of June. The next audit to be performed will be Audit No. 87-5 at Sandia National Laboratory on June 1, 1987.

Of the five audits conducted in FY 86, four remain open. Of the 15 audits conducted in FY 85, four remain open.

Three surveillances were conducted during April at SAIC/T&MSS, Las Vegas, Nevada, and USGS, Denver, Colorado. Ten items or activities were monitored revealing no Standard Deficiency Reports. Three reports documenting the surveillances, are in various stages of processing.

To date, 18 surveillances have been conducted in FY 87 and 58 items or activities monitored. During this effort, nine Standard Deficiency Reports have been recorded.

QASC Overview completed a third version of Quality Management Procedure (QMP) 06-03, "Document Review/Acceptance/Approval" and submitted it to the WMPO for review and comment.

QASC has continued to issue QALAs for the ESF and has issued a status list of the QALAs. A total of 76 QALAs are listed with 10 Level I; 36 Level II; and, 30 Level III. Thirty-five QALAs are in the review and approval cycle where the major delay is being caused by the WMPO which has not been able to find time to return the Document Review Sheets. Personal contacts have been made

to impress the WMPO of the need for issuance of the QALAs, but only a small amount of progress has been made.

#### PLANNED WORK

At the request of the USGS QA Office, efforts are being directed by SAIC/Golden at resolving Project records maintenance issues and problems. Recommendations should be available by mid-May.

REECo staff will prepare the QA Records Management Handbook for distribution to all departments, upon receipt of approval from the WMPO.

REECo staff will complete and submit QAPP 568-DOC-115, Revision 5, to WMPO for approval. They will also rewrite all QA procedures (NQPs) and departmental procedures for compliance with Revision 5 of the QA program and develop a training program for the familiarization of personnel to the requirements of Revision 5.

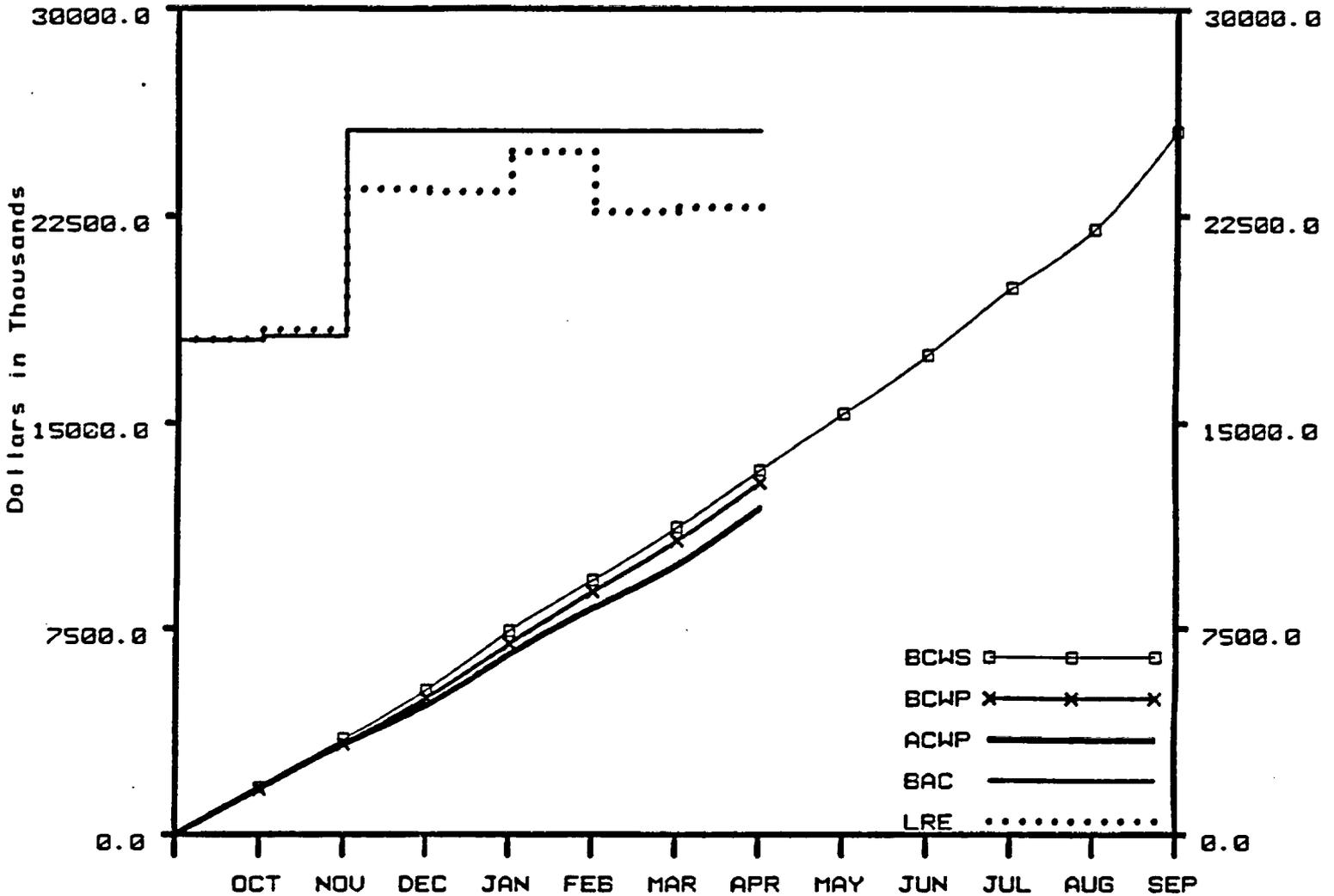
#### PROBLEM AREAS

A significant problem continues concerning formal submissions to WMPO for review and/or approval, WMPO is taking more than three months to reply to requests for approval or nonconformance reports, QAPPs, and technical reports.

#### MILESTONE PROGRESS

SNL Milestone T138, management assessment of QA, was completed.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.9



**PROJECT MANAGEMENT**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	2098.1	13253.9
B. BUDGETED COST OF WORK PERFORMED (BCWP)	2133.9	12807.7
C. ACTUAL COST OF WORK PERFORMED (ACWP)	2080.6	11872.4
D. BUDGET AT COMPLETION (BAC)		25551.0
E. LATEST REVISED ESTIMATE (LRE)		22780.0

**UARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE UARIANCE (B-A)	-446.2	-3.37
G. COST UARIANCE (B-C)	935.3	7.30
H. AT COMPLETION UARIANCE (D-E)	2771.0	10.84

Remarks:

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

For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1291 Management and Integration	6,834.430	6,675.901	5,987.552	-158.529	688.349
1292 Project Control	2,212.800	2,186.261	2,429.793	-26.539	-243.532
1293 Quality Assurance	3,653.640	3,392.539	2,902.040	-261.101	490.499
1299 NTS Allocation	553.000	553.007	553.000	.007	.007
129 PROJECT MANAGEMENT	13,253.870	12,807.708	11,872.385	-446.162	935.323

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MILESTONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	MONTHS														
				O	N	D	J	F	M	A	M	J	J	A	S			
R448	WMPO/SAIC	1.2.9.1	Final NNWSI Project Management Plan to WMPO/NV and DOE/HQ			△									◇			
R849	WMPO/SAIC	1.2.9.1	Submit FY 87 Baseline Budget Information and Cost Plans to OGR for Information			▲												
R850	WMPO/SAIC	1.2.9.1	Approved Revised Project Charter				△				◆							
M712	WMPO SAIC	1.2.9.1	Submit FY 89 Budget to DOE/HQ								▲							
R647	WMPO/SAIC	1.2.9.1	Licensing Support System Document Collection Procedure to Headquarters for Approval									△						◇ TBD
M725	WMPO/SAIC	1.2.9.2	Implement Phase II of Earned Value System			△								◇				
RB10	WMPO SAIC	1.2.9.1	Submit NNWSI Project Plan to WMPO/NV and DOE/HQ															△
R842	WMPO/SAIC	1.2.9.1	Implement Document Collection for the Licensing Support System													△		◇ TBD

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

1.2.10 FINANCIAL AND TECHNICAL ISSUES

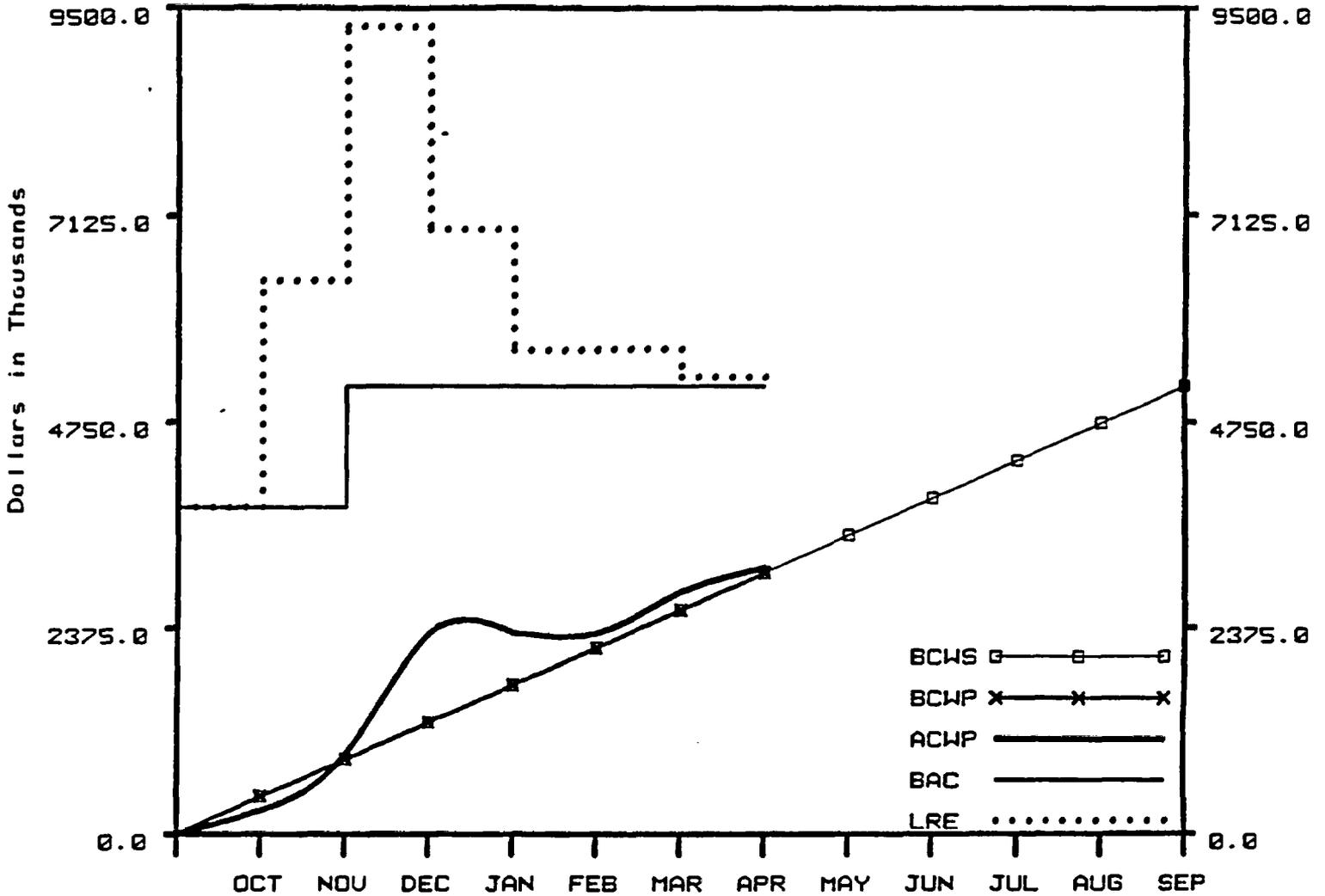
OBJECTIVES

This WBS element includes grant assistance to the State of Nevada.

ACTIVITIES

None to report.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.10



**FINANCIAL & TECHNICAL ASSISTANCE**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	430.0	3010.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	430.0	3010.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	278.9	3068.0
D. BUDGET AT COMPLETION (BAC)		5162.0
E. LATEST REVISED ESTIMATE (LRE)		5261.5

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-58.0	-1.93
H. AT COMPLETION VARIANCE (D-E)	-99.5	-1.93

Remarks:

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

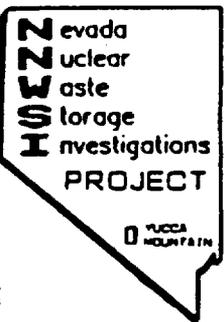
For: APR 1987

Date: May 20, 1987

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
12101 Financial & Technical Assistance	3,010.000	3,009.998	3,067.992	-.002	-57.994
1210 FINANCIAL & TECHNICAL ASSISTANCE	3,010.000	3,009.998	3,067.992	-.002	-57.994

U.S. DEPARTMENT OF ENERGY

**OC  
RW  
M  
OGR**



# **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 FISCAL MONTH AND YEAR				SIGNATURE			
MWSI Project			NEVADA NUCLEAR BASIS SITEWIDE INVESTIGATIONS				APR 1987							
LOCATION P. O. Box 14100 Las Vegas, NV 89114											TITLE PROJECT MANAGER			
											Date May 20, 1987			
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		BUD COST OF WORK SCHEDULED	BUD COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES		BASELINED BUDGET	LATEST REVISED ESTIMATE	VARIANCE	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
121	SYSTEMS	600 000	583 677	626 827	-97 223	-43 151	3,713 600	3,521 435	3,400 891	-192 165	31 444	7,923 000	6,062 468	1,820 540
122	WASTE PACKAGE	804 000	729 589	809 183	-75 381	-159 504	4,682 200	4,648 385	4,123 446	-33 895	524 858	8,535 000	8,168 165	1,366 835
123	SITE INVESTIGATIONS	2,540 540	2,186 888	1,966 633	-364 552	229 375	16,496 970	13,610 972	11,913 381	-2,877 000	1,705 500	29,835 000	22,248 855	7,584 845
124	REPOSITORY INVESTIGATIONS	871 700	1,166 888	1,383 149	195 188	-216 261	5,026 600	5,486 812	5,336 317	480 312	158 595	12,472 000	10,546 412	1,925 588
125	REGULATORY AND INSTITUTIONAL INVESTIGATIONS	549 000	489 157	751 895	-68 743	-262 539	4,482 000	4,008 428	4,727 868	-394 372	-718 832	7,086 000	6,314 585	771 415
126	EXPLORATORY SHAFT INVESTIGATIONS	1,885 550	1,556 468	1,367 842	-129 088	188 618	8,283 818	8,821 221	6,182 737	-1,461 788	828 484	17,378 000	13,239 342	4,138 658
127	TEST FACILITIES	79 870	79 870	81 600	000	-1 830	321 990	311 000	232 121	-10 000	78 889	489 000	383 174	105 826
128	LAND ACQUISITION	16 900	9 000	14 867	-7 000	-5 867	78 500	57 000	52 416	-13 500	4 584	158 000	185 288	44 732
129	PROJECT MANAGEMENT	2,088 000	2,133 989	2,088 567	35 829	53 342	13,253 878	12,887 788	11,872 385	-446 182	835 323	25,551 000	22,778 985	2,771 805
1210	FINANCIAL & TECHNICAL ASSISTANCE	438 000	438 000	278 848	- 000	151 852	3,018 000	3,000 000	3,067 982	- 002	-57 984	5,162 000	5,261 453	-99 453
12	MWSI - SUBTOTAL	9,878 180	9,374 368	9,441 231	-503 792	-66 883	58,281,348	54,291 888	51,887 847	-4,088 572	3,284 121	115,573 000	95,848 989	19,632 891
	UNDISTRIBUTED BUDGET											1,893 000	1,893 000	000
	CAPITAL EQUIPMENT							1,821 813				11,845 000	11,845 000	000
	MWSI - TOTAL	9,878 180	9,374 368	9,441 231	-503 792	-66 883	58,281,348	54,291 888	52,829 760	-4,088 572	3,284 121	128,511 000	108,878 989	19,632 891

NOTE CAPITAL EQUIPMENT COSTS HAVE A ONE MONTH LAG  
COSTS REPORTED ARE YTD THROUGH MARCH

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

CONTRACTOR		CONTRACT TYPE NO		PROJECT NAME/NUMBER		REPORT FISCAL MONTH AND YEAR		SIGNATURE					
MWSI Project				NEVADA NUCLEAR WASTE SITE/AGE INVESTIGATIONS		APR 1987		TITLE PROJECT MANAGER					
LOCATION P O Box 14100 Las Vegas, NV 89114								Date May 20, 1987					
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		BUD COST OF WORK SCHEDULED	BUD COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES		BASELINED BUDGET	LATEST REVISED ESTIMATE	VARIANCE
	(2)	(3)	(4)	SCHEDULE (5)	COST (6)	(7)	(8)	(9)	SCHEDULE (10)	COST (11)	(12)	(13)	(14)
1211 Systems Management and Integration	43 000	43 000	35 034	-8 000	8 866	217 000	217 000	112 827	000	104 173	478 000	243 049	234 851
1212 Systems Engineering	215 000	195 045	200 793	-19 955	-5 749	1,324 600	1,323 111	1,227 164	-1 489	95 947	2,748 000	2,425 954	2,516 886
1213 Technical Data Base Management	120 000	51 732	82 000	-77 268	-30 268	605 000	494 320	500 000	-100 672	-13 872	1,437 000	756 428	680 572
1214 Total Systems Performance Assessment	293 000	293 000	309 000	-8 000	-16 000	1,487 000	1,486 994	1,642 000	-155 006	-155 006	3,268 000	3,476 169	-208 169
121 SYSTEMS	680 000	583 677	626 827	-97 223	-43 151	3,713 600	3,521 435	3,489 991	-192 165	31 444	7,923 000	6,992 468	1,020 540
1221 Management and Integration	81 000	51 900	48 483	-10 000	2 487	418 200	368 200	311 748	-50 000	56 454	725 000	523 106	201 894
1222 Package Environment	85 000	42 400	92 400	-47 600	-50 000	585 000	478 400	581 000	-105 600	-104 500	900 000	948 182	49 888
1223 Waste Form & Materials Testing	460 000	464 300	602 900	4 300	-138 000	2,865 000	2,865 000	2,548 700	189 705	314 005	5,625 000	5,278 660	346 140
1224 Design, Fabricate, and Prototype Testing	118 000	100 000	15 200	-18 000	64 000	529 000	511 000	228 200	-18 000	282 000	1,240 000	534 247	705 753
1225 Performance Assessment	86 000	78 999	169 200	-9 000	-38 201	495 000	435 000	458 000	-50 000	-23 000	855 000	891 669	63 331
122 WASTE PACKAGE	804 900	729 599	809 183	-75 301	-159 504	4,682 200	4,640 305	4,123 446	-33 895	524 850	9,535 000	8,168 165	1,366 835
1231 Management & Integration	505 000	508 911	162 148	3 811	436 763	3,345 000	3,813 645	2,122 813	-331 355	890 732	6,521 000	3,887 746	2,633 254
1232 Geology	445 000	398 920	295 160	-54 980	104 760	2,826 000	1,624 820	1,461 450	-121 200	163 401	5,131 000	3,559 097	1,571 903
1233 Hydrology	545 000	389 618	637 000	-155 382	-248 200	3,815 000	3,273 320	2,753 452	-541 680	518 868	6,352 000	4,353 673	2,198 327
1234 Geochemistry	522 300	533 700	540 600	11 400	-6 900	3,209 000	3,126 500	3,162 000	-83 300	-35 500	5,890 000	5,681 139	118 861
1235 Drilling	221 500	115 528	178 389	-106 040	-82 869	1,594 470	1,154 870	827 186	-438 600	227 884	3,874 000	2,178 766	1,695 234
1236 Environment	97 800	73 645	104 521	-23 355	-30 878	806 400	723 202	636 414	-83 198	82 788	1,215 000	1,195 533	19 467
1237 Socioeconomic	87 000	45 694	48 115	-22 286	-7 421	458 400	315 515	306 757	-134 885	-71 242	818 000	574 838	243 162
1238 Geotechnical Modeling Code EQ3/6	85 000	48 000	88 000	-17 000	-40 000	449 000	387 000	469 200	-82 000	82 000	714 000	788 862	-14 862
1239 Deferred Site Close Out	000	000	000	000	000	000	000	000	000	000	000	000	000
123 SITE INVESTIGATIONS	2,560 500	2,196 000	1,966 833	-364 552	229 375	16,406 970	13,618 872	11,813 381	-2,877 888	1,705 500	28,835 000	22,240 655	7,594 345
1241 Management and Integration	289 700	428 700	585 149	159 000	-166 370	1,497 000	1,084 000	2,172 317	406 400	-108 237	2,898 000	4,048 897	-1,067 897
1242 Development and Testing Facilities	367 000	343 100	248 000	36 100	95 100	1,952 000	1,825 832	1,840 000	-26 168	76 832	5,534 000	3,168 823	2,364 177
1243 Operations and Maintenance	153 000	153 000	439 000	000	-286 000	597 000	597 001	854 000	001	-56 999	1,448 000	1,592 740	-144 740
1244 Decommissioning	64 000	64 000	50 000	000	14 000	268 000	268 000	251 000	-000	17 000	811 000	788 750	22 250
1245 Repository Performance Assessment	18 000	18 000	000	-000	18 000	46 000	46 000	2 000	-000	44 000	89 000	4 304	84 696
1246	168 000	168 000	51 000	000	117 000	666 000	666 000	408 000	-000	258 000	1,594 000	886 797	633 203
124 REPOSITORY INVESTIGATIONS	871 700	1,166 800	1,383 149	105 188	-216 261	5,826 600	5,486 812	5,356 317	480 312	150 595	12,472 000	10,346 412	1,025 588
1251 Management and Integration	55 700	65 830	42 188	9 930	23 484	300 000	370 400	236 297	-19 000	132 103	881 000	415 648	265 352
1252 Licensure	410 500	354 963	650 683	-56 337	-296 539	3,433 200	3,130 412	4,262 658	-282 788	-872 246	5,373 000	5,213 273	163 727
1253 Environmental Compliance	47 300	33 863	34 488	-14 337	-1 425	321 000	228 715	282 286	-92 285	-53 551	550 000	336 380	213 620
1254 Communication and Liaison	36 400	36 400	24 438	000	11 962	278 000	278 001	283 840	001	75 841	478 000	340 356	128 644
1255 Technology and Financial Assistance	000	000	000	000	000	000	000	000	000	000	000	000	000
125 REGULATORY AND INSTITUTIONAL INVESTIGATIONS	548 900	489 157	751 695	-60 743	-262 539	4,402 000	4,008 478	4,727 060	-394 372	-718 632	7,886 000	6,314 585	771 415
1261 Management and Integration	384 000	384 000	498 549	-000	-114 549	2,818 430	3,381 200	2,532 527	-238 150	48 753	4,871 000	4,525 873	345 127
1262 Site Preparation	38 000	000	1 800	-38 000	-1 800	113 000	53 300	62 800	-80 500	-9 500	324 000	244 754	79 246
1263 Surface Facilities	18 100	000	000	-18 100	000	80 000	39 200	33 000	-20 700	5 300	161 000	33 742	127 258
1264 First Shaft	6 000	8 000	19 845	000	-13 845	139 000	139 000	84 872	-000	44 878	252 000	173 485	78 515
1265 Second Shaft	18 000	18 000	21 000	-000	-3 000	87 000	87 000	63 830	-000	18 370	198 000	125 161	72 839
1266 Subsurface Excavations	26 000	26 000	15 112	000	12 888	187 000	187 000	188 101	-000	-2 101	358 000	362 822	-4 822
1267 Underground Service Systems	96 000	72 168	31 851	-24 148	41 184	383 000	261 400	153 382	-102 428	104 000	881 000	748 200	132 800
1268 Operations	000	000	000	000	000	15 000	15 000	000	000	000	20 000	0 333	18 667
1269 Testing	1,196 550	1,050 500	781 877	-56 250	268 421	4,513 980	3,482 861	3,075 415	-1,031 818	487 546	10,285 000	7,816 851	3,188 149
126 EXPLORATORY SHAFT INVESTIGATIONS	1,685 350	1,556 460	1,367 842	-129 990	188 614	8,283 810	6,821 221	6,192 737	-1,481 780	628 484	17,370 000	13,230 342	4,138 658
1271 Management and Integration	000	000	000	000	000	000	000	000	000	000	000	000	000
1272 Testing	79 870	79 870	81 600	000	-1 730	321 900	311 990	232 121	-10 000	79 889	489 000	383 174	105 826
1273 New Facility Acquisitions	000	000	000	000	000	000	000	000	000	000	000	000	000

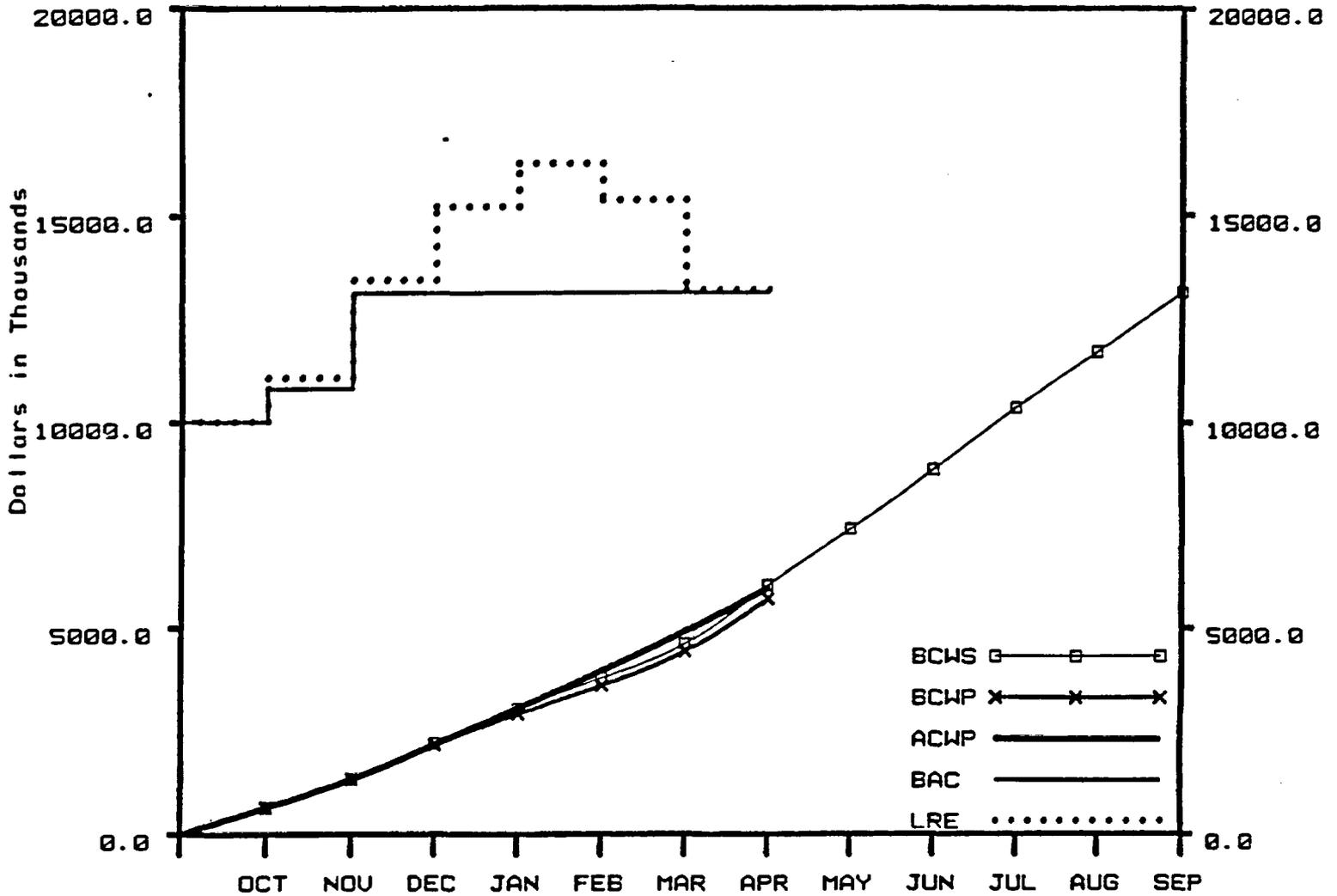
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**COST PERFORMANCE REPORT - LEVEL 4  
WORK BREAKDOWN STRUCTURE (FORMAT 1)  
U.S. DEPARTMENT OF ENERGY**

CONTRACTOR		CONTRACT TYPE NO	PROJECT NAME/NUMBER			REPORT FISCAL MONTH AND YEAR		SIGNATURE					
MWSI Project			NEVADA NUCLEAR WASTE SITEWALK INVESTIGATIONS			APR 1987							
LOCATION		CURRENT PERIOD		YEAR TO DATE		FISCAL YEAR COMPLETION							
P. O. Box 14100 Las Vegas, NV 89114		BUD COST OF WORK SCHEDULED	BUD COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE   COST	BUD COST OF WORK SCHEDULED	BUD COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE   COST	BASELINED BUDGET	LATEST REVISED ESTIMATE	VARIANCE	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
127	TEST FACILITIES	70 870	70 870	81 600	000   -1 930	321 990	311 000	232 121	-10 000   79 889	489 000	383 174	105 826	
1201	Land Acquisition	16 000	9 000	14 867	-7 000   -5 867	70 500	57 000	52 416	-13 500   4 584	150 000	105 200	44 732	
120	LAND ACQUISITION	16 000	9 000	14 867	-7 000   -5 867	70 500	57 000	52 416	-13 500   4 584	150 000	105 200	44 732	
1201	Management and Integration	1 002 140	1 133 500	911 502	51 429   221 007	6 834 430	6 675 001	5 007 552	-150 529   880 340	12 315 000	10 726 671	1 588 329	
1202	Project Control	351 000	306 000	300 323	-45 000   -74 263	2 212 000	2 186 261	2 420 703	-26 539   -243 532	3 090 000	4 410 500	-420 500	
1203	Quality Assurance	505 000	615 270	700 663	29 399   -94 384	3 653 640	3 392 530	2 062 040	-261 101   400 400	7 023 000	5 411 823	1 611 177	
1209	NIS Allocation	70 000	70 001	70 000	001   -001	553 000	553 007	553 000	007   -007	2 223 000	2 223 000	000	
120	PROJECT MANAGEMENT	2 098 000	2 133 000	2 000 567	35 829   53 342	13 253 870	12 807 700	11 872 305	-446 162   835 323	25 551 000	22 770 995	2 771 005	
12101	Financial & Technical Assistance	430 000	430 000	278 048	-000   151 952	3 010 000	3 000 000	3 067 992	-002   -57 994	5 162 000	5 261 453	-99 453	
1210	FINANCIAL & TECHNICAL ASSISTANCE	430 000	430 000	278 048	-000   151 952	3 010 000	3 000 000	3 067 992	-002   -57 994	5 162 000	5 261 453	-99 453	
12	MWSI - SUBTOTAL	9 878 100	9 374 360	9 441 231	-503 792   -66 863	59 261 540	56 291 000	51 007 847	-4,060 572   3,204 121	115,573 000	85,040 000	10,632 000	
	INDISTRIBUTED BUDGET									1,003 000	1,003 000	000	
	CAPITAL EQUIPMENT							1,021 913		11,045 000	11,045 000	000	
	MWSI - TOTAL	9 878 100	9 374 360	9 441 231	-503 792   -66 863	59 261 540	56 291 000	52,029 760	-4,060 572   3,204 121	128,511 000	100,878 000	10,632 000	

NOTE CAPITAL EQUIPMENT COSTS HAVE A ONE MONTH LAG COSTS REPORTED ARE YTD THROUGH MARCH

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.A



**LOS ALAMOS - TOTAL**

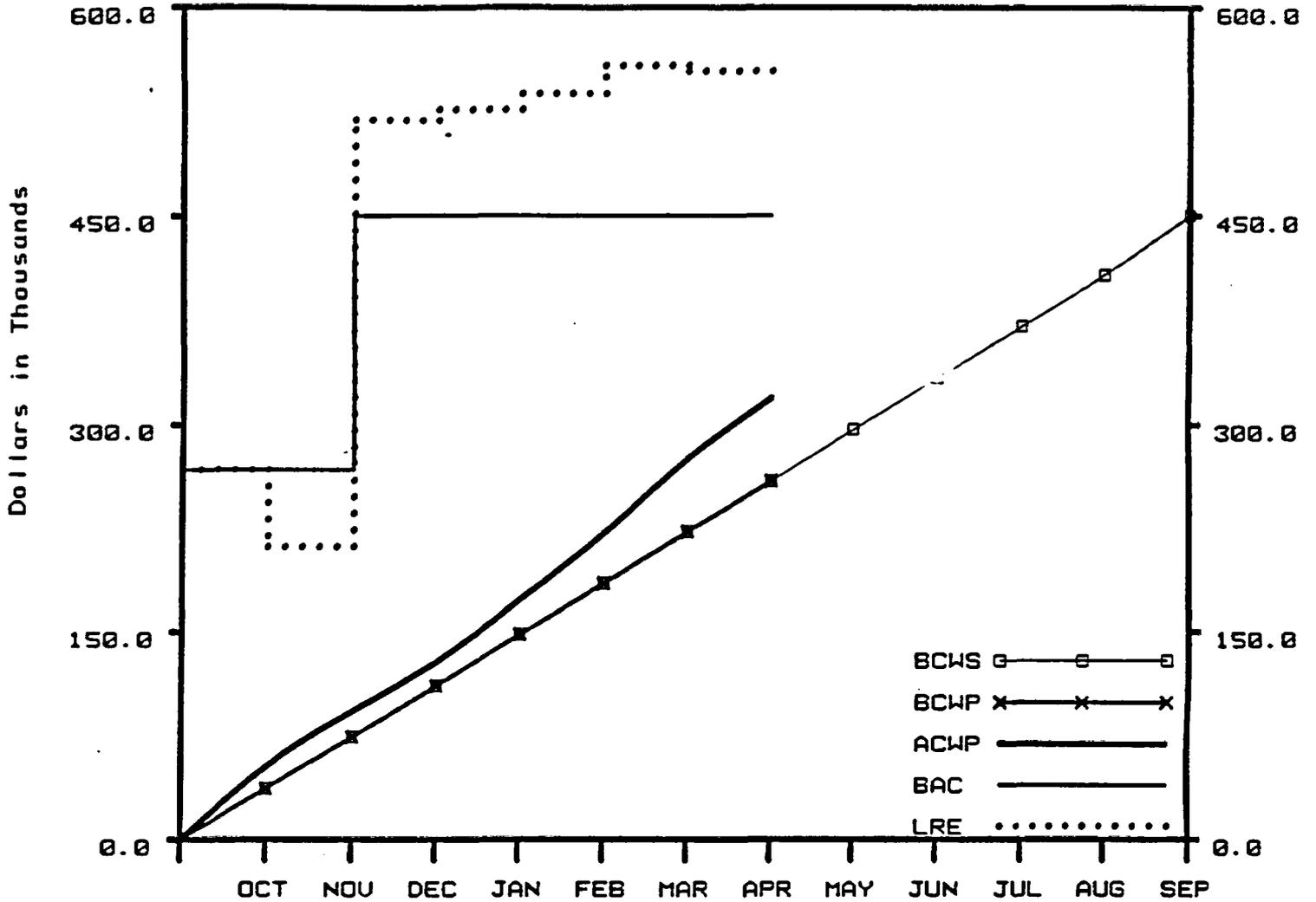
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1419.1	6028.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1281.7	5713.6
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1056.7	5968.3
D. BUDGET AT COMPLETION (BAC)		13128.0
E. LATEST REVISED ESTIMATE (LRE)		13183.1

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-315.0	-5.23
G. COST VARIANCE (B-C)	-254.7	-4.46
H. AT COMPLETION VARIANCE (D-E)	-55.1	-0.42

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.6



**LBL - TOTAL**

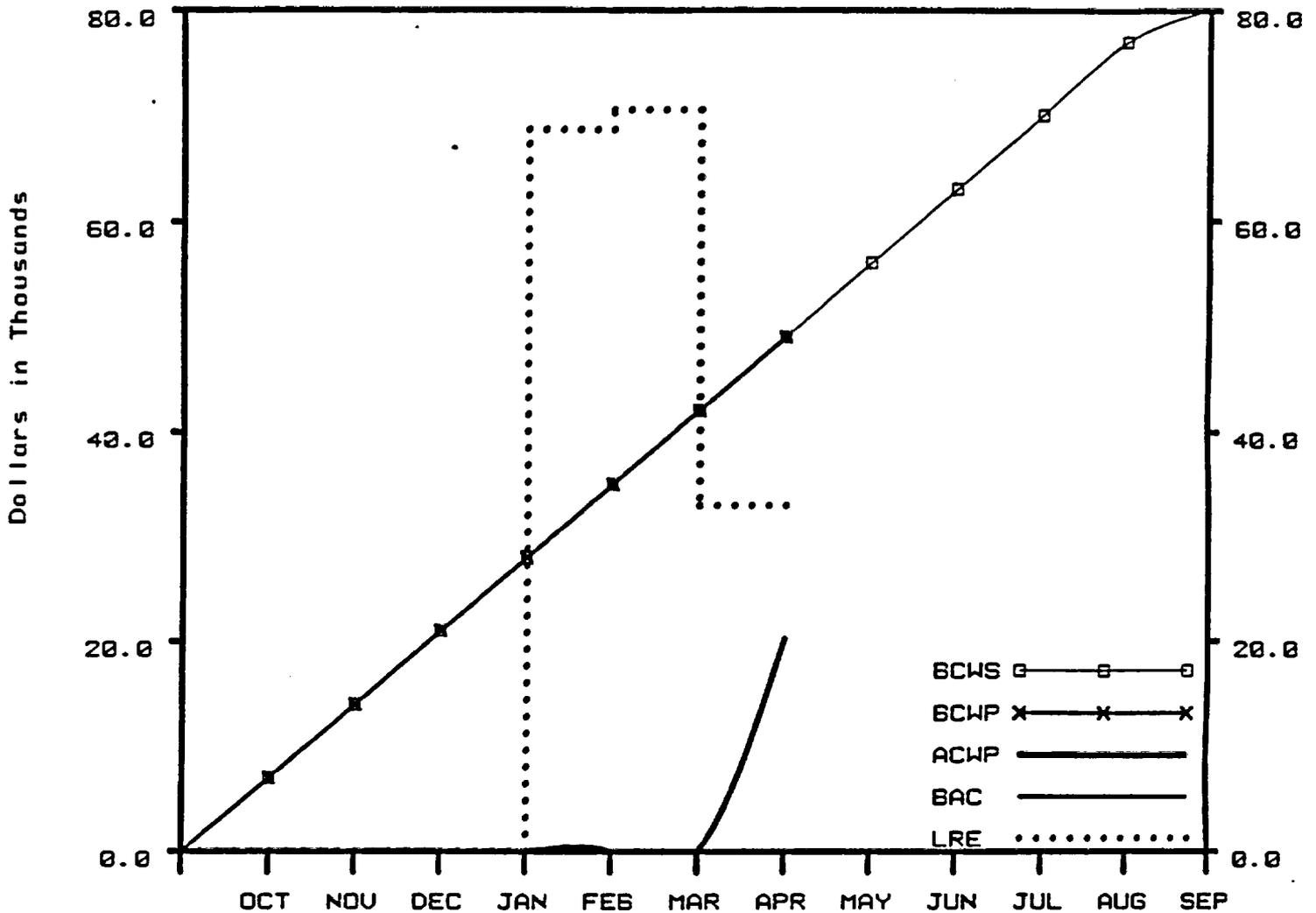
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	37.0	259.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	37.0	259.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	43.5	318.6
D. BUDGET AT COMPLETION (BAC)		450.0
E. LATEST REVISED ESTIMATE (LRE)		553.6

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-59.6	-23.02
H. AT COMPLETION VARIANCE (D-E)	-103.6	-23.02

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.C



**CSC-TOTAL**

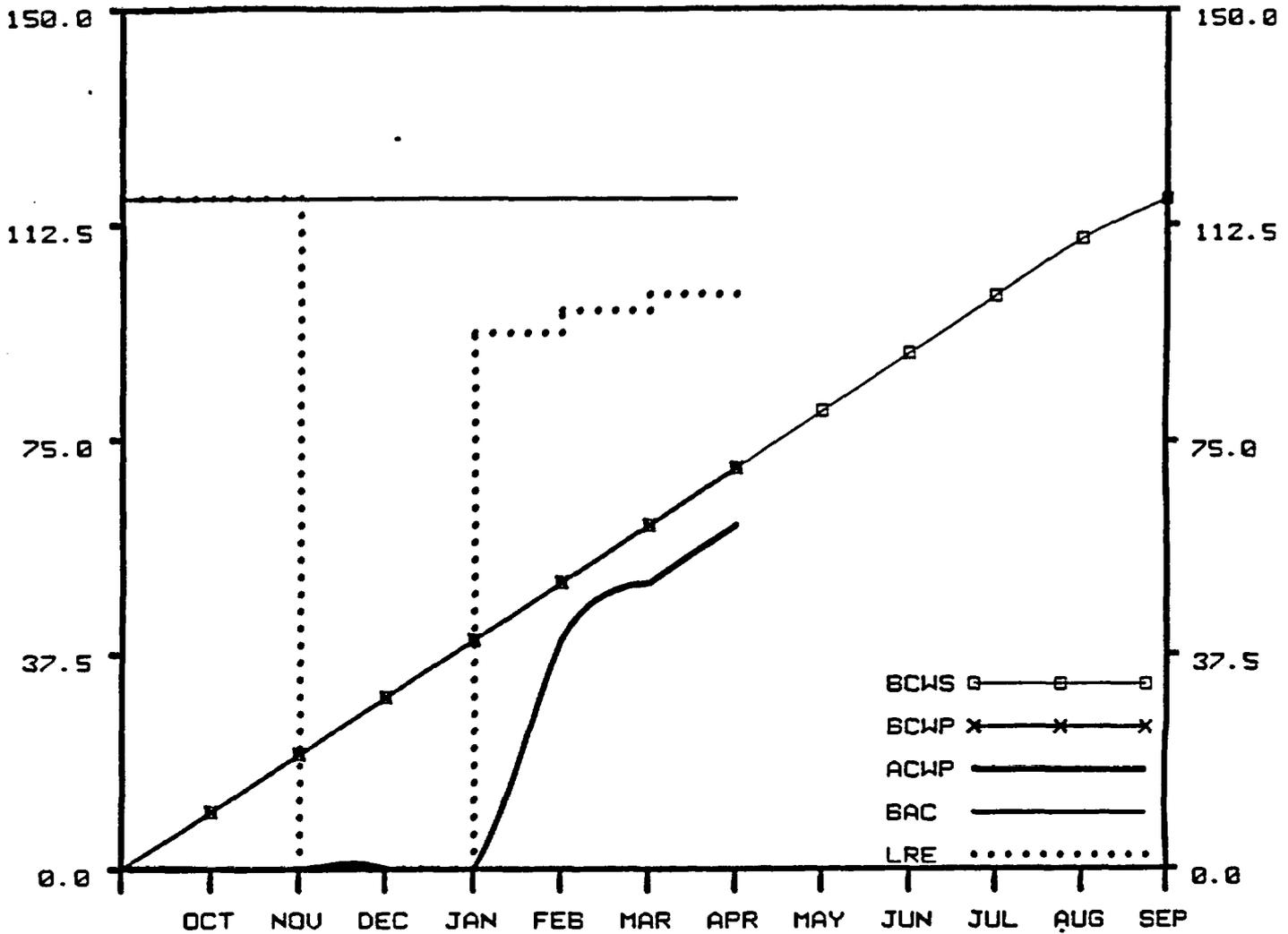
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	7.0	49.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	7.0	49.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	20.2	20.2
D. BUDGET AT COMPLETION (BAC)		80.0
E. LATEST REVISED ESTIMATE (LRE)		33.0

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	28.8	58.81
H. AT COMPLETION VARIANCE (D-E)	47.0	58.81

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.D



HEDL-TOTAL

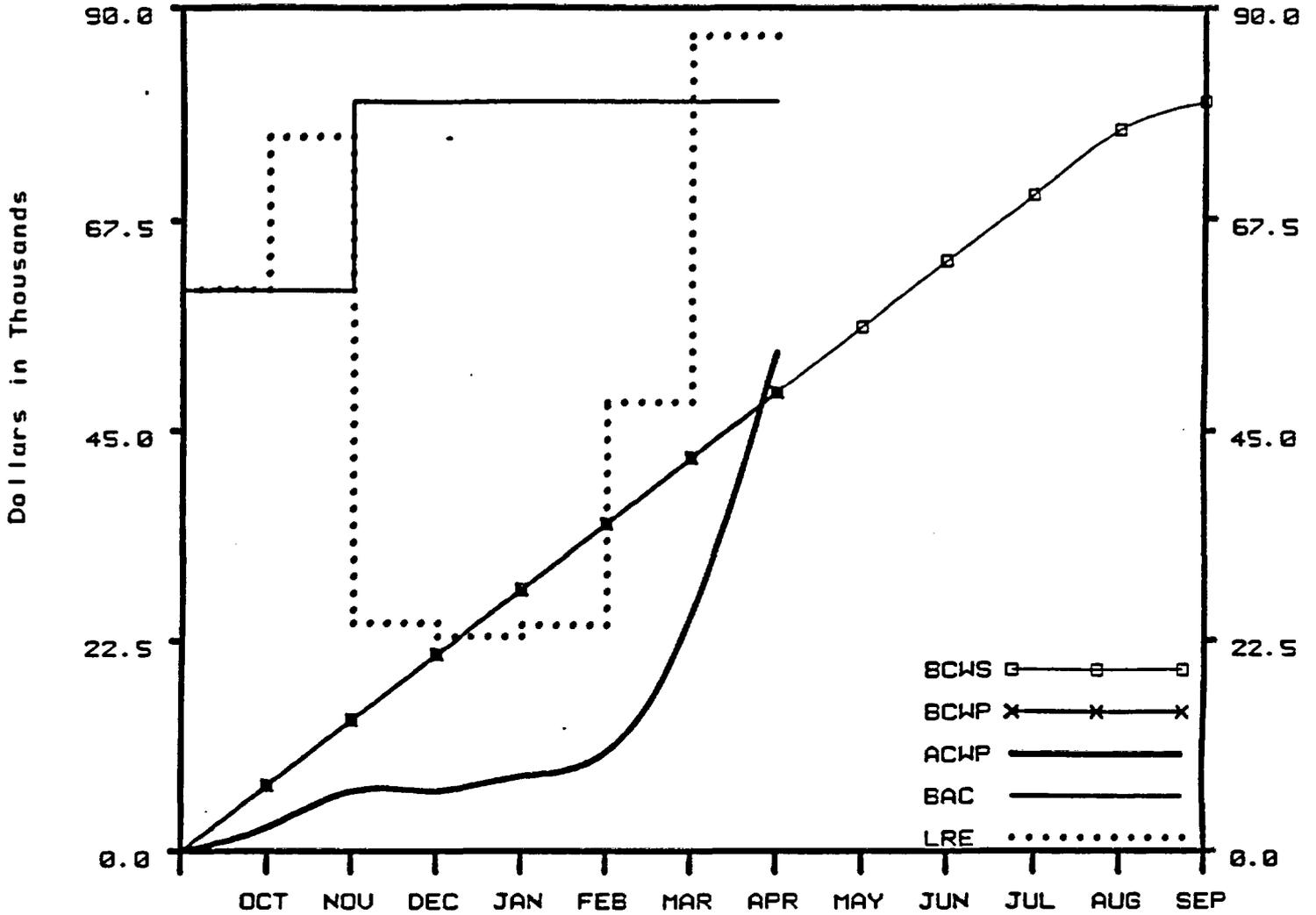
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	10.0	70.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	10.0	70.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	10.0	60.0
D. BUDGET AT COMPLETION (BAC)		117.0
E. LATEST REVISED ESTIMATE (LRE)		100.3

UARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	10.0	14.29
H. AT COMPLETION VARIANCE (D-E)	16.7	14.29

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.E



**EG&G - TOTAL**

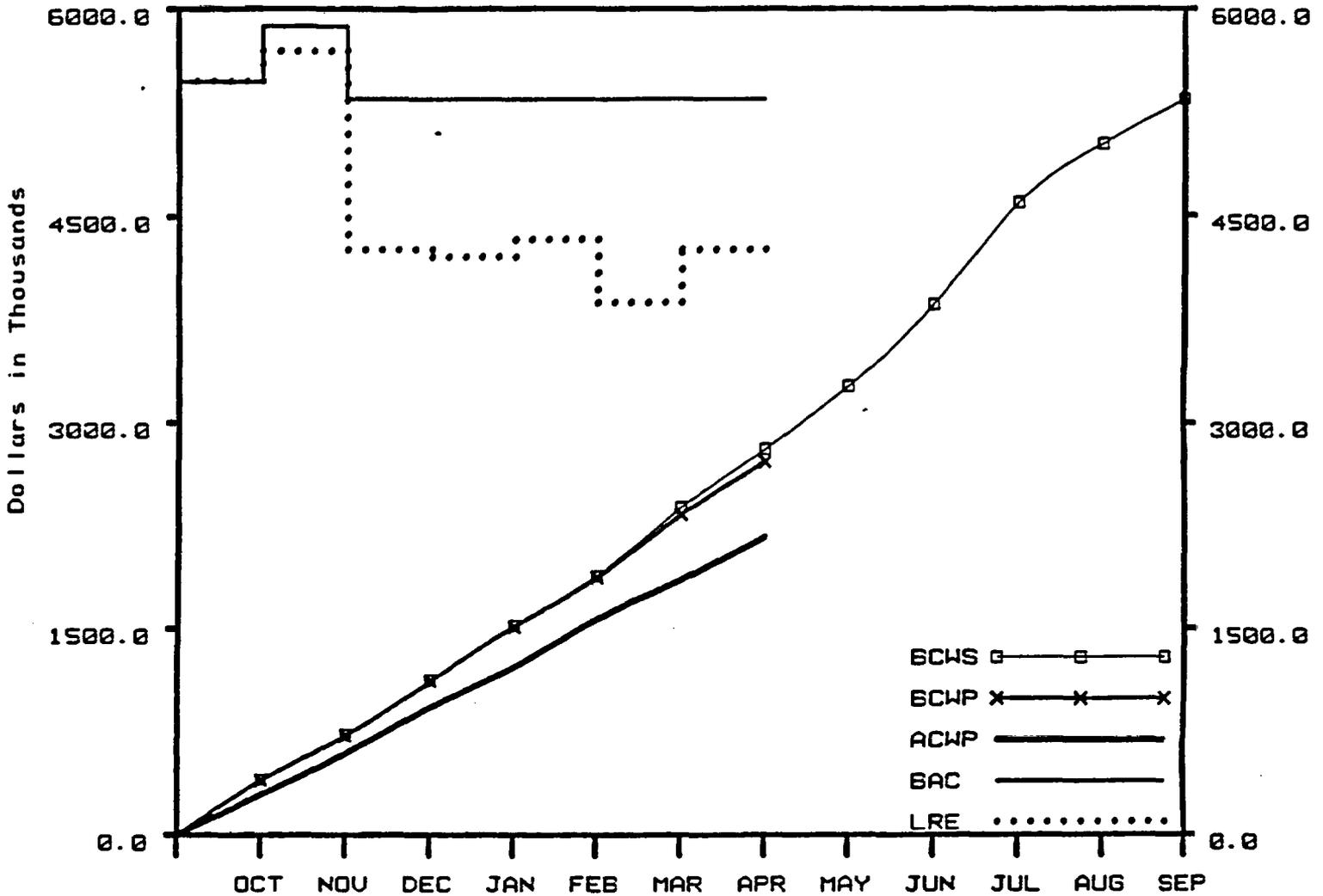
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	7.0	49.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	7.0	49.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	28.1	53.2
D. BUDGET AT COMPLETION (BAC)		80.0
E. LATEST REVISED ESTIMATE (LRE)		86.9

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-4.2	-8.62
H. AT COMPLETION VARIANCE (D-E)	-6.9	-8.62

Remarks:

**NNWSI PROJECT  
COST PERFORMANCE GRAPH FOR APR 1987  
WBS: 1.2.F**



**F&S - TOTAL**

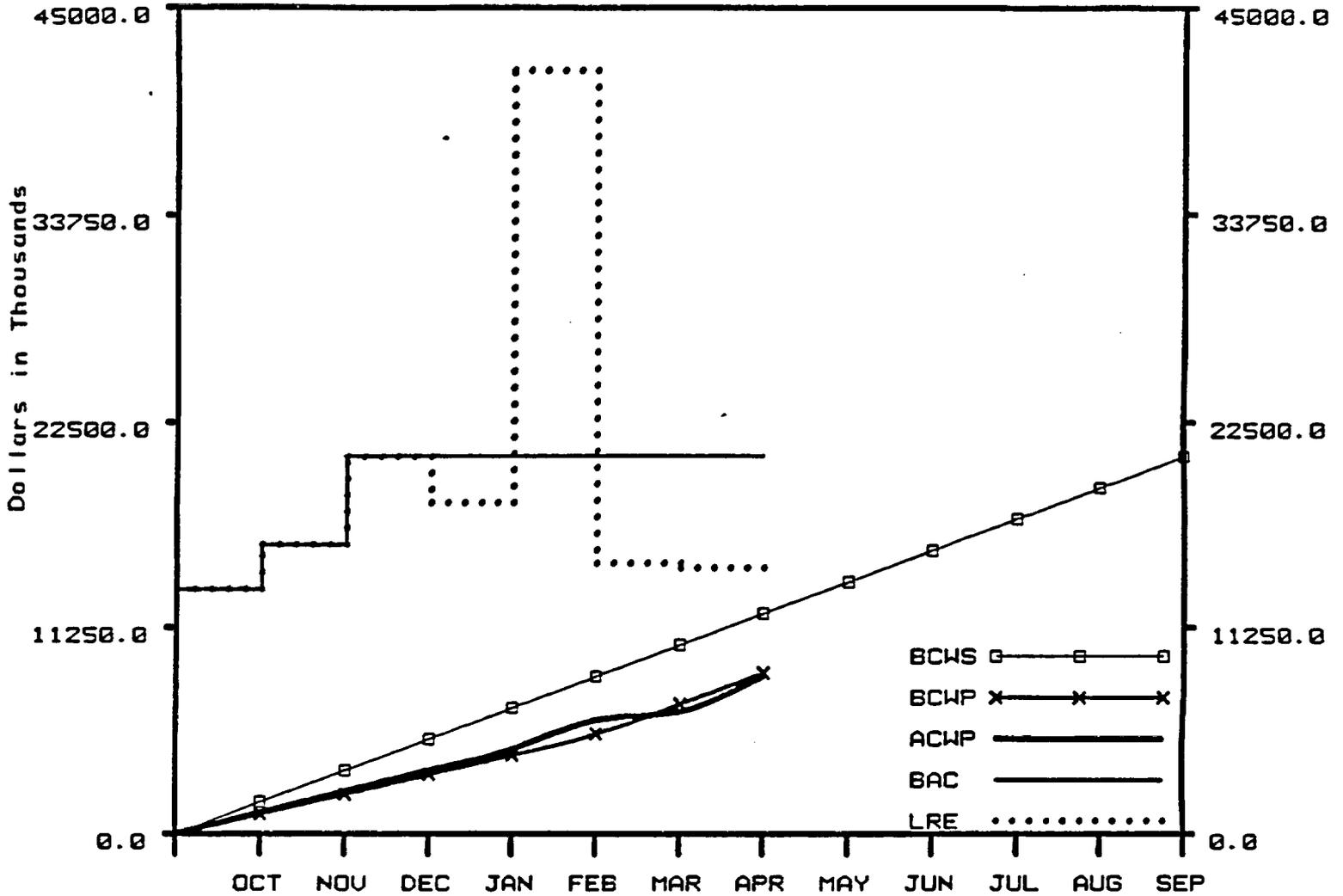
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	424.0	2804.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	383.0	2713.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	311.6	2166.9
D. BUDGET AT COMPLETION (BAC)		5344.0
E. LATEST REVISED ESTIMATE (LRE)		4252.4

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-91.0	-3.25
G. COST VARIANCE (B-C)	546.1	20.13
H. AT COMPLETION VARIANCE (D-E)	1091.6	20.43

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.G



**USGS - TOTAL**

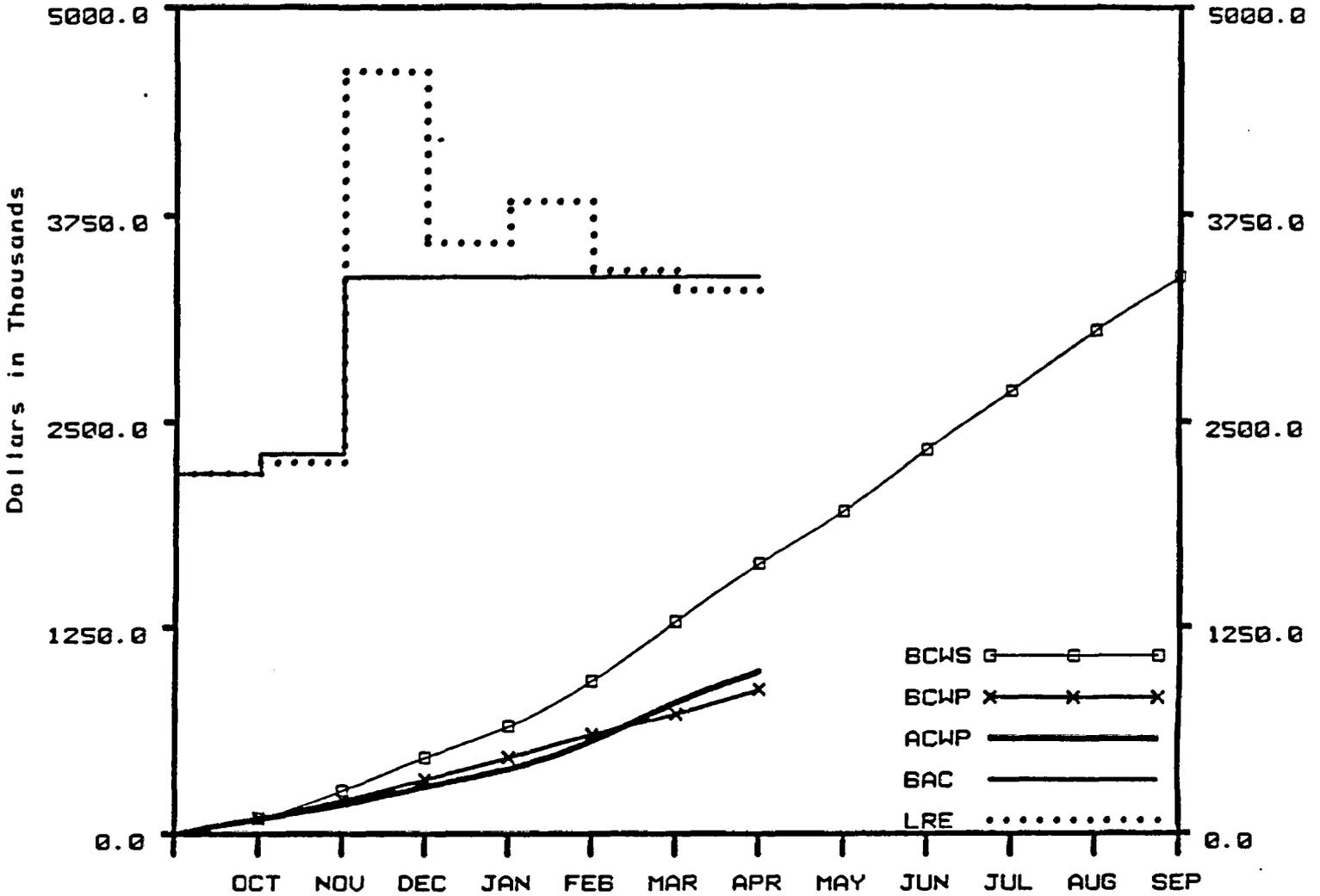
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1715.0	12005.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1703.7	8769.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1953.6	8612.2
D. BUDGET AT COMPLETION (BAC)		20592.0
E. LATEST REVISED ESTIMATE (LRE)		14482.2

**UARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-3235.6	-26.95
G. COST VARIANCE (B-C)	157.1	1.79
H. AT COMPLETION VARIANCE (D-E)	6109.8	29.67

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.H



**H&N - TOTAL**

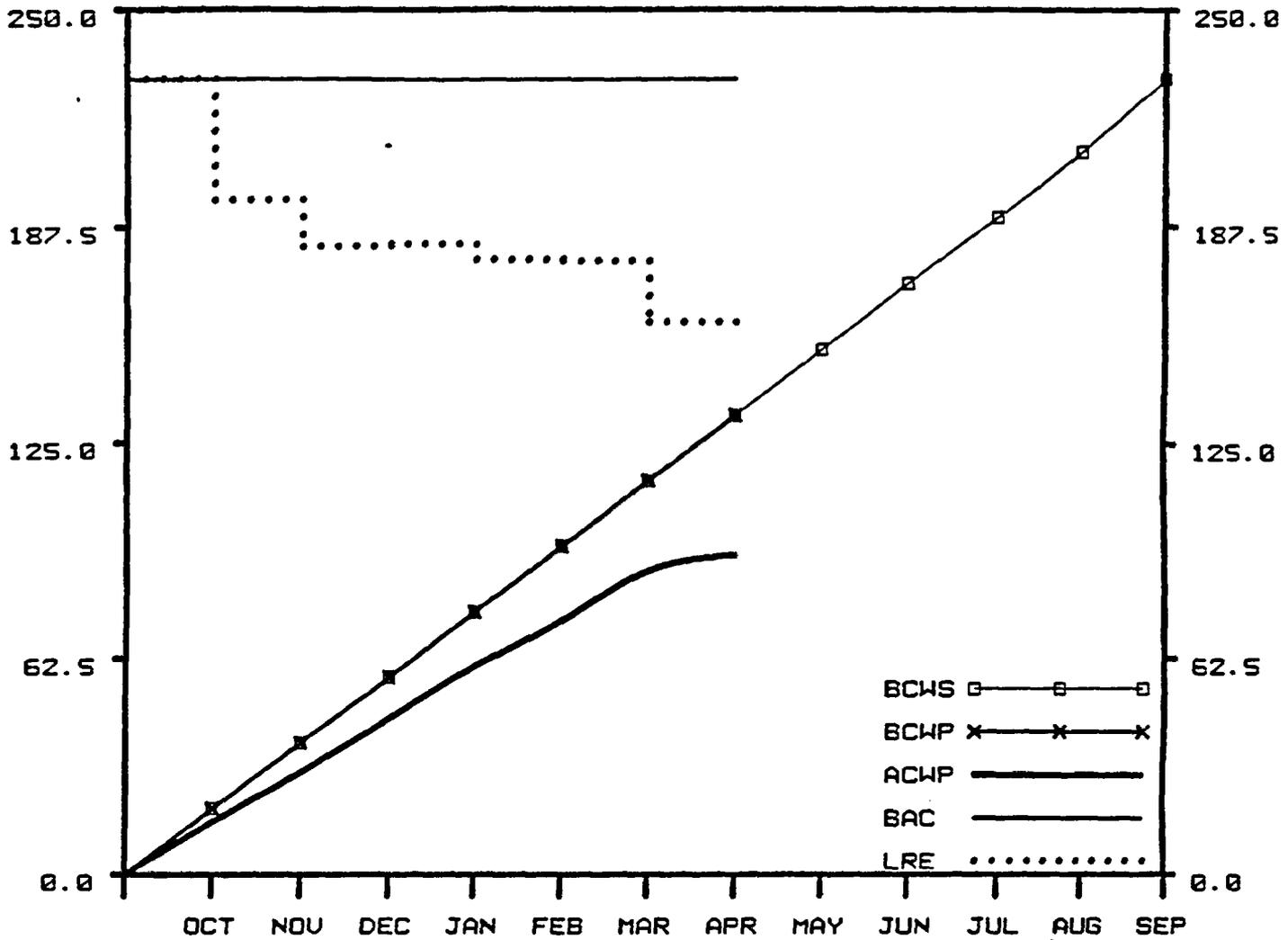
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	353.9	1637.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	146.9	872.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	186.1	981.7
D. BUDGET AT COMPLETION (BAC)		3371.0
E. LATEST REVISED ESTIMATE (LRE)		3288.3

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-765.0	-46.73
G. COST VARIANCE (B-C)	-109.6	-12.56
H. AT COMPLETION VARIANCE (D-E)	82.7	2.45

Remarks:

**NNWSI PROJECT  
COST PERFORMANCE GRAPH FOR APR 1987  
WBS: 1.2. I**



WSI - TOTAL

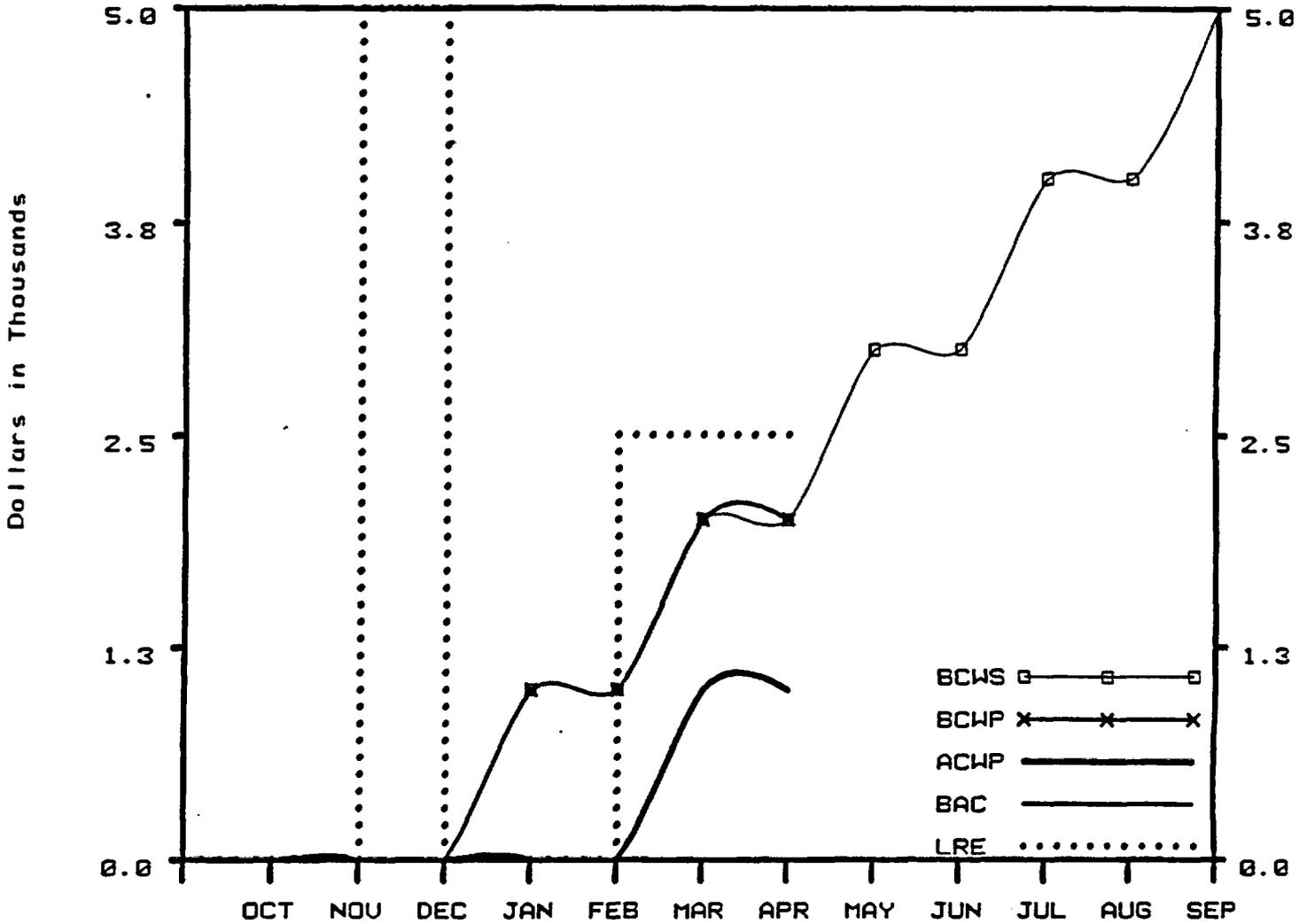
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	19.0	133.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	19.0	133.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	4.6	92.5
D. BUDGET AT COMPLETION (BAC)		230.0
E. LATEST REVISED ESTIMATE (LRE)		159.9

VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	40.5	30.47
H. AT COMPLETION VARIANCE (D-E)	70.1	30.47

Remarks:

**NNWSI PROJECT  
COST PERFORMANCE GRAPH FOR APR 1987  
WBS: 1.2.J**



**OSTI/TC-TOTAL**

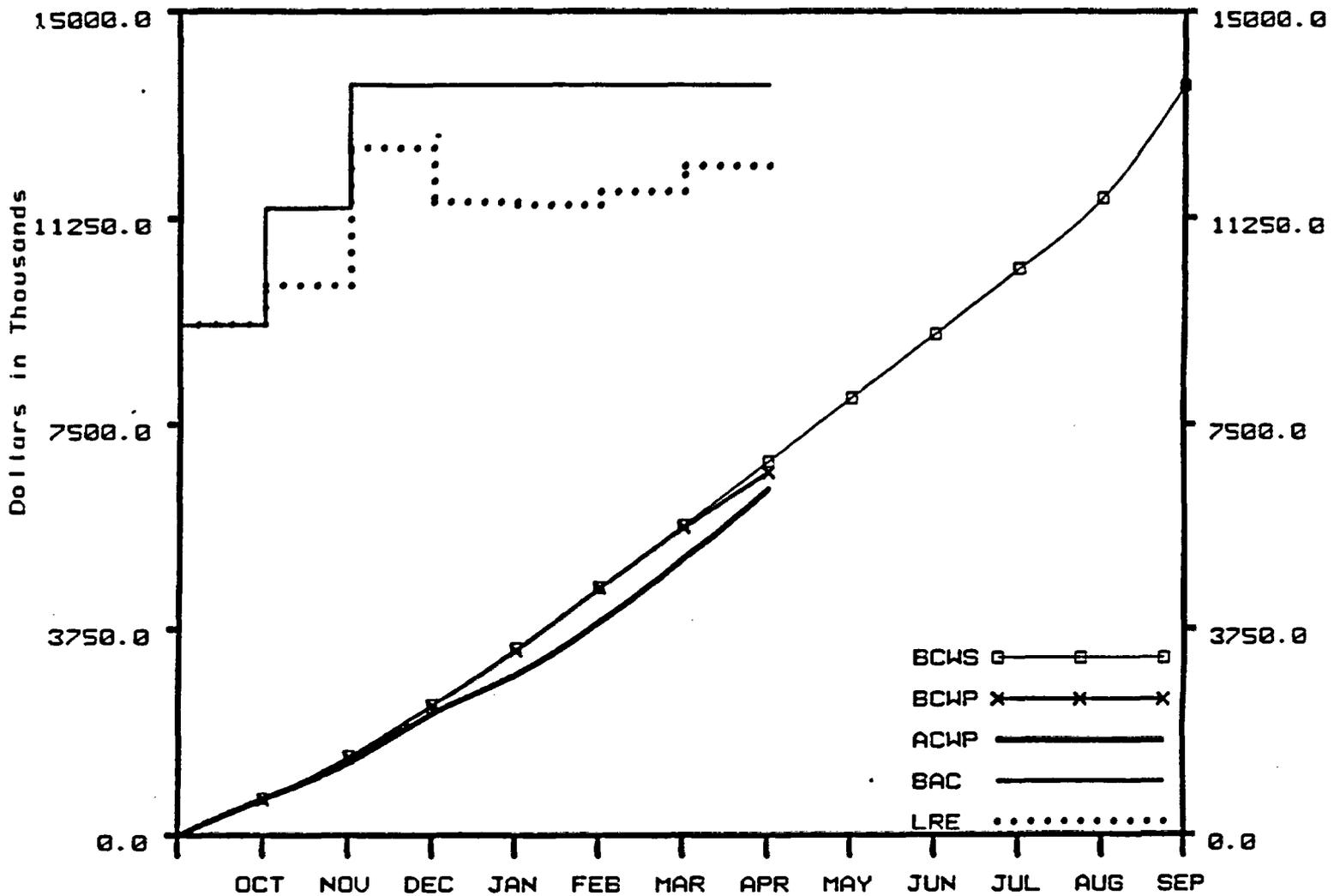
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	0.0	2.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	0.0	2.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	0.0	1.0
D. BUDGET AT COMPLETION (BAC)		5.0
E. LATEST REVISED ESTIMATE (LRE)		2.5

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	1.0	50.00
H. AT COMPLETION VARIANCE (D-E)	2.5	50.00

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.L



**LLNL - TOTAL**

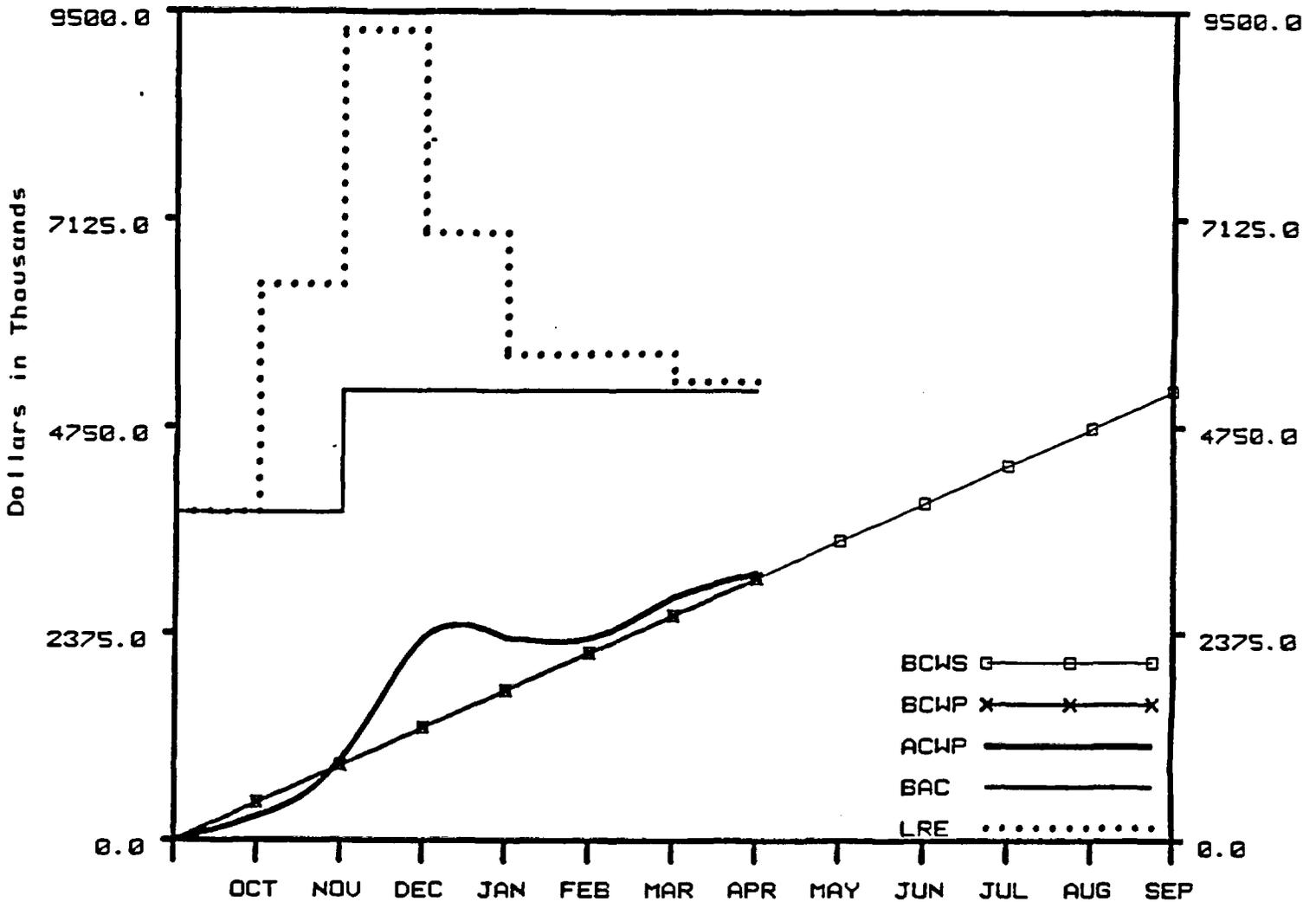
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1154.0	6809.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1001.8	6609.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1265.2	6307.9
D. BUDGET AT COMPLETION (BAC)		13654.0
E. LATEST REVISED ESTIMATE (LRE)		12180.5

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-199.9	-2.94
G. COST VARIANCE (B-C)	301.2	4.56
H. AT COMPLETION VARIANCE (D-E)	1473.5	10.79

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.N



**STATE - TOTAL**

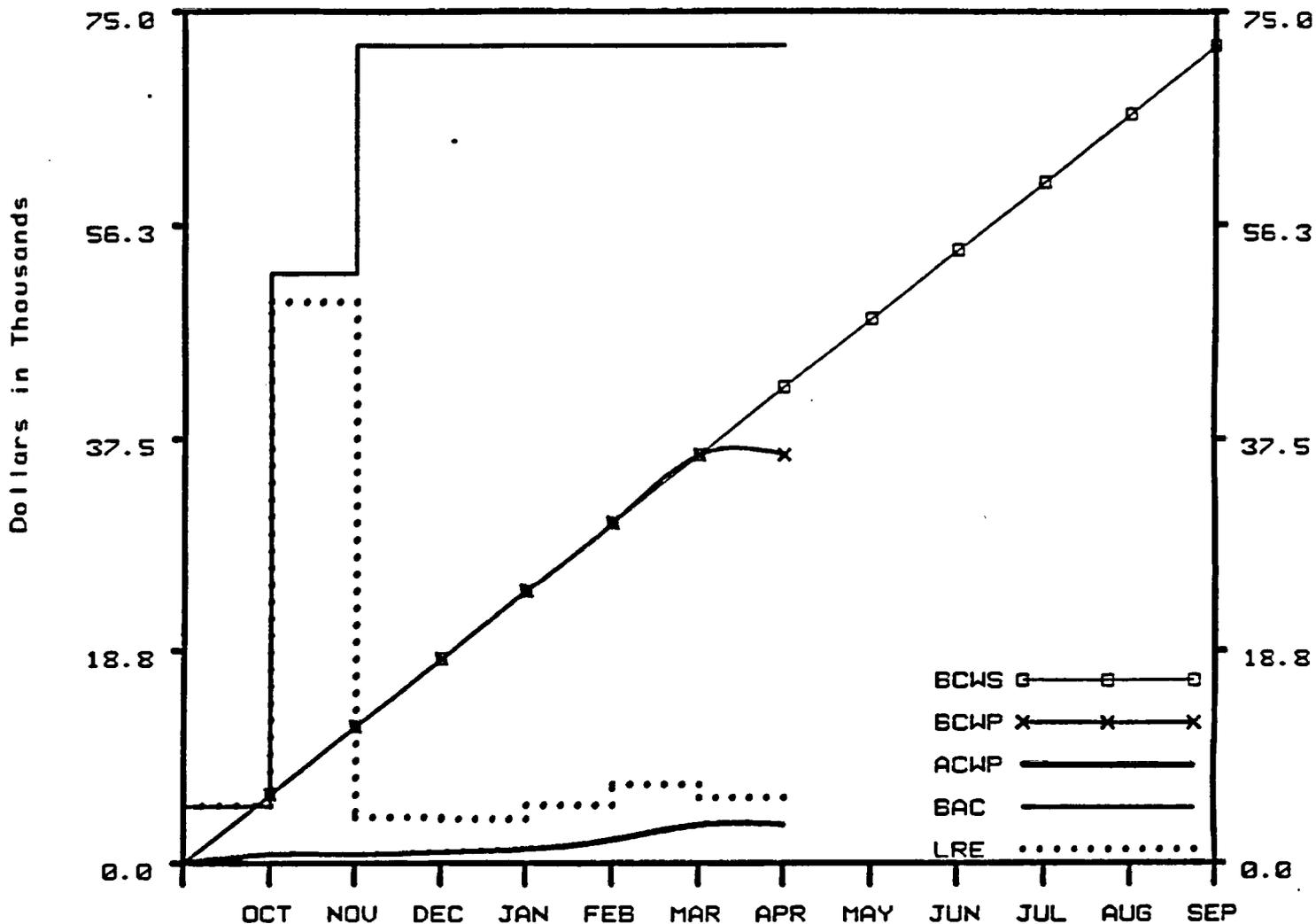
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	430.0	3010.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	430.0	3010.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	278.9	3068.0
D. BUDGET AT COMPLETION (BAC)		5162.0
E. LATEST REVISED ESTIMATE (LRE)		5261.5

**UARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-58.0	-1.93
H. AT COMPLETION VARIANCE (D-E)	-99.5	-1.93

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.P



**PAN AM - TOTAL**

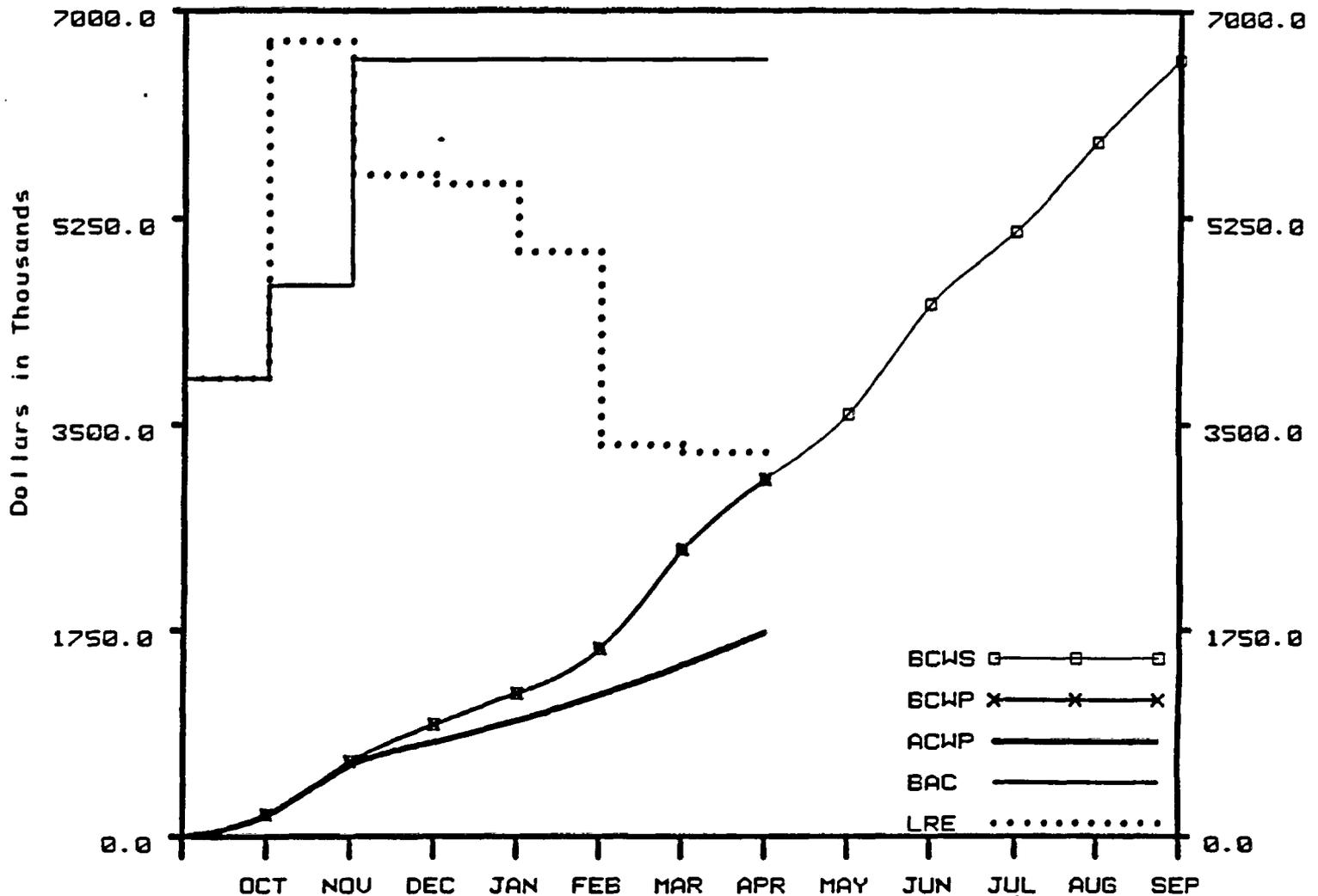
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	6.0	42.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	0.0	36.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	0.0	3.4
D. BUDGET AT COMPLETION (BAC)		72.0
E. LATEST REVISED ESTIMATE (LRE)		5.7

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-6.0	-14.29
G. COST VARIANCE (B-C)	32.6	90.56
H. AT COMPLETION VARIANCE (D-E)	66.3	92.03

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.R



**REECO - TOTAL**

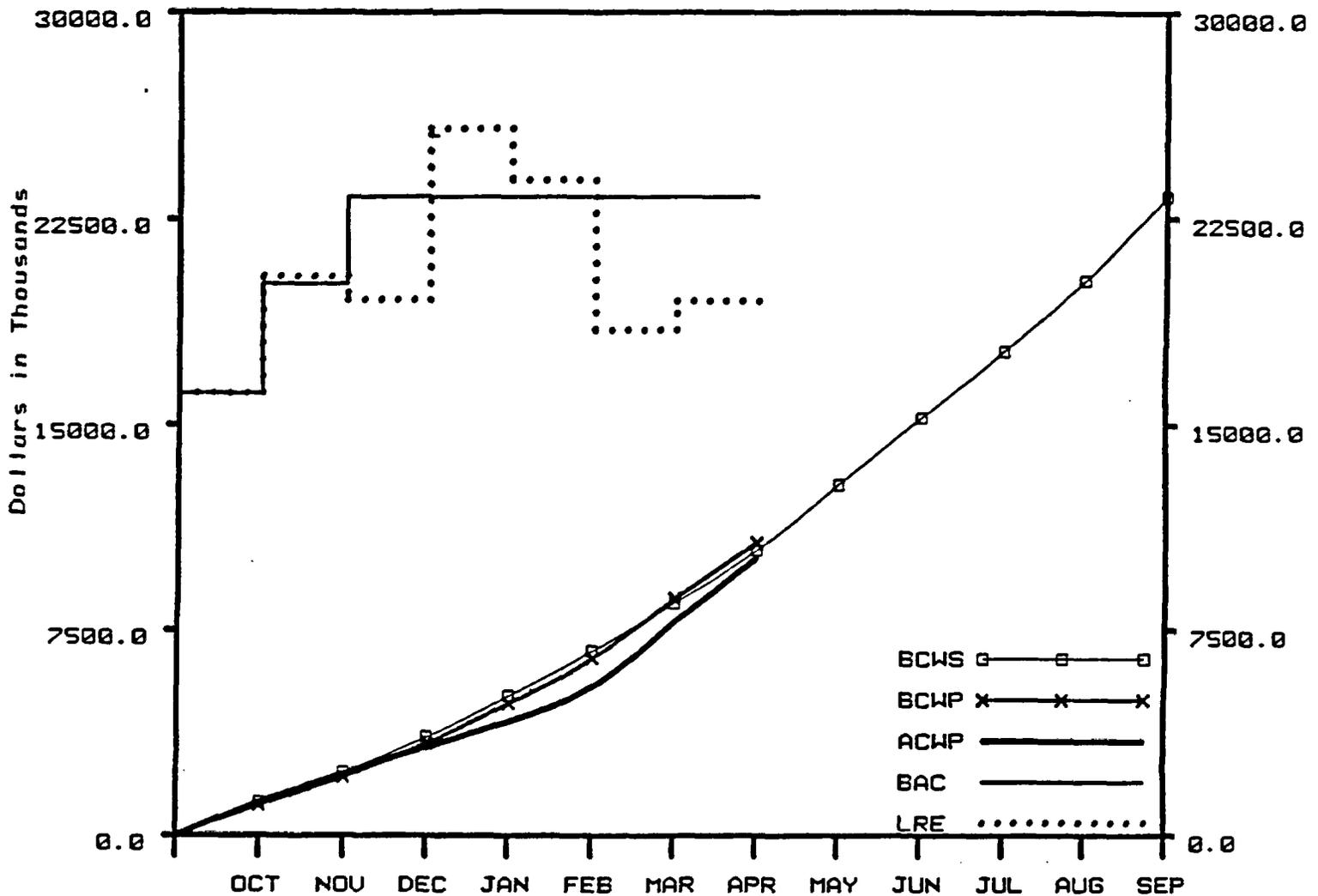
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	600.0	3030.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	600.0	3030.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	276.5	1725.0
D. BUDGET AT COMPLETION (BAC)		6584.0
E. LATEST REVISED ESTIMATE (LRE)		3255.5

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	1305.4	43.08
H. AT COMPLETION VARIANCE (D-E)	3328.5	50.55

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.S



**SNL - TOTAL**

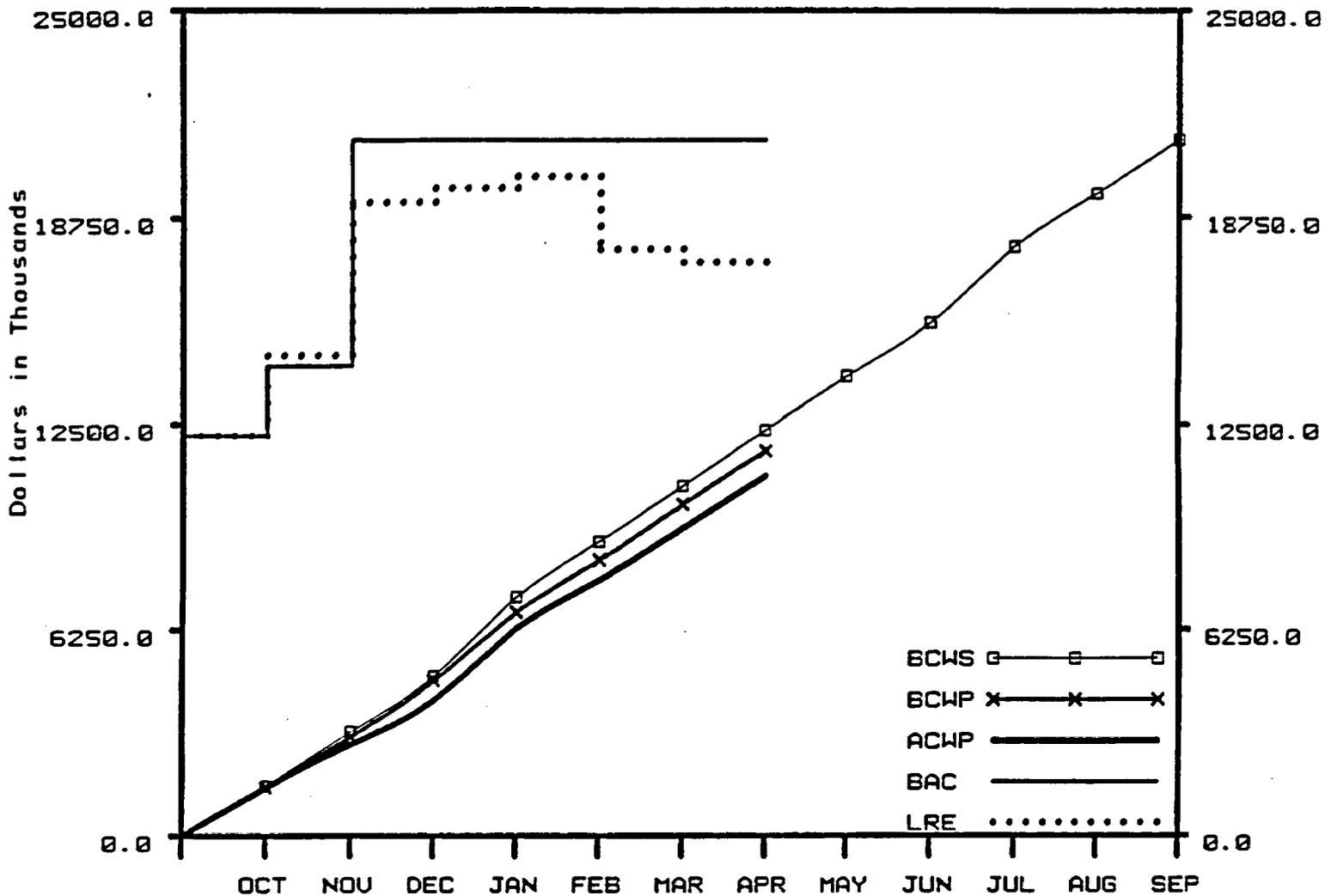
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1925.0	10416.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	2042.9	10685.6
C. ACTUAL COST OF WORK PERFORMED (ACWP)	2345.0	10137.0
D. BUDGET AT COMPLETION (BAC)		23289.0
E. LATEST REVISED ESTIMATE (LRE)		19503.0

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	269.6	2.59
G. COST VARIANCE (B-C)	548.6	5.13
H. AT COMPLETION VARIANCE (D-E)	3786.0	16.26

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.T



**SAIC - TOTAL**

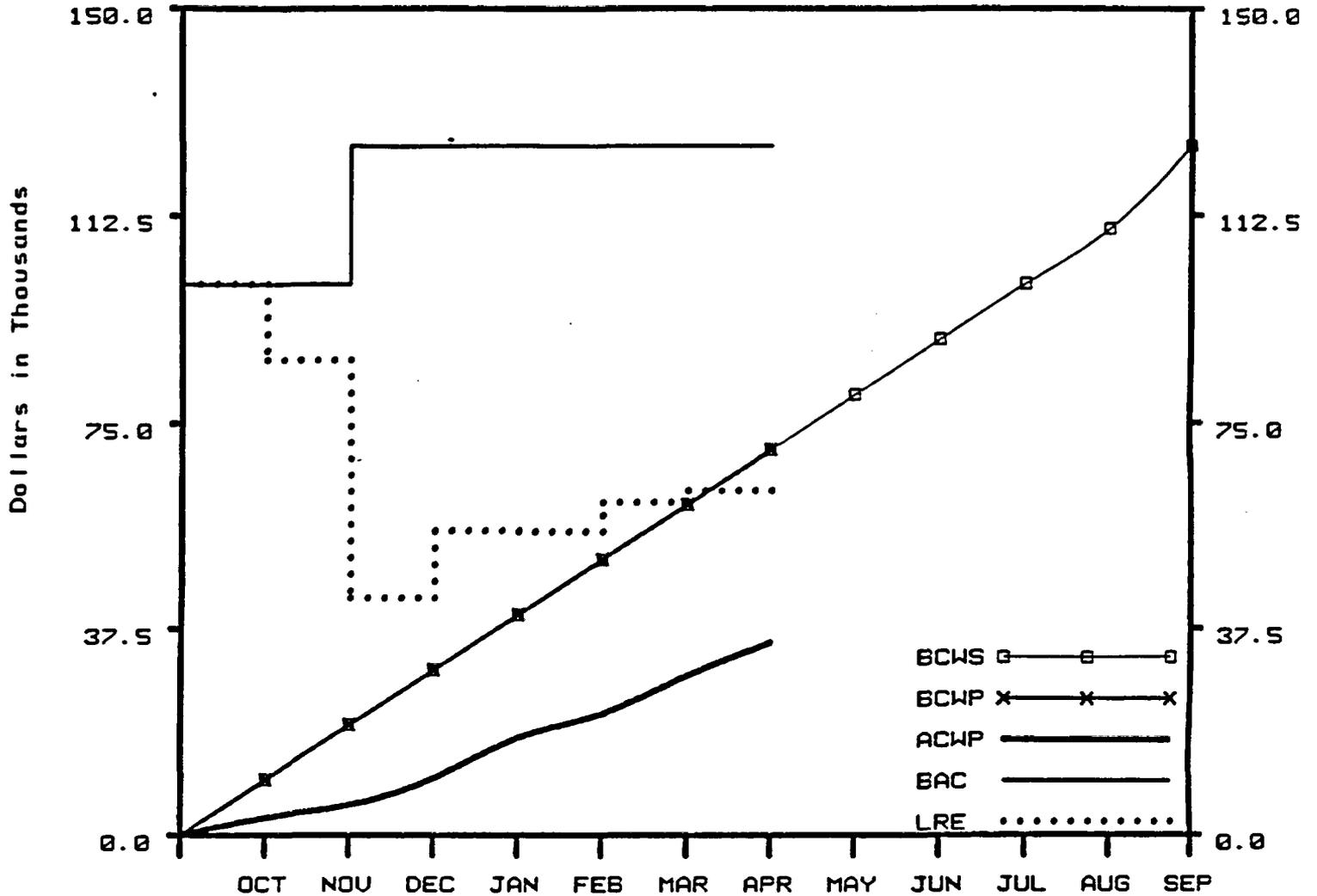
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1682.2	12294.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1615.3	11667.7
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1576.3	10903.9
D. BUDGET AT COMPLETION (BAC)		21067.0
E. LATEST REVISED ESTIMATE (LRE)		17377.1

**VARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	-626.7	-5.10
G. COST VARIANCE (B-C)	763.8	6.55
H. AT COMPLETION VARIANCE (D-E)	3689.9	17.52

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR APR 1987 WBS: 1.2.U



**DRI - TOTAL**

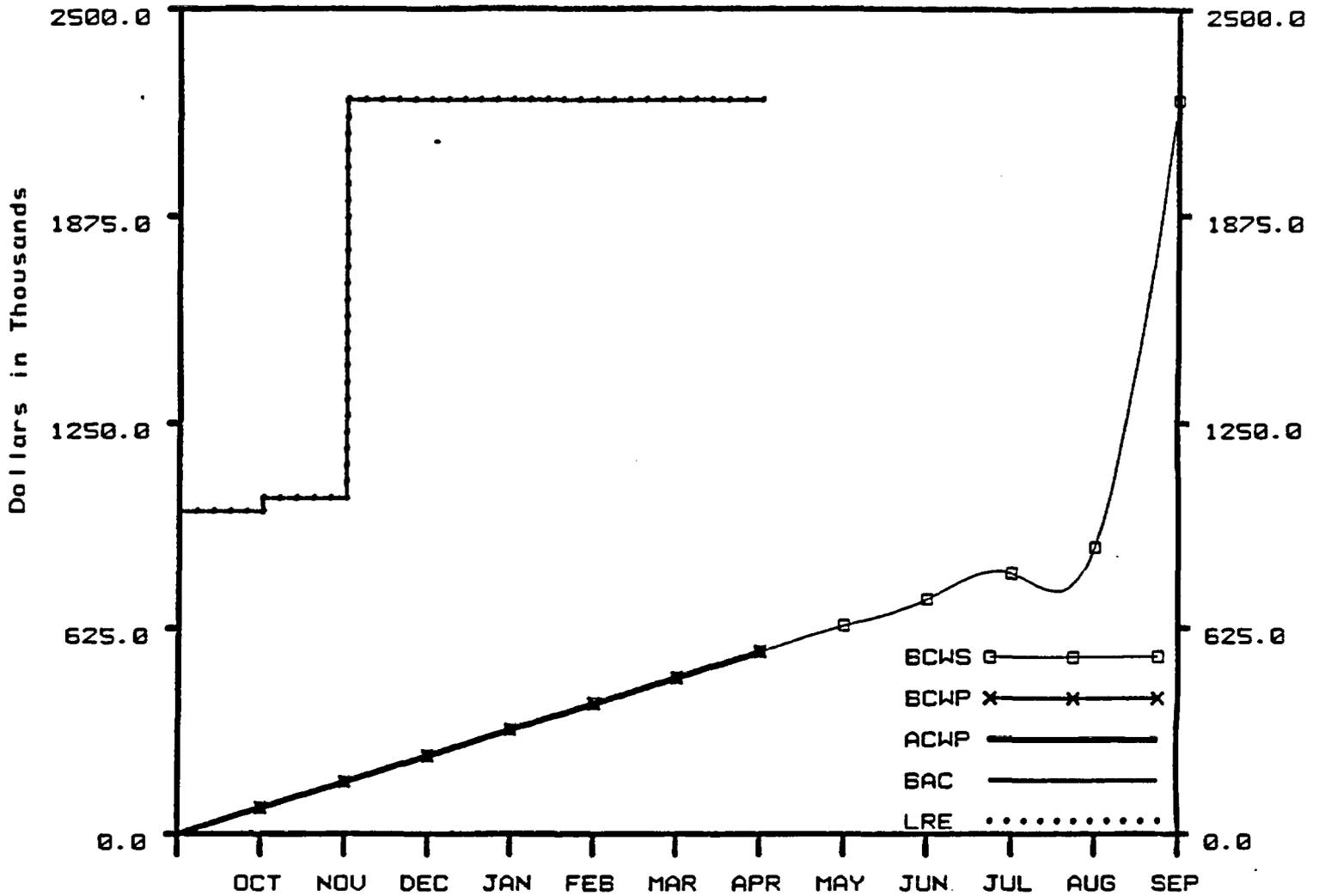
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	10.0	70.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	10.0	70.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	6.0	35.0
D. BUDGET AT COMPLETION (BAC)		125.0
E. LATEST REVISED ESTIMATE (LRE)		62.4

**UARIANCES (Year To Date)**

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	35.0	50.00
H. AT COMPLETION VARIANCE (D-E)	62.6	50.00

Remarks:

**NNWSI PROJECT  
COST PERFORMANCE GRAPH FOR APR 1987  
WBS: 1.2.X**



**NTS - TOTAL**

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	79.0	553.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	79.0	553.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	79.0	553.0
D. BUDGET AT COMPLETION (BAC)		2223.0
E. LATEST REVISED ESTIMATE (LRE)		2223.0

**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:

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS  
MAJOR SYSTEMS ACQUISITION (MSA) MILESTONES  
01 Oct 1986 to 30 Sep 1987

(B)=Baselined  
(P)=Planned

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINE DATE	FORECAST or ACTUAL	(F) (A)
WMPO submits letter report on Studies of Coupled Processes Included in the SCP to OGR for information	1.2.1.1	Robson	1	WMPO	R109 (B)	26 Nov 86	08 Apr 87	(A)
WMPO submits letter report on Studies of Performance Allocation Included in SCP to OGR	1.2.1.1	Robson	1	WMPO/SNL	R108 (B)	16 Feb 87	02 Jul 87	(F)
WMPO submits Annual PASS Program Interaction Letter Report for FY87 to OGR	1.2.1.1	Robson	1	WMPO/SNL	P132 (B)	30 Sep 87	30 Sep 87	(F)
Yucca Mountain Mined Geologic Disposal System (MGDS) Requirements	1.2.1.2.1	Robson	1	WMPO/SNL	M120 (B)	31 Mar 87	29 May 87	(f)
Draft Yucca Mountain Site-Specific Mined Geologic Disposal System (MGDS) Description	1.2.1.2.1	Robson	1	WMPO/SNL	M261 (B)	30 Jun 87	28 Jan 88	(F)
System Engineering Management Plan (SEMP)	1.2.1.2.4	Robson	1	WMPO/SNL	M108 (B)	16 Feb 87	15 Jul 87	(F)
OGR Systems Engineering Review of the NNWSI Project	1.2.1.2.4	Robson	1	WMPO/SNL	R074 (B)	15 Mar 87	15 Jul 87	(F)
WMPO submits hard copy (1987 Annual) version of the Reference Information Base to OGR	1.2.1.3.3	Livingston	1	WMPO/SNL	R092 (B)	29 May 87	29 May 87	(F)
Waste Package Postclosure Compliance Strategy Document	1.2.2.1	Valentine	1	WMPO/LLNL	R003 (B)	30 Jan 87	30 Aug 87	(F)
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	Valentine	1	WMPO/LLNL	M236 (B)	30 Jan 87	31 Jul 87	(F)
Decision Made on Using Packing Material in the Waste Package to Assist in Controlling Radionuclides Release Rate	1.2.2.3.3	Valentine	1	WMPO/LLNL	M257 (B)	30 Jan 87	30 Sep 87	(F)
Revised Draft Waste Package Subsystem Conceptual Design Requirements to DOE/HQ for Review	1.2.2.4	Valentine	1	WMPO/LLNL	M013 (B)	30 Apr 87	31 Aug 87	(F)
Initiate Waste Package Advanced Conceptual Design	1.2.2.4	Valentine	1	WMPO/LLNL	M233 (B)	30 Sep 87	30 Sep 87	(F)
Report on the System Model for Waste Package Performance Analysis	1.2.2.5	Valentine	1	WMPO/LLNL	M276 (B)	31 Oct 86	12 Jan 87	(A)
Report on Long Term Performance Analysis of the Conceptual Waste Package Design	1.2.2.5	Valentine	1	WMPO/LLNL	M260 (B)	30 Apr 87	30 Sep 87	(F)
Submit Report on Evaluation of Natural Resources at Yucca Mountain and Vicinity received to DOE/ HQ for Information	1.2.3.1	Livingston	1	WMPO/SAIC	M895 (B)	31 Jul 87	31 Jul 87	(F)
Recommendation to Proceed With Deep Regional Seismic Survey to OGR for Approval	1.2.3.2 2	Robert	1	WMPO/USGS	R845 (B)	31 Aug 87	31 Aug 88	(f)

11-22

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS  
MAJOR SYSTEMS ACQUISITION (MSA) MILESTONES  
01 Oct 1986 to 30 Sep 1987

(B)=Baselined  
(P)=Planned

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINE DATE	FORECAST (F) or ACTUAL (A)
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	Livingston	1	WMPO/LANL	M325 (B)	26 Nov 86	29 May 87 (F)
Preliminary Report on Sorption Modeling	1.2.3.4.1	Livingston	1	WMPO/LANL	R309 (B)	30 Jan 87	29 May 87 (F)
Final Radiological Monitoring Plan Complete	1.2.3.6.1	Jankus	1	WMPO/SAIC	M897 (B)	27 Feb 87	29 May 87 (F)
Submit Air Quality Monitoring Plan to DOE/HQ	1.2.3.6.1	Jankus	1	WMPO/SAIC	R327 (B)	30 Apr 87	07 Jul 87 (F)
Begin Air Quality Monitoring	1.2.3.6.1	Blanchard	1	WMPO/SAIC	N345 (B)	30 Sep 87	22 Dec 87 (F)
Submit Working Draft Site Characterization Socioeconomic Monitoring and Mitigation Plan (SMMP)	1.2.3.7	Dixon	1	WMPO/SAIC	R945 (B)	01 Dec 86	21 Nov 86 (A)
Submit Draft Socioeconomic Monitoring and Mitigation Plan to DOE/HQ	1.2.3.7	Dixon	1	WMPO/SAIC	P030 (B)	02 Apr 87	01 Sep 87 (F)
Start Repository Advanced Conceptual Design	1.2.4.1.1	Zvada	1	WMPO/SNL	N430 (B)	30 Sep 87	30 Sep 87 (F)
Initial Subsystem Design Requirement (SDR)	1.2.4.1.2	Skousen	1	WMPO/SNL	N433 (B)	30 Apr 87	03 Aug 87 (F)
Repository Conceptual Design in Support of Site Characterization	1.2.4.1.3	Skousen	1	WMPO/SNL	N432 (B)	27 Feb 87	28 Apr 87 (A)
Report on G-Tunnel Underground Facility (GTUF) Summary	1.2.4.2.1	Skousen	1	WMPO/SNL	M455 (B)	30 Jan 87	01 Apr 87 (A)
Feasibility Analysis of Horizontal Emplacement and Retrieval - Letter Report	1.2.4.2.2	Skousen	1	WMPO/SNL	M295 (B)	30 Nov 86	05 Sep 86 (A)
Initiate Procurement of Development Prototype Boring Machine	1.2.4.2.2	Skousen	1	WMPO/SNL	N427 (B)	30 Nov 86	01 Sep 87 (F)
Horizontal Waste Emplacement Equipment Development Plan	1.2.4.2.2	Skousen	1	WMPO/SNL	N406 (B)	27 Feb 87	30 Jun 87 (F)
Analysis to Evaluate the Effect of the Exploratory Shaft on Repository Performance at Yucca Mountain	1.2.4.2.3	Skousen	1	WMPO/SNL	R036 (B)	27 Feb 87	27 Jul 87 (F)
Prepare "Technical Basis for Performance Goals, Design Requirements and Material Recommendation for the NNWSI Project Repository Sealing Program Report"	1.2.4.2.3	Skousen	1	WMPO/SNL	P404 (B)	31 Mar 87	30 Jun 87 (F)
Final Report on Spent Fuel Rod Consolidation	1.2.4.4	Skousen	1	WMPO/SNL	R267 (B)	31 Dec 86	14 Aug 87 (F)
Submit Retrievability Compliance Strategy Plan to OGR for Review and Comment	1.2.4.4	Skousen	1	WMPO/SNL	R848 (P)	31 Mar 87	31 Dec 87 (F)
Preliminary Study of the Effects of Uncertain Geologic Data on Design of the Underground Facility	1.2.4.6.2	Skousen	1	WMPO/SNL	N457 (B)	27 Feb 87	29 May 87 (F)

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NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS  
MAJOR SYSTEMS ACQUISITION (MSA) MILESTONES  
01 Oct 1986 to 30 Sep 1987

(B)=Baselined  
(P)=Planned

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINE DATE	FORECAST or ACTUAL	(f) (A)
Submit Draft Seismic/ tectonic Summary Position Paper to WMPO/NV	1.2.5.2.1	Szymanski	1	WMPO/SAIC	R583 (B)	15 Jun 87	30 Jun 87	(F)
Submit Draft Preliminary Plan for Scheduling, Management, and Preparation of Position Papers to WMPO/NV	1.2.5.2.1	Szymanski	1	WMPO/SAIC	R579 (B)	31 Aug 87	30 Sep 87	(F)
Draft Site Characterization Plan (SCP)	1.2.5.2.2	Clanton	1	WMPO/SAIC	M521 (B)	16 Jan 87	14 Jan 87	(A)
Site Characterization Plan (SCP)	1.2.5.2.2	Clanton	1	WMPO/SAIC	M522 (B)	27 Feb 87	21 Aug 87	(F)
Draft Environmental Field Study Plans Received at HQ for review.	1.2.5.3	Jankus	1	WMPO/SAIC	R798 (B)	30 Jun 87	30 Jun 87	(F)
Environmental Field Study Plans Received at HQ for Baselining	1.2.5.3	Jankus	1	WMPO/SAIC	R799 (B)	31 Aug 87	31 Aug 87	(F)
Submit Working Draft Environmental Regulatory Compliance Plan to DOE/HQ & State.	1.2.5.3.3	Jankus	1	WMPO/SAIC	R794 (B)	30 Jan 87	06 Mar 87	(A)
Environmental Regulatory Compliance Plan Issued	1.2.5.3.3	Jankus	1	WMPO/SAIC	R795 (B)	31 May 87	01 Sep 87	(F)
Submit Draft II Environmental Monitoring and Mitigation Plan (EMMP) to WMPO/NV	1.2.5.3.4	Jankus	1	WMPO/SAIC	R996 (B)	01 Dec 86	01 Dec 86	(A)
Submit Environmental Monitoring and Mitigation Plan (EMMP) to DOE/HQ	1.2.5.3.4	Jankus	1	WMPO/SAIC	P034 (B)	30 Apr 87	22 Jun 87	(F)
Complete and Sign C&C Agreement with State	1.2.5.4.1	Dixon	1	WMPO	M795 (P)	31 Mar 87	TBD	(F)
Exploratory Shaft Facility (ESF) Subsystems Design Requirements Document	1.2.6.1.1	Irby	1	WMPO/LANL	R241 (B)	30 Dec 86	23 Apr 87	(A)
Submit Prototype Test Plans to DOE/HQ for review and comment	1.2.6.1.1	Irby	1	WMPO/LANL	M105 (B)	27 Feb 87	TBD	(F)
DOE/HQ receives Final FY89 Project Validation Material	1.2.6.1.1	Irby	1	WMPO/SAIC	R841 (B)	13 Mar 87	20 Mar 87	(A)
Start Field Prototype Testing in G-Tunnel	1.2.6.1.1	Irby	1	WMPO/LANL	M282 (B)	30 Mar 87	TBD	(F)
Final ESF Title II Design Requirements Document submitted to DOE/HQ	1.2.6.1.1	Irby	1	WMPO/SAIC	M773 (B)	29 May 87	29 Jul 87	(F)
Exploratory Shaft Title I Design Summary Submitted to WMPO	1.2.6.1.1	Irby	1	WMPO/SAIC	P763 (B)	29 May 87	29 Jul 87	(F)
Complete Exploratory Shaft Readiness Review	1.2.6.1.1	Irby	1	WMPO/LANL	M243 (B)	30 Sep 87	31 Mar 88	(F)
Submit FY 87 Baseline Budget Information and Cost Plans to OGR for Information	1.2.9.1.1	Kunich	1	WMPO/SAIC	R849 (B)	30 Dec 86	22 Dec 86	(A)

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April 1987 Status Report  
 Run Date: 01 May 1987

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS  
 MAJOR SYSTEMS ACQUISITION (MSA) MILESTONES  
 01 Oct 1986 to 30 Sep 1987

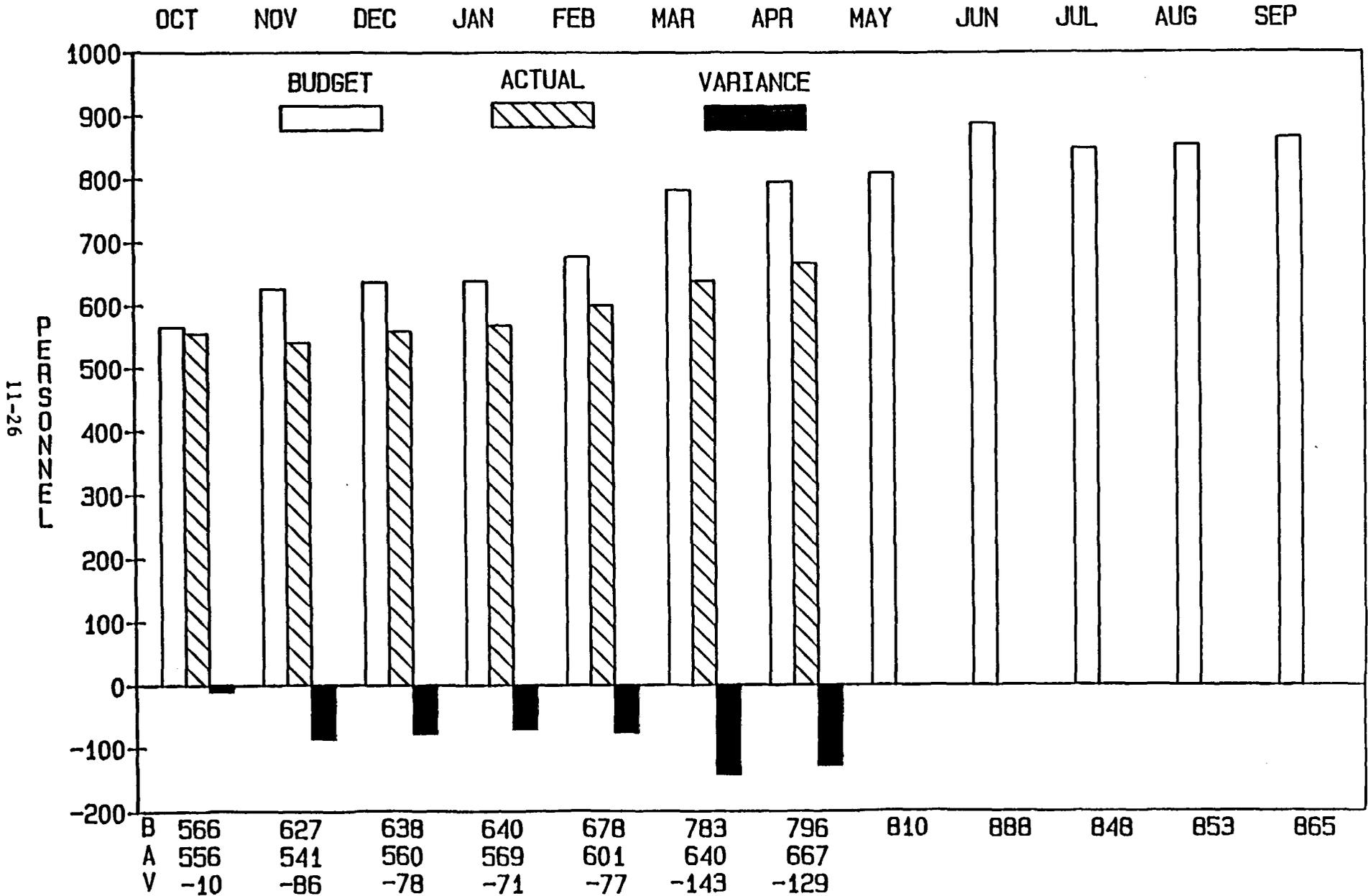
(B)=Baselined  
 (P)=Planned

MILESTONE DESCRIPTION	WBS NO.	WMPO RESP	LEVEL	RESP ORG	MILESTONE	BASELINE DATE	FORECAST or ACTUAL	(F) (A)
Final NNWSI Project Management Plan to WMPO/NV and DOE/HQ	1.2.9.1.1	Dixon	1	WMPO/SAIC	R448 (B)	30 Dec 86	30 Jun 87	(F)
Approved Revised Project Charter	1.2.9.1.1	Vieth	1	WMPO/SAIC	R850 (B)	30 Jan 87	16 Apr 87	(A)
Submit NNWSI Project Plan to WMPO/NV and DOE/HQ	1.2.9.1.1	Dixon	1	WMPO/SAIC	R810 (B)	30 Sep 87	30 Sep 87	(F)
Submit FY 89 Budget to DOE/HQ	1.2.9.1.2	Dixon	1	WMPO/SAIC	M712 (B)	13 Mar 87	14 Mar 87	(A)
Licensing Support System Document Collection Procedure to Headquarters for Approval	1.2.9.1.4	Hatch	1	WMPO/SAIC	R647 (B)	30 Apr 87	TBD	(F)
Implement Document Collection for the Licensing Support System	1.2.9.1.4	Hatch	1	WMPO/SAIC	R842 (P)	31 Jul 87	TBD	(F)
Implement Phase II of Earned Value System	1.2.9.2	Dixon	1	WMPO/SAIC	M725 (B)	30 Nov 86	04 May 87	(F)

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# NNWSI PROJECT STAFFING\*

## FISCAL YEAR 1987



\*FTEs SHOWN REFLECT INPUT FROM ALL NNWSI PROJECT PARTICIPANTS EXCEPT THE STATE OF NEVADA

PLANNED NNWSI PROJECT FIELD ACTIVITIES  
FOR JUNE

Participant	Activity	Location	Planned	
			Day	Time
LLNL	No scheduled activities			
Los Alamos	No report received			
SAIC	Meteorological monitoring	Yucca Mountain	Field site technicians will maintain stations weekly, 3 days per week.	
USGS	Seismic network monitoring	NTS and Vicinity	Continuous throughout month.	
	Collect precipitation and runoff data	NTS	Following storm events.	
	Water-level monitoring	Wells at Yucca Mountain and Vicinity	June 1-2, 15-16, and 24-30	8-4
	Monitoring of test well USW UZ-1	Test well USW UZ-1	June 8, 19, and 29	8-11 2:30-3:30
	Monitoring of neutron test holes	Yucca Mountain and vicinity	Continuous throughout month	8-4