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# NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT



## MONTHLY REPORT

NOVEMBER 1986

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UNITED STATES DEPARTMENT OF ENERGY  
NEVADA OPERATIONS OFFICE

**NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT**

**MONTHLY REPORT**

**NOVEMBER 1986**

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

**UNITED STATES DEPARTMENT OF ENERGY  
NEVADA OPERATIONS OFFICE**

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## ABSTRACT

### 1.2.1 SYSTEMS

During November 1986, Sandia National Laboratories (SNL) staff members concentrated efforts on the Nevada Nuclear Waste Storage Investigations (NNWSI) Project Systems Engineering Management Plan (SEMP). A first draft of the cost effectiveness section of the Site Characterization Plan Conceptual Design Report (SCP-CDR) was written and submitted for review by the SNL staff. The SNL data base staff assisted in compiling a list of parameter needs for the site and engineering properties data base. SNL computer graphics personnel developed a topographic mapping program, compiled a land grid map of townships and sections, and completed a preliminary modeling study of hydrologic parameters at Yucca Mountain. The SNL staff also completed a report (satisfying Milestone M180) on saturated flow modeling. SNL reports on the boundary for the engineered-barrier system and the sealing program completed peer review.

### 1.2.2 WASTE PACKAGE

Vitric tuff alteration experiments were initiated at LLNL and are progressing. A glass dissolution simulation was successfully completed using the EQ3/6 code. After terminating all remaining in-house experiments on test specimen exposure to repository-relevant environments, LLNL personnel are characterizing the specimens for evidence of corrosion or degradation. LLNL staff members completed information need text for Issue 1.4 in Chapter 8 of the SCP. The LLNL scientific investigation planning (SIP) documentation for performance assessment was approved by the Waste Management Project Office (WMPO) and the stop-work order for this activity was lifted.

### 1.2.3 SITE INVESTIGATIONS

The stop-work order issued to the U.S. Geological Survey (USGS) suspended almost all site characterization technical activities, but quality level assignments are being developed. Fenix and Scisson (F&S) personnel prepared Project drillhole histories (for publication and printing) and an accurate drillhole designation list. F&S staff presented the preliminary drawing of the Exploratory Shaft Facility (ESF) layout at the 1,020-foot level to WMPO for review. Due to the accelerated SCP schedule, SAIC staff focused their efforts on writing, editing, and reviewing the data and plans chapters of the SCP. SAIC staff completed review of the State Grant Proposal and compiled a comprehensive review package for WMPO. USGS personnel collected streamflow and precipitation data that records a November 18 flood; only minor runoff occurred in Topopah Wash and upper Fortymile Wash near Rattlesnake Ridge. The data suggest that at least 1 in. of rainfall is needed to result in runoff in the Yucca Mountain area. USGS personnel performed psychrometry on preserved drilling samples in the Test Cell-C lab. A Los Alamos quality assurance (QA) audit of the solubility determination task identified no significant problems. Los Alamos staff conducted a computerized literature search for thermodynamic data on americium. Los Alamos Milestone R309 was submitted for technical review. The Milestone R319, Report on problematic

mineral deposits in faults was completed, but will not be ready for incorporation into SCP Chapter 1. The meteorological monitoring stations are in operation, and the Final Preliminary Site Characterization Radiological Monitoring Plan was completed. The Transportation Scientific Investigation Plan was completed and submitted to T&MSS QA for transmittal to WMPO. LLNL staff completed a draft of the Fiscal Year EQ 3/6 Data Base Status Report (Milestone P331).

#### 1.2.4 REPOSITORY INVESTIGATIONS

SNL prepared Chapters 1 and 5 of the SCP-CDR for design review by the Office of Geologic Repositories and WMPO. SNL personnel tested two repaired flat-jacks in the G-Tunnel underground facility. SNL staff members incorporated the U.S. Department of Energy/Headquarters (DOE/HQ) comments into the horizontal emplacement feasibility report.

#### 1.2.5 REGULATORY AND INSTITUTIONAL INVESTIGATIONS

The schedule for NNWSI Project and the U.S. Nuclear Regulatory Commission (NRC) interactions was preempted by the accelerated SCP deadline. DOE/HQ requested accelerating the SCP preparation process with an expected April 1, 1987 delivery to the printers; therefore, PIRC revisions must be completed by the end of December 1986. The Technical Overview Committee was replaced by the Project Overview Committee (POC). The SAIC Institutional Branch submitted a revised draft of the NNWSI Project Affairs Plan for WMPO review.

#### 1.2.6 EXPLORATORY SHAFT INVESTIGATIONS

REECo Management and Integration staff worked with F&S and Holmes & Narver (H&N) on proposals to refine the surface and underground layouts. Los Alamos staff members completed and issued the first version of the data base on fluids and materials to be used in the ESF. H&N, REEC, and F&S completed work on the Phase I Construction Schedule for the ESF. Los Alamos, SAIC, and WMPO prepared a draft Project position paper on the need to change ESF design. The Los Alamos draft Integrated Data System Requirements document was approved by WMPO. The USGS response to review comments on prototype hydrologic tests was completed (first draft) and submitted for internal Project review.

#### 1.2.7 TEST FACILITIES

USGS personnel evaluated pressure measurements on vented and unventilated air. The LLNL topical report on posttest thermomechanical calculations was printed and distributed. H&N nondestructive testing personnel completed radiography tests on the flatjacks from G-Tunnel.

### 1.2.9 PROJECT MANAGEMENT

LLNL staff submitted a procurement plan to WMPO in response to an HQ request for contractor and subcontractor information. Larry R. Hayes officially became the new TPO for the USGS. The SAIC Computer Support Services Staff installed the XYPLEX communications equipment on the VAXcluster. H&N Microfilming Archival Storage Service Facility (MASSF) personnel completed microfilming properly prepared documents for records management. REECO implementing procedures for the Local Records Center and the QA Records Type List has been finalized. DOE/HQ requested a cost/benefit analysis for the NNWSI Project Information Management System. The USBR prepared the ES prototype budget. WMPO approved the REECO Project Quality Assurance Program Plan (QAPP). The F&S Director of QA approved revisions to sixteen procedures of the Tulsa ESF Design Effort. The Los Alamos report for the Lawrence Berkeley Laboratory (LBL) audit was completed, reviewed, and sent to LBL. The stop-work order was lifted for all ongoing Los Alamos NNWSI Project activities. The USGS QA manual is printed. The LLNL performance assessment SIP documentation and QALAs were approved. WMPO comments were incorporated into Revision 3 of the T&MSS QAPP. Revision 1 of the SCP Management Plan was approved by WMPO. The SAIC QAPP and implementing procedures were approved.

NOVEMBER 1986

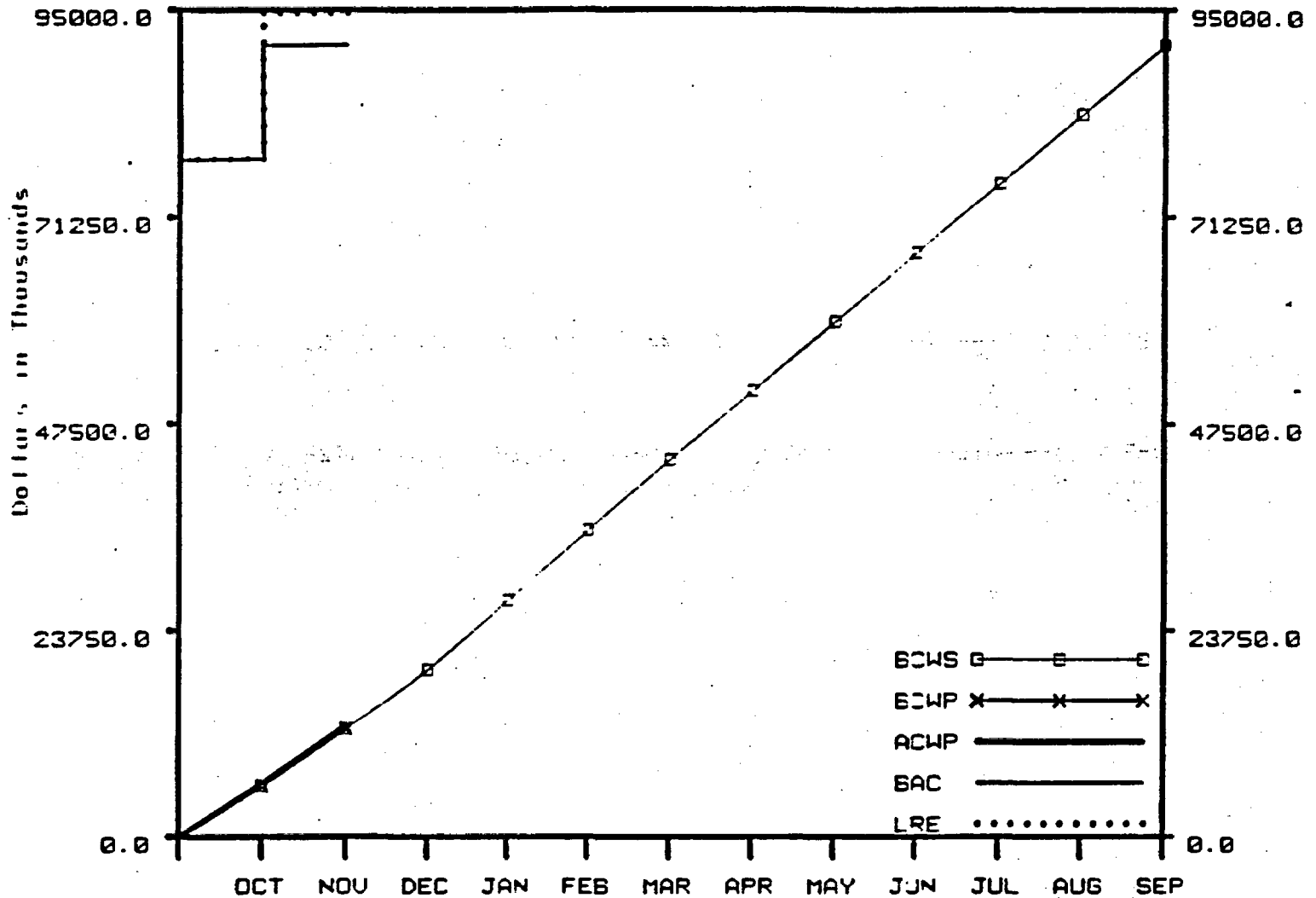
### Funding Overview

The month-end estimated costs were \$6,687,090 against a plan of \$6,572,837 resulting in a cost overrun of \$114,253.

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	\$ 446	\$ 391	\$ 55	12
WBS 1.2.2	Waste Package	488	376	112	23
WBS 1.2.3	Site	1,603	1,675	(72)	(5)
WBS 1.2.4	Repository Investigations	554	591	(37)	(7)
WBS 1.2.5	Regulatory and Institutional Investigations	544	553	(9)	(2)
WBS 1.2.6	Exploratory Shaft Investigations	1,034	888	146	14
WBS 1.2.7	Test Facilities	25	28	(3)	(12)
WBS 1.2.8	Land Acquisition	-0-	-0-	-0-	-0-
WBS 1.2.9	Project Management	1,605	1,533	72	5
WBS 1.2.10	Financial and Technical Assistance	274	652	(378)	(138)
WBS 1.2	NNWSI Project	<u>\$ 6,573</u>	<u>\$6,687</u>	<u>\$ (114)</u>	<u>(2)</u>

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR NOV 1986 WBS: 1.2



## NNWSI - TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	6572.8	12418.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	6572.8	12418.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	6687.1	12770.2
D. BUDGET AT COMPLETION (BAC)		90941.0
E. LATEST REVISED ESTIMATE (LRE)		94584.0

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-351.8	-2.83
H. AT COMPLETION VARIANCE (D-E)	-3643.0	-4.01

Remarks:



# NNWSI PROJECT BUDGET BASELINE

NOVEMBER 1986

<u>CONTRACTORS</u>	<u>(\$000) ORIGINAL FY 87 FUNDING</u>	<u>(\$000) CURRENT BASELINED BUDGET</u>	<u>(\$000) CHANGE</u>
SNL	\$ 16,148	\$ 20,131	3,983
LLNL	9,311	11,440	2,129
Los Alamos	10,003	10,810	807
USGS	13,333	15,739	2,406
SAIC	12,138	14,272	2,134
REECo	3,889	4,678	789
H&N	2,182	2,304	122
F&S	5,472	5,871	399
WSI	230	230	-0-
PAN AM	5	52	47
State grant	3,765	3,765	-0-
DRI	100	100	-0-
EG&G	60	60	-0-
LBL	267	267	-0-
OSTI/TC	-0-	5	5
HEDL	-0-	117	117
CSC	-0-	80	80
NTS allocation	980	1,020	40
Unidistributed Budget	1,398	1,398	-0-
 SUBTOTAL	 \$ 79,281	 \$ 92,339	 13,058
CAPITAL EQUIPMENT	5,081	2,727	(2,354)
TOTAL	84,362	95,066	10,704

U.S. DEPARTMENT OF ENERGY

**DOE  
ROW  
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OGR**

**NEEDS  
INVESTIGATIONS  
PROJECT**

**YUCCA MOUNTAIN**

## **PROJECT STATUS**

## 1.2.1 SYSTEMS

### OBJECTIVE

The objective of this task is to apply the concept of systems to the development and design of the repository, both the surface and subsurface facilities, and to the evaluation of the effectiveness of the geologic and hydrologic environment in isolating radionuclides.

### ACTIVITIES

#### WBS 1.2.1.1 SYSTEMS MANAGEMENT AND INTEGRATION

During November 1986 Sandia National Laboratories (SNL) staff members concentrated on preparation of the NNWSI Project Systems Engineering Management Plan (SEMP), which relates systems engineering and technical data base management to all other technical activities in the Project.

#### WBS 1.2.1.2 SYSTEMS ENGINEERING

##### WBS 1.2.1.2.3 Cost Schedule

A first draft of the Site Characterization Plan (SCP) Conceptual Design Report (SCP-CDR) subsection 8.2.12, Cost Effectiveness, written by SNL staff members, was submitted for review.

SNL personnel prepared four total system life cycle cost (TSLCC) estimates and transmitted them to the Project Office. These TSLCCs will be used in the fuel rod consolidation study.

##### WBS 1.2.1.2.4 Systems Engineering Integration

The Systems Engineering Integration Group (SEIG) met at Los Alamos on November 19-21. Major topics of discussion included: (1) identification of implementing procedures required by the SEMP, and (2) revision of the technical baseline change control process to reflect responsibilities assigned to the systems engineering and configuration management tasks.

LLNL staff members completed a review of the draft Configuration Management Plan (CMP) and written comments were forwarded to WMPO and SAIC on November 3. A revision of selected sections is in progress.

During November, the SAIC Systems Engineering staff completed FY 87 task plans and budget input for Systems Management and Integration, and T&MSS Systems Engineering support. They also continued review of the preliminary draft versions of the SEMP in support of SNL and the WMPO. The SEMP is currently subject to an internal review at SNL and is scheduled to be submitted to WMPO for review and comment on December 15, 1986.

#### WBS 1.2.1.2.5 Configuration Management and Change Control

The Configuration Management Plan, Milestone R047, was rescheduled for delivery to the Project Manager by December 15, 1986. This plan is under continuing review by WMPO and NNWSI Project participants, including those developing the Project SEMP.

#### WBS 1.2.1.3 TECHNICAL DATA BASE MANAGEMENT

##### WBS 1.2.1.3.1 Tuff Data Base

SNL data base staff assisted in the compilation of a comprehensive list of parameter needs for the NNWSI Project. The parameter listing was prepared and organized from information obtained from Chapter 8 of the draft SCP. Redundant parameters are now being eliminated. The result of this effort will be the first complete listing of the (minimum) requirements for data storage for the site and engineering properties data base (SEPDB).

##### WBS 1.2.1.3.2 Computer Graphics

SNL staff members completed a preliminary modeling study of hydrologic parameters at Yucca Mountain.

SNL personnel have developed a program for creating topographic slope maps for the Interactive Graphics Information System (IGIS). The software will be used initially to identify areas of high, intermediate, and gentle topographic slopes at Yucca Mountain.

Members of the SNL staff compiled a land grid map showing surveyed and protracted townships and sections in the Yucca Mountain area from official Bureau of Land Management (BLM) records. Boundaries of the Nevada Test Site (NTS), Nellis Air Force Range, and BLM lands have been determined from the original land-withdrawal orders.

##### WBS 1.2.1.3.4 Data Base Management Systems Computer Support

Work is continuing on extending the technical data base logical design to accommodate a complete list of scientific and engineering properties and parameters. Approximately 775 individual data items have been identified from Chapter 8 of the SCP as inputs required to satisfy specific information needs. These parameters are currently being characterized and analyzed to form a basis for data base planning activities.

#### WBS 1.2.1.4 TOTAL SYSTEMS PERFORMANCE ASSESSMENT

##### WBS 1.2.1.4.1 Flow and Radionuclide Transport

SNL staff members revised and submitted SCP Section 8.3.5.12, Ground-water Travel Time Performance.

A contractor report from Lawrence Berkeley Laboratory (LBL) entitled "Hydrologic Mechanisms Governing Partially Saturated Fluid Flow in Fractured Welded Units and Porous Nonwelded Units at Yucca Mountain" (SAND85-71145) is being printed.

SNL personnel completed a report on the saturated flow modeling at Yucca Mountain. The report, which will satisfy Milestone M180, describes contours of heads and concentrations based on several interpretations of inverse calculations.

#### WBS 1.2.1.4.2 Radionuclide Source Term

Members of the SNL staff modified the SCP writeup on the disturbed zone based on peer review comments. Recent information from the latest U.S. Nuclear Regulatory Commission (NRC) generic technical position paper was also included.

The SNL report on the boundary for the engineered-barrier system completed peer review and has started through SNL management review.

Peer review of the SNL report entitled "Performance Goals, Design Requirements and Material Recommendations for the NNWSI Repository Sealing Program" was completed.

#### WBS 1.2.1.4.4 Radionuclide Releases from Total System

SNL staff participated in the 5th HYDROCOIN Workshop and Coordinating Group meeting in the Netherlands on November 10-14, 1986. Preliminary results of sensitivity analyses of one-dimensional isothermal flow through layered, unsaturated tuff were presented. Two other HYDROCOIN teams (the NRC and the UK Atomic Energy Research Establishment (AERE) at Harwell) are also working on the unsaturated zone problems proposed by the NNWSI Project. AERE is having good success with the flow code NAMMU, while the NRC is having considerable difficulty with the code FEMWATER.

The SNL paper entitled "A Continuum Model for Water Movement in a Fractured Rock Mass" has completed review by WMPO and is currently in line review at SNL.

Two SNL abstracts, "Radionuclide Transport in an Unsaturated, Fractured Medium," and "Measuring and Modeling Water Imbibition into Tuff," are being prepared for the American Geophysical Union (AGU) Fall Meeting session "Symposium on Flow and Transport Through Unsaturated, Fractured Rock," December 8-12, 1986, in San Francisco, CA.

#### PLANNED WORK

Members of the SNL staff will start the documentation of NNWSI Project Systems Studies Register (Milestone P126) during January 1987. The System Study Register task has been delayed because of commitments to the NNWSI Project SEMP.

An NNWSI Project cost concurrence meeting is scheduled for December 11, 1986, at DOE/HQ to address several design scenarios concerning high-burnup fuel currently being studied by Weston.

#### MILESTONE PROGRESS

SNL Milestone M261, the Yucca Mountain site-specific mined geologic disposal system description, is delayed.

SNL Milestone R079, "Technique for Subterranean Surface Modeling for the NNWSI Project Repository: Software Documentation," will be delayed.

SNL Milestone R091, "Initial Three-dimensional Reference Stratigraphic Model for the Area Within the Accessible Environment of the NNWSI Project," and R790, "Definition and Pictorial Representation of Critical Boundaries," are on schedule.

SNL Milestone R080, "Status Report of NNWSI Project Data Base Capabilities," is delayed and the new estimated date of completion is December 24, 1986.

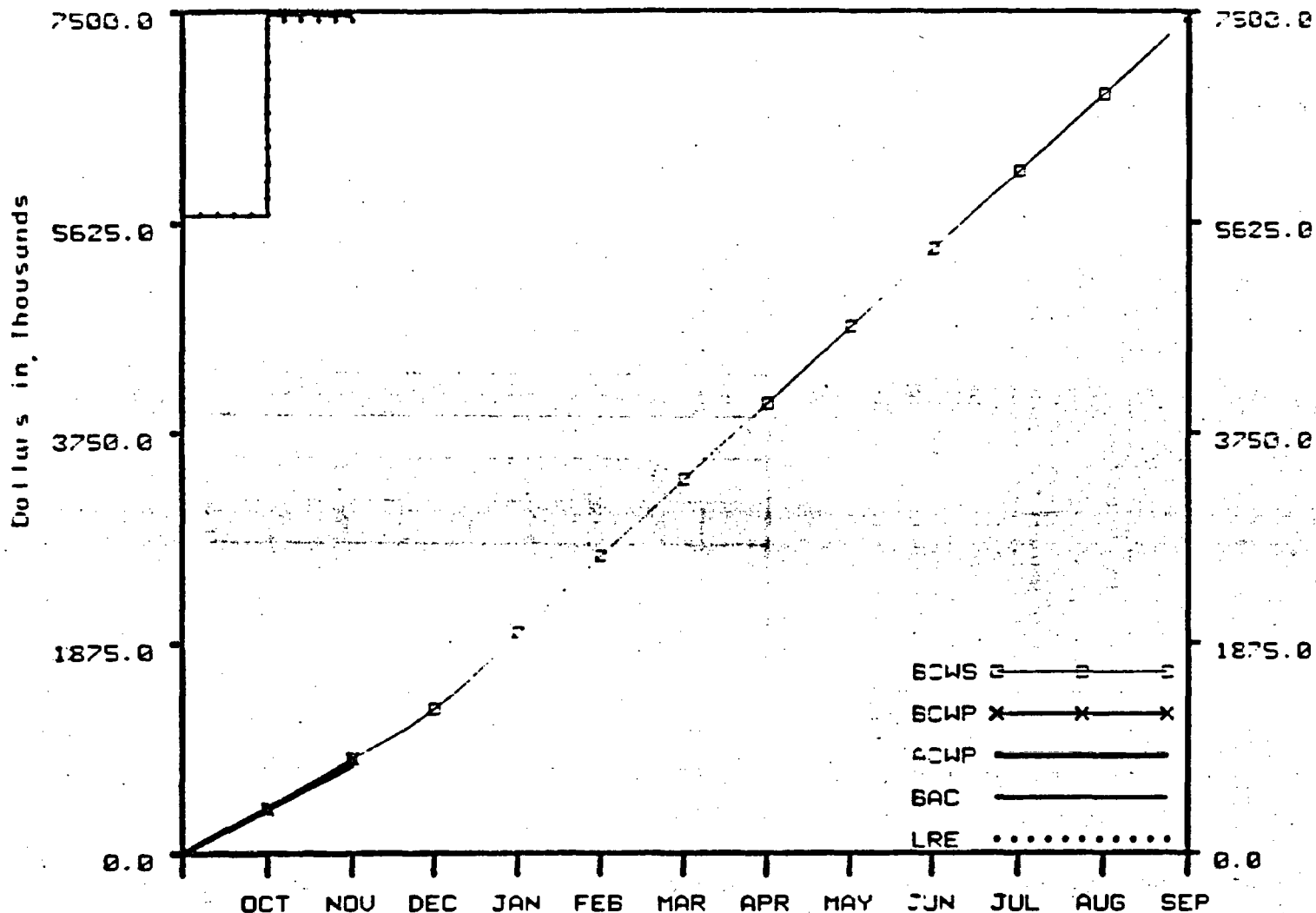
A report for SNL Milestone N117, "Updated Concepts of Flow in Fractured Unsaturated Tuff," is being printed.

A draft of the technical portions of volume 1 of the Total System Performance-Assessment Code (TOSPAC), in support of Milestone M102, should be available for peer review by December 31, 1986.

# NNWSI PROJECT

## COST PERFORMANCE GRAPH FOR NOV 1986

WBS: 1.2.1



### SYSTEMS

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	446.2	840.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	446.2	840.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	390.8	783.0
D. BUDGET AT COMPLETION (BAC)		7457.0
E. LATEST REVISED ESTIMATE (LRE)		7419.7

### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	57.3	6.82
H. AT COMPLETION VARIANCE (D-E)	37.3	0.50

Remarks:

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

For: NOV 1987

Date: December 17, 1986

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1211 Systems Management and Integration	22.000	22.000	11.000	.000	11.000
1212 Systems Engineering	340.776	340.776	306.032	.000	34.744
1213 Technical Data Base Management	189.600	189.600	145.000	.000	44.600
1214 Total Systems Performance Assessment	288.000	288.001	321.000	.001	-32.999
121 SYSTEMS	840.376	840.378	783.032	.002	57.346

MILESTONE	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 NNWSI Project						△						
R092	WMPO/ SNL	1.2.1.3	WMPO Submits Hard Copy (1987 Annual) Version of the Reference Information Base to OGR								△				

△ 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 November, members of the SAIC Engineering Staff completed FY 87 task plans and budget input for the waste package management and integration support; supported WMPO concerning the waste package regulatory compliance strategy; and received final response from DOE/HQ on the revised definitions for the anticipated and unanticipated occurrences, the engineered barrier system (EBS), and substantially complete containment.

#### WBS 1.2.2.2 PACKAGE ENVIRONMENT

The vitric tuff alteration experiments (DB29 & DB30) which support this activity include a relatively long-term run (6 months) at 150°C and a short-term experiment at high temperature. Both of these experiments were started early in November and are progressing normally. Fluid samples have been collected covering this first month of reaction and have been submitted for analysis.

LLNL staff prepared probe mounts of clinoptilolite crystals and carbon-coated them prior to electron microprobe analyses. If acceptably pure, these will become standard minerals for thermodynamic property determinations. The microprobe analyses should be completed early in December.

#### WBS 1.2.2.3 WASTE FORM AND MATERIALS TESTING

##### WBS 1.2.2.3.1 Waste Form Testing

The effort at LLNL to use EQ3/6 in glass modeling continued with successful completion of a glass dissolution simulation using the methods developed in Berlin.

##### WBS 1.2.2.3.2 Metals Barriers Testing

LLNL personnel terminated all remaining in-house experimental activity directed toward exposure of test specimens to various repository-relevant environments. The test specimens are now being characterized for evidence of corrosion or other degradation. A series of reports on results from these experimental activities is in preparation.

Staff members at LLNL completed information needs for Issue 1.4 in Chapter 8 of the SCP. Review comments for the metal barrier part of Chapter 7 were received and responses prepared for these comments.

#### WBS 1.2.2.3.3 Other Materials

No ongoing work for the LLNL subtask to characterize other materials was completed due to the stop-work order.

#### WBS 1.2.2.3.4 Integrated Testing

LLNL personnel used a purified solution of AM(III) for preparation of crystalline americium hydroxide last month. This material will be used in solubility and speciation determinations.

A schoepite sample has been prepared, purified, and x-ray powder patterns obtained by staff members at LLNL. The patterns were quite good and correspond to those reported for pure schoepite. Samples of this material will be sent to Argonne in December for calorimetry work.

#### WBS 1.2.2.4 DESIGN, FABRICATE, AND PROTOTYPE TESTING

The scientific investigation planning (SIP) documentation was prepared by LLNL staff and is under internal review. Comments on Sections 7.2 and 7.3 of the Site Characterization Plan (SCP) have been received and are being addressed. The draft of Chapter 8 is under preparation.

#### WBS 1.2.2.5 PERFORMANCE ASSESSMENT

The LLNL SIP documentation was approved by WMPO and the stop-work order was lifted for the performance assessment activity on November 3, 1986.

#### PLANNED WORK

LLNL staff members will finalize the SIP for the design, fabricate, and prototype testing task and present it to WMPO and SAIC for review. Revisions will be incorporated as needed.

#### PROBLEM AREAS

The simultaneous requirements of writing the SCP, the waste package strategy document, and the SIP documentation exceed the available time of the LLNL staff in the integrated testing task.

#### MILESTONE PROGRESS

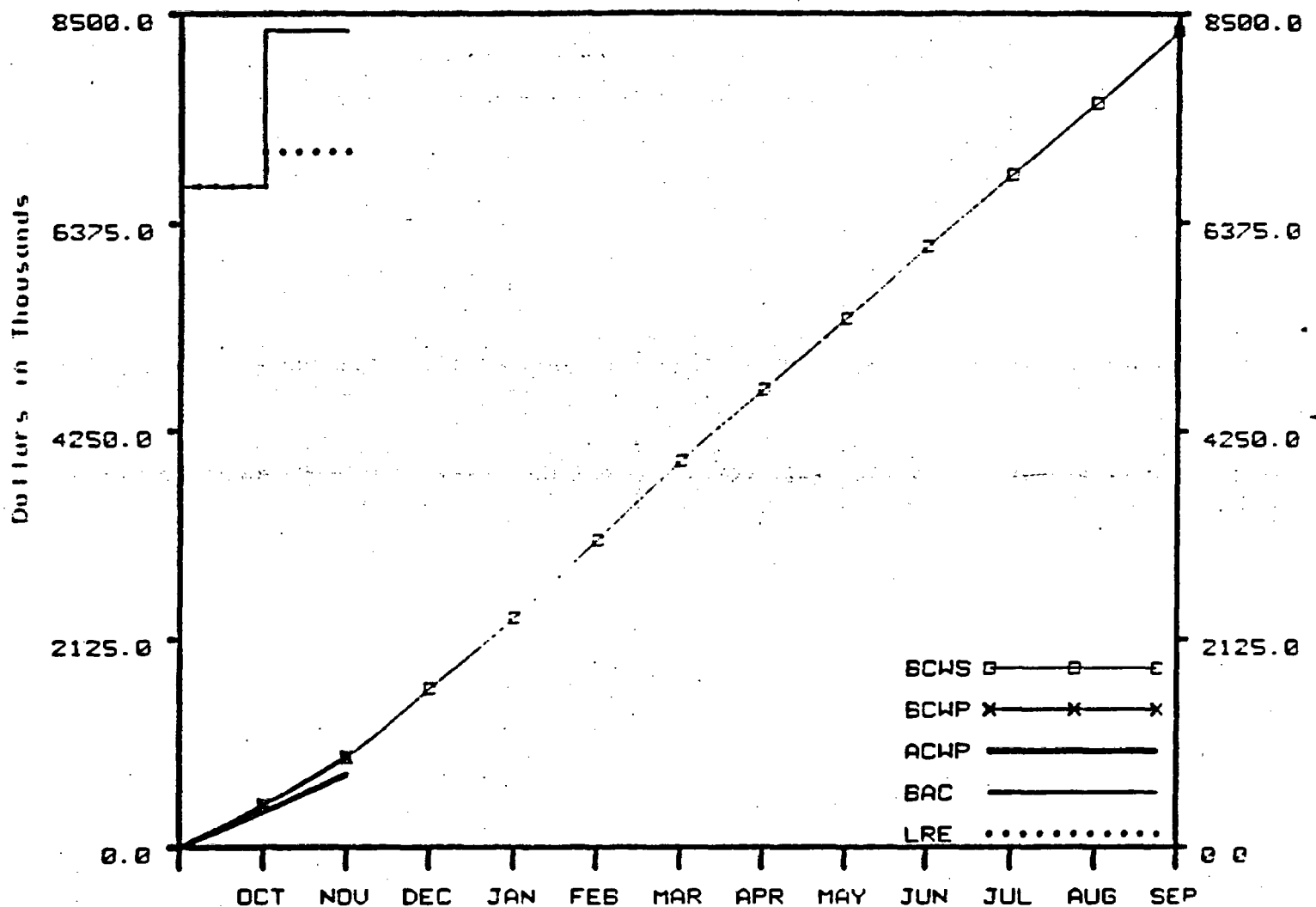
LLNL Milestone M015, "A Report on the Hydrothermal Experiment Using Topopah Spring Vitrophyre and Vitric Tuff," was submitted for internal review.

The new completion date for LLNL Milestone W224, "A report On Actinide Distribution in Rock Reaction Vessels," is June 1987. A new LLNL milestone, "A Report on the Actinide Distribution in Tuff Disks That Have Been Part of Glass Waste Form Testing," will be completed first. Estimated delivery date for the new milestone is December 1986. All of the data is in hand; however, the SCP schedule and the waste package strategy document work precluded earlier preparation of the report.

LLNL milestone progress on performance assessment has been delayed by diversion of effort to the SCP and the Waste Package Post-Compliance Strategy document.

Milestones for the metal barrier testing task at LLNL are being reevaluated as part of the input for the Site Characterization Plan (SCP) Chapter 8 information needs and as part of the subject matter for the scientific investigation planning documents. Drafts of both documents are due for internal review on November 30, 1986. The actual schedule for milestones for the metal barrier subtask will depend on funding levels for FY 87 and beyond.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR NOV 1986 WBS: 1.2.2



## WASTE PACKAGE

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	488.0	915.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	488.0	915.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	376.1	737.0
D. BUDGET AT COMPLETION (BAC)		8323.0
E. LATEST REVISED ESTIMATE (LRE)		7097.7

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	178.0	19.45
H. AT COMPLETION VARIANCE (D-E)	1225.3	14.72

Remarks:

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

For: NOV 1987

Date: December 17, 1986

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1221 Management and Integration	86.982	86.982	65.006	-.000	21.976
1222 Package Environment	180.000	180.000	158.100	-.000	21.900
1223 Waste Form & Materials Testing	405.000	405.001	347.900	.001	57.101
1224 Design, Fabricate, and Prototype Testing	85.000	85.000	73.000	-.000	12.000
1225 Performance Assessment	158.000	158.000	93.000	.000	65.000
122 WASTE PACKAGE	914.982	914.983	737.006	.001	177.978

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/ER 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 the U.S. Geological Survey (USGS) in March 1986 remained in effect through November and almost all site characterization technical activities continued to be suspended. Most Project personnel continued work on preparation of scientific investigation planning documents with their corresponding quality assurance level assignment sheets (QALAs), a necessary step for resumption of work.

Fenix and Scisson (F&S) personnel prepared NNWSI Project drillhole histories for publication and sent the first series of the publication to the printer.

Staff members at F&S compiled and submitted to WMPO an accurate NNWSI Project drillhole designation list that will be used to correct the Holmes & Narver (H&N) data base.

F&S staff presented the preliminary drawing of the ESF 1,020-foot level layout to WMPO for review.

Many of the regular activities at SAIC were curtailed or postponed during the month of November due to the demands of the accelerated schedule to produce the Site Characterization Plan (SCP). Staff members were involved in writing portions of the data and plans chapters, reviewing and editing material for the PIRCs, and organizing and participating in POC reviews. This involvement will continue through the month of December.

SAIC staff members completed a thorough review of the State Grant Proposal, collating the total collection of review materials in a comprehensive package for the WMPO. The staff also prepared responses to several questions on site characterization posed by the general accounting office in preparation for its audit of site characterization activities.

Planning for the Sample Management Facility (SMF) continued at a reduced level this month. The action memorandum and support materials requested by the WMPO were completed except for the portion regarding construction costs for converting warehouses #1 and #2 in Area 25 at the NTS. NTS and REECO personnel met to discuss the design needs of the SMF, and REECO indicated that the cost estimates would be completed by December 15. The cost estimates are the last element needed to complete the action memorandum.

SAIC personnel continued development of the technical and QA procedures for sample management. The "Activity Work Plan for NNWSI Core and Sample Curation" was completed in draft form, as were procedure No. 4, "Procedures for collection, labeling, and handling of NNWSI drill site samples," and Procedure No. 5, "Procedures for field logging and documentation of NNWSI core."

#### **WBS 1.2.3.2 GEOLOGY**

##### **WBS 1.2.3.2.1 Geologic Investigations**

###### **WBS 1.2.3.2.1.1 Site Geology**

SNL staff members completed the draft field experiment procedure and it began internal review along with recently completed technical procedures for surface geologic mapping, trench mapping, sample collection and control, and geologic age dating. The study plan for these activities has been revised and is beginning a similar informal internal review prior to submission in the formal review process with WMPO and the NRC.

##### **WBS 1.2.3.2.3 Site Stability**

###### **WBS 1.2.3.2.3.1 Tectonics and Volcanism**

Los Alamos staff members completed a rough draft of the preclosure volcanic hazards report. A review of recent silicic volcanism (less than 1 million years) in the western Great Basin indicates that the most likely eruptive event during the preclosure period would be the eruption of domes, and associated tephra sheets with a combined volume of less than 1 km<sup>3</sup>. Eruptions of this type would pose only a minimal hazard during the preclosure period because of the small volume of pyroclastic material erupted and the distance of the repository from the vent areas.

###### **WBS 1.2.3.2.3.3 Seismicity and Strain**

The seismic network for recording natural seismic events in southern Nevada continued in operation during November. No other technical activities were reported.

### **WBS 1.2.3.3 HYDROLOGY**

#### **WBS 1.2.3.3.1 Streamflow**

USGS personnel collected streamflow and precipitation data that record the flood of November 18, 1986, in the Las Vegas valley. They also visited the streamflow network at the Nevada Test Site (NTS) on November 20 and found only minor runoff had occurred in Topopah Wash and in upper Fortymile Wash near Rattlesnake Ridge. Rainfall at the NTS on November 18 was roughly 0.8 inches during about 8-10 hours. Data suggest that rainfall near, or in excess, of 1 inch is needed to result in runoff in the Yucca Mountain area. This conclusion verifies earlier experiences of late January 1986, when similar amounts of rain (0.5-0.9 in.) also failed to result in runoff.

#### **WBS 1.2.3.3.2 Ground-water Flow Analysis**

USGS staff completed the first draft of the scientific investigation planning (SIP) documentation, "Hydraulic and conservative-tracer tests in fractured rock." This documentation describes well tests that will be done at Yucca Mountain and interpretation of test results to estimate aquifer properties. To the extent possible, test results will be used to estimate aquifer properties. The document will be submitted for technical review during December after typing and editorial review.

#### **WBS 1.2.3.3.4 Unsaturated Zone Hydrology**

USGS staff members continued the monitoring of shallow neutron access holes in the Yucca Mountain area for soil-moisture and infiltration data through November. USGS personnel spent several weeks performing psychrometry on preserved drilling samples in the Test Cell-C lab.

### **WBS 1.2.3.4 GEOCHEMISTRY**

#### **WBS 1.2.3.4.1.2 Natural Isotope Chemistry**

A Los Alamos report on the use of chlorine-36 measurements to trace infiltration at Yucca Mountain is being prepared for publication. A representative from Los Alamos traveled to Tucson on November 19 to discuss some of the data that will be included in the report with Hydro Geo Chem personnel. Planning began for a field trip to Yucca Mountain as part of additional work to characterize infiltration through chloride and chlorine isotope measurements. The field trip is expected to require about two weeks of effort by two workers from Hydro Geo Chem and one worker from Los Alamos. This field work will be undertaken when the current land use restrictions at Yucca Mountain are lifted.

#### **WBS 1.2.3.4.1.3 Hydrothermal Geochemistry**

A representative from Los Alamos attended the Geological Society of America Annual Meeting this month and presented a paper on the thermodynamics of ordering in albite. Presentation of the paper resulted in finding additional data that apply to the problem and making contact with investigators who will be measuring the heat capacity of high albite in the near future.



#### WBS 1.2.3.4.1.4 Solubility Determination

A Los Alamos quality assurance audit of the solubility determination task contracted to Lawrence Berkeley Laboratory was conducted on October 28 and 29, 1986, by Los Alamos Technical Associates, Inc. The formal audit report (LANL-NNWSI-86-01) was issued on November 17, 1986. No significant quality assurance problem areas were identified and no response to the audit report was required.

Los Alamos staff members conducted a computerized literature search for thermodynamic data for americium. The search was done to ensure that all relevant work concerning aqueous speciation and solids of americium has been reviewed for the EQ3/6 data base. The search accessed Chemical Abstracts, Energy Abstracts, and the National Technical Information Center files. Copies of the search results were sent to the Nuclear Energy Agency, OECD.

#### WBS 1.2.3.4.1.5 Sorption and Precipitation

Los Alamos Milestone R309 was submitted for internal technical review and Milestone M316 is being revised in accordance with the review of the manuscript.

Work was completed on two Los Alamos papers. The genetics group input to the "fluids" paper was sent to Las Vegas, and a final revision of "Biodegradation of Drilling Fluids: Effects on Water Chemistry and Actinide Sorption" was submitted to the Los Alamos Program Office for policy review.

#### WBS 1.2.3.4.2 Mineralogy and Petrology

Los Alamos staff made additions and corrections to Section 1.2.2.2.10 (Post-Diagenetic Lithologic Features) of the NNWSI Project SCP. This section reflects the work done to date on the calcite plus silica deposits encountered in faults near Yucca Mountain. The Milestone R319 report, "Problematic Mineral Deposits in Faults near Yucca Mountain, Nevada, Compared with Possible Analogs," has been completed but will not be published in time to be incorporated into Chapter 1 of the SCP; this report will be incorporated into the next SCP update. Modifications were also made in the Chapter 8 activity description dedicated to studies of the calcite and silica deposits. All changes and additions to these sections are being reviewed by Science Applications International Corporation, Los Alamos National Laboratory, and the U.S. Geological Survey (USGS). In addition, the Permanent Internal Review Committee (PIRC) 4 met with mineralogy-petrology personnel at Los Alamos to resolve technical and editorial review comments on Information Need 1.14.2 (mineralogy, petrology, and rock chemistry within the potential emplacement horizon and along potential flow paths) for Chapter 8 of the SCP.

Los Alamos personnel prepared a compilation of stratigraphic information from x-ray diffraction data for SNL following the requested format for input to the NNWSI Project stratigraphic data summary for the technical data base. This compilation will be given to SNL following review and approval at Los Alamos. Data were compiled for core samples from holes J-13, UE-25A#1, UE-25B#1, USW G-1, USW G-2, USW GU-3, USW G-3, USW G-4, and USW H-6 and for cuttings from holes USW H-3, USW H-4, USW WT-1, and USW WT-2. Mineralogic

subdivisions were made for correlation with the stratigraphic subdivisions used by Ortiz et al. (SNL report SAND84-1076, October 1985).

Los Alamos Milestone R345, "Minerals in Fractures of the Saturated Zone from Drill Core USW G-4, Yucca Mountain, Nye County, Nevada." was also revised following Los Alamos technical review. This report was submitted to the WMPO for review during the month.

Completed notebooks from mineralogy-petrology studies were collected and copied by Los Alamos staff members for records management. Organizational readjustments were made in preparation for the subdivision of mineralogy-petrology studies into several WBS elements organized along task lines.

The Los Alamos report, "Chemistry of Diagenetically Altered Tuffs at a Potential Nuclear Waste Repository, Yucca Mountain, Nye County, Nevada," was received from the publisher and distributed during the month. This report may be obtained or referenced as Los Alamos report LA-10802-MS.

#### **WBS 1.2.3.5 DRILLING**

##### **WBS 1.2.3.5.2 Drilling, Construction, Engineering**

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

##### **WBS 1.2.3.5.3 Field Geology and Hydrology**

F&S personnel assisted the USGS in preparing SIP documentation for the matrix property study.

#### **WBS 1.2.3.6 ENVIRONMENT**

The meteorological monitoring stations are in operation, and there are no significant problems to report. SAIC staff members continued work this month on the preparation of the First Quarterly Data Report for submittal to WMPO. All outstanding QA nonconformance reports (NCRs) have been dispositioned.

At SAIC work continued on the Radiological Monitoring Plan (RMP) and the Pre-Site Characterization Radiological Monitoring Plan (PSCRMP). A draft of the PSCRMP was forwarded to WMPO for review. Several review sessions were held with WMPO representatives.

##### **WBS 1.2.3.6.2 Transportation**

The Transportation Scientific Investigation Plan was completed and submitted to T&MSS QA for transmittal to WMPO. Work packages (currently unfunded) were added to select the rail access route and perform transportation risk analysis.

SAIC staff members prepared response to the Office of Storage and Transportation Systems (OSTS) comments on the draft routing study and sent it to WMPO. Due to uncertainty in the selection of routes for use during repository

operations, references to specific routes will be deleted from the draft report. Clarification of comments related to OSTs plans for route selection decisions was requested.

The final Preliminary Site Characterization Radiological Monitoring Plan was completed by SAIC staff and approved by WMPO. The monitoring program will characterize radon and radioactive particulate releases from the site prior to the start of significant site characterization activities.

Staff members at SAIC completed a revised draft of "Population Densities Along Nevada Transportation Routes" (DOE/NV/10270-12, SAIC-86/8005) and sent it to DOE/NV for policy review prior to publication. The report documents methods and results of analyses to estimate route-specific population densities in Nevada.

#### WBS 1.2.3.8 PERFORMANCE ASSESSMENT GEOCHEMICAL MODELING CODE EQ3/6

A LLNL draft of the fiscal year EQ3/6 Data Base Status Report (Milestone P331) has been completed and is in internal review.

#### PLANNED WORK

Los Alamos Staff members will continue work on summarizing and analyzing the literature on the kinetics of silica polymorph evolution.

Los Alamos personnel will continue solubility studies of plutonium and americium in J-13 well water. These should be completed in the next reporting period. Work on the preparation of the study plan for the solubility determination task will be initiated.

Los Alamos Milestone R314 will be completed in draft form in December.

The COVE2A meeting was postponed until after the first of the year.

#### PROBLEM AREAS

Without access to Well J-13, Los Alamos will soon be out of J-13 water, which will force stopping most of their experimental work. A QA procedure for sampling is being developed to restore access.

Because of the reduced number of Los Alamos staff assigned to the dynamic transport task and the increased administrative work, there likely will be long delays in future work in diffusion, if the appropriate design changes are to be implemented.

Los Alamos Milestone R323, smectite dehydration and stability, was delayed because the author had to devote full time to equipment problems that arose when his analytical equipment was installed in a new location. Costly loss of equipment would have resulted if this diversion of effort had not been made.

The stop-work order was lifted by WMPO for all LLNL EQ3/6 activities on October 20, 1986. Until then, progress on the technical milestones had been delayed due to the redirection of effort for the completion of required QA documents.

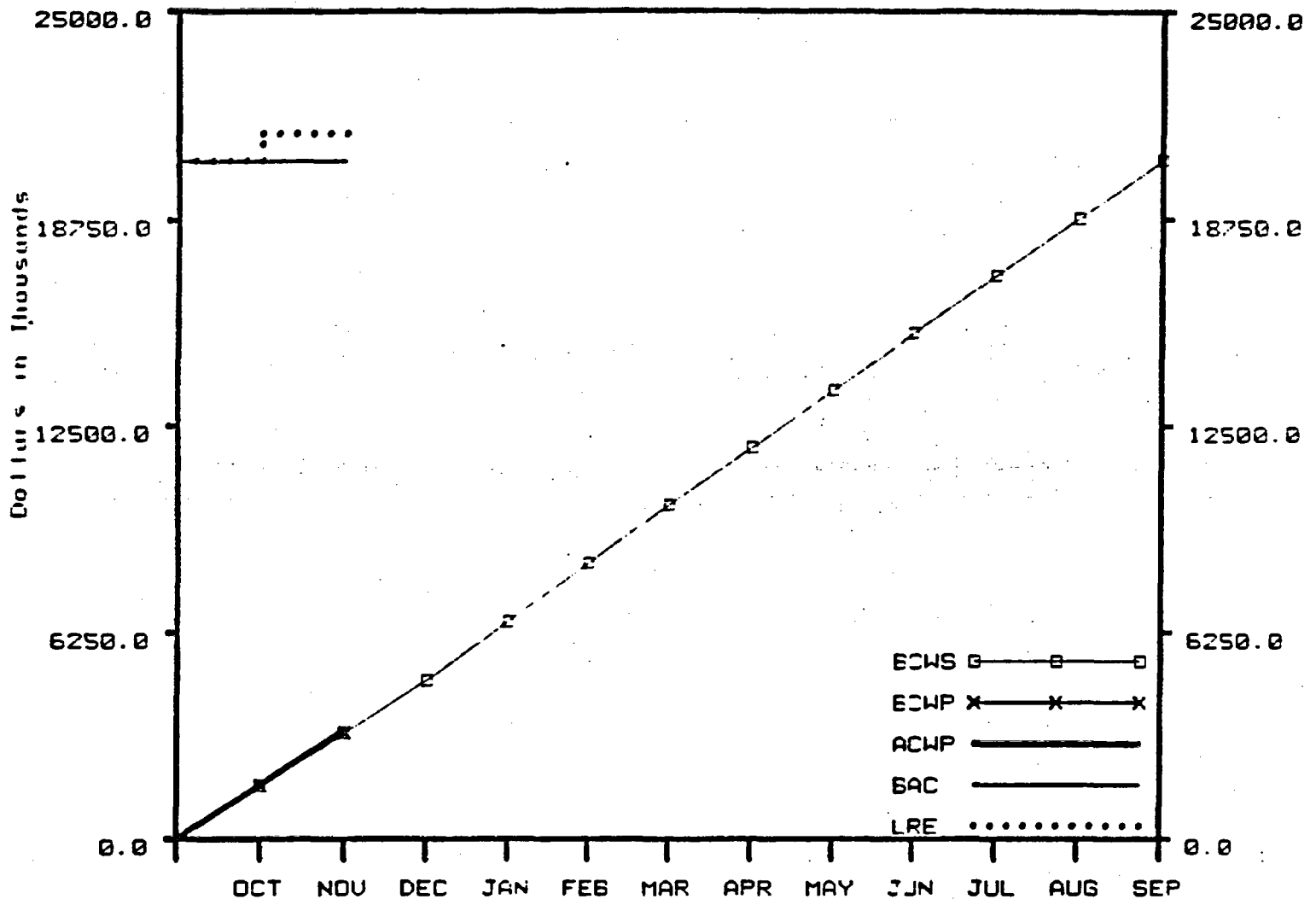
#### MILESTONE PROGRESS

LLNL milestone M343 a completed draft of the "MCRT User's Manual," is in internal review.

# NNWSI PROJECT

## COST PERFORMANCE GRAPH FOR NOV 1986

### WBS:1.2.3



#### SITE INVESTIGATIONS

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1602.7	3205.3
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1602.7	3205.3
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1675.2	3305.8
D. BUDGET AT COMPLETION (BAC)		20521.0
E. LATEST REVISED ESTIMATE (LRE)		21322.6

#### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-100.4	-3.13
H. AT COMPLETION VARIANCE (D-E)	-801.6	-3.91

Remarks:

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

For: NOV 1987

Date: December 17, 1986

WBS NUMBER AND DESCRIPTION		YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
					SCHEDULE	COST
1231	Management & Integration	672.052	672.053	652.779	.001	19.274
1232	Geology	746.000	745.998	709.400	-.002	36.598
1233	Hydrology	694.900	694.900	682.062	-.000	12.838
1234	Geochemistry	561.600	561.601	693.000	.001	-131.399
1235	Drilling	204.659	204.658	198.061	-.001	6.597
1236	Environment	121.991	121.991	150.986	-.000	-28.995
1237	Socioeconomic	76.142	76.142	89.599	-.000	-13.457
1238	Geochemical Modeling Code EQ3/6	128.000	127.999	129.900	-.001	-1.901
1239	Deferred Site Close Out	.000	.000	.000	.000	.000
123	SITE INVESTIGATIONS	3,205.344	3,205.341	3,305.787	-.003	-100.445

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											△	
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				△								
P509	WMPO/ REECo	1.2.3.5	Report: Completion of Trench Preparation at Surface Facilities Site						△						
P519	WMPO/ SAIC	1.2.3.5	Complete Drilling Shallow Unsaturated Zone										△		
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												△
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 November, members of the SAIC Engineering Staff reviewed a draft of the NNWSI Project Site Integration Management Plan, reviewed and identified numerical changes required in SCP Section 8.4.1, Surface Site Preparation Activities, and completed FY 87 task plans and budget input for the repository management and integration support task.

##### WBS 1.2.4.1.1 Management

Activities scheduled for the SNL management task during November 1986 were suspended because of the effort required to prepare SCP Chapters 6 and 8 and the SCP CDR.

##### WBS 1.2.4.1.2 Basis for Design

No work was performed by SNL staff on the Subsystems Design Requirements (SDR) pending reformatting guidance from the DOE.

The proposed NRC seismic and tectonics workshop has been postponed because of the SCP and SCP-CDR schedule.

##### WBS 1.2.4.1.3 Major Design Deliverables

Staff at SNL directed major effort toward the preparation of Chapters 1 and 5 of the SCP-CDR so that a design review by the Office of Geologic Repositories (OGR) and the WMPO could be held November 20-21, 1986. The design review was held as scheduled. Many comments made by Weston, Inc., and SAIC were discussed and noted for resolution in the near future. The minutes and action items were transmitted to the review attendees.



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

No work was performed at SNL under the Engineering Design Support: Special Studies task in November 1986; staff time was devoted to the SCP-CDR.

#### WBS 1.2.4.2 DEVELOPMENT AND TESTING

##### WBS 1.2.4.2.1 Rock Mechanics

###### WBS 1.2.4.2.1.1 Rock Mass Analysis

Work to complete the task statement memorandum to revise sections of Chapters 6 and 8 of the SCP, and to revise Section 2.3 of the SCP-CDR continued and superseded all other work in the rock mass analysis task.

###### WBS 1.2.4.2.1.2 Field Testing

SNL personnel tested two repaired flatjacks (0.5 by 0.5 m) in a slot in the G-Tunnel underground facility. A new flatjack is being fabricated in the SNL shop on the NTS.

###### WBS 1.2.4.2.1.4 Water Migration Analysis

No activities were performed by SNL personnel under water migration analysis during November 1986 because of staff involvement with the preparation of the SCP and department operating procedures.

##### WBS 1.2.4.2.2 Equipment and Instrument Development

SNL staff members have revised the horizontal emplacement feasibility report originally issued in September 1986 to incorporate review comments from DOE/HQ. DOE/HQ approval is still needed before design activities related to horizontal emplacement equipment, particularly the prototype boring machine, can proceed.

##### WBS 1.2.4.2.3 Sealing

###### WBS 1.2.4.2.3.1 Seal Performance Requirements

SNL personnel have resumed the preparation of "Analysis to Evaluate the Effect of the Exploratory Shaft on Repository Performance at Yucca Mountain" (Milestone R036, SAND85-0589). A draft outline has been prepared that addresses the scope of the performance analysis study.

###### 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" has completed first-level management review. It is being revised as a result of these reviews.

### **WBS 1.2.4.3 FACILITIES**

#### **WBS 1.2.4.3.2 Surface Facilities**

An SNL draft report prepared by Bechtel National, Inc., (BNI) on the repository options study has been reviewed and comments were sent to BNI for resolution.

The current SNL contract with BNI is being revised to incorporate specific SNL department operating procedures and quality assurance requirements.

#### **WBS 1.2.4.3.3 Shaft and Ramps**

SNL staff members provided support in the writing and review of the SCP-CDR. This work included revision of drawings, refinement of supporting calculations, and the development of revised text.

#### **WBS 1.2.4.3.4 Underground Excavations**

The major effort of staff members at SNL on the underground excavations task has been writing support for the SCP-CDR, including text revisions, development of operational and mechanical flow diagrams, and development of equipment lists.

#### **WBS 1.2.4.3.5 Underground Services Systems**

A draft of the position paper on fan reversibility was completed by Mine Ventilation Services. This paper will be submitted to SNL for review and approval this month.

### **WBS 1.2.4.4 OPERATIONS AND MAINTENANCE**

Preliminary operations plan drawings were received from BNI, and from Parsons Brinckerhoff Quade & Douglas (PBQ&D), including a block flow diagrams, timeline diagrams, isometric diagrams, emplacement flow diagrams, a material flow diagram, layout drawing, and organization chart. SNL staff members will review these and other operations plan drawings.

### **WBS 1.2.4.6 REPOSITORY PERFORMANCE ASSESSMENT**

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

Work to complete the task statement memorandum and to revise SCP Chapters 6 and 8 and SCP-CDR Section 2-3 continued and superseded all other work in this task.

"JEM Verification Calculations - Phase I," by RE/SPEC, Inc., was completed and summarized in a memo report and submitted to SNL. The memo completes work requested on Thermomechanical Analysis #12. The memo report will be reviewed and placed in the records system as time permits.

The draft SNL report, "A Computational Model for Jointed Media with Orthogonal Sets of Joints" (SAND86 1122), was submitted for line review.

#### WBS 1.2.4.6.2 Design Analysis

SNL staff reformatted and revised Section 6.4.2 of the SCP based upon Permanent Internal Review Committee review comments. Work is proceeding on revising Section 8.3.2.2 (Issue 1.11, Configuration of Underground Facilities - Postclosure) of the SCP. This work included reformatting the data-needed list based upon the products required to resolve the issue.

#### WBS 1.2.4.6.3. Preclosure Safety Analysis

SNL staff members completed drafts of SCP-CDR Sections 2.7, 4.6, 6.1, 7.4, 8.2.5, 8.3.3, 8.3.4, and 8.3.5. Also, Appendices F and I have been drafted.

SNL staff members revised and commented on "Guidance for the Preclosure Risk Assessment Methodology (PRAM)" for DOE/HQ.

#### PLANNED WORK

A draft of SCP-CDR Chapters 6, 7, 8, and 9 will be transmitted to the DOE Office of Geologic Repositories (OGR) by December 12, 1986, and the OGR will return additional comments on Chapters 1 through 5 to SNL by that date. A meeting with representatives from the OGR, WMPO, Weston Inc., SAIC, and SNL will be held the week of January 12, 1987, to review Chapters 6, 7, 8, and 9 and remaining comments for Chapters 1 through 5.

Modifications to SCP Chapters 6 and 8 and to the SCP-CDR will supersede all work planned for this SNL task. All schedules for work are expected to slip accordingly.

During December 1986, the major emphasis of design analysis work at SNL will be on the SCP-CDR. Work will continue on preparing SAND reports of contractor work and other documentation required for support of the SCP.

#### PROBLEM AREAS

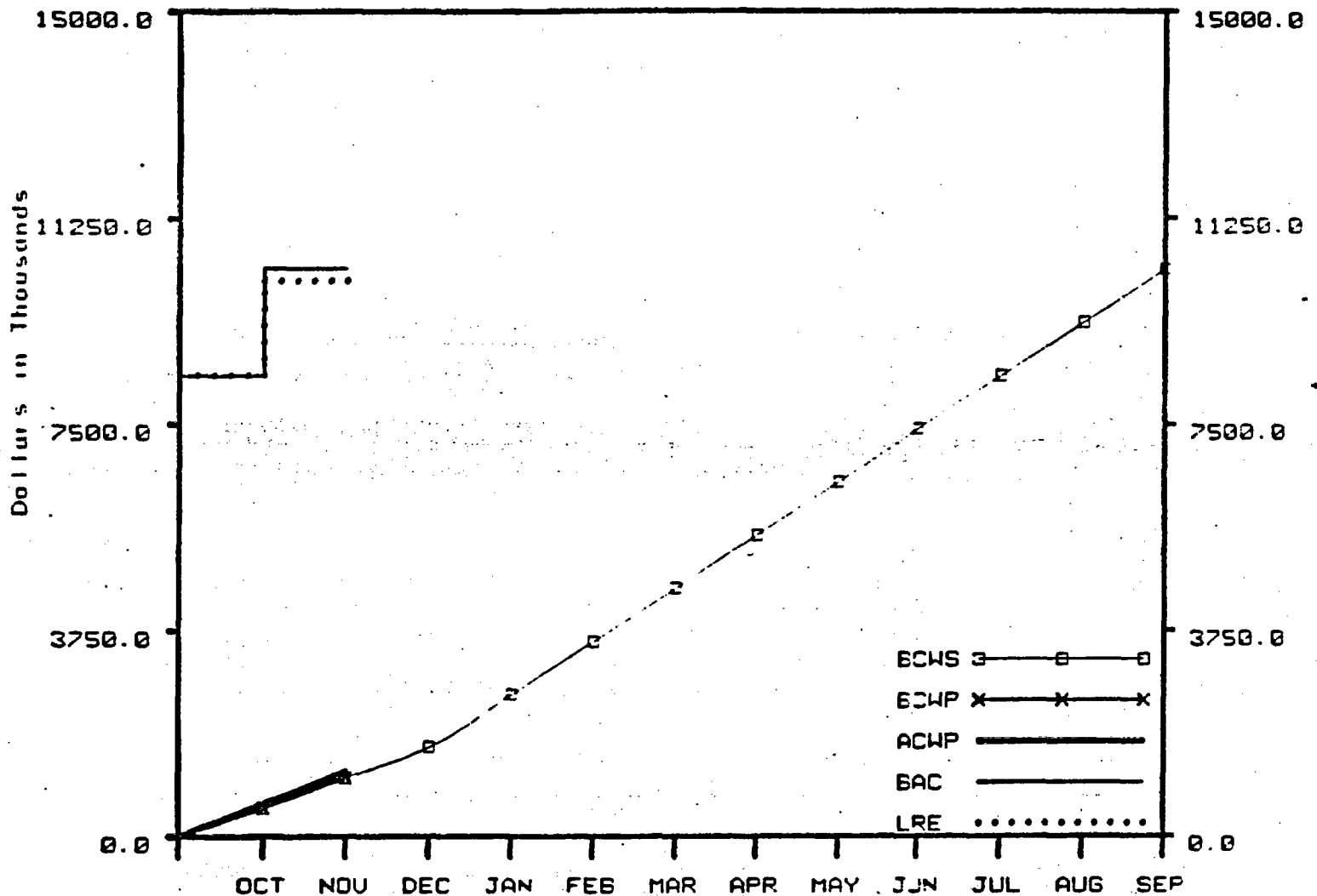
SNL cannot revise the SDR until DOE/HQ provides reformatting guidance. Revision will not begin until the physical subsystem structure has been provided.

#### MILESTONE PROGRESS

SNL Milestone N496, a report on properties of fractures in the Topopah Spring Member, has been delayed and the new completion date is December 15, 1986.

The SNL Milestone informing WMPO that procurement of development prototype boring machine has started (P209), has been delayed.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR NOV 1986 WBS: 1.2.4



## REPOSITORY INVESTIGATIONS

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	554.1	1066.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	554.1	1066.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	590.8	1175.6
D. BUDGET AT COMPLETION (BAC)		10324.0
E. LATEST REVISED ESTIMATE (LPE)		10101.0

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-109.2	-10.24
H. AT COMPLETION VARIANCE (D-E)	223.0	2.16

Remarks:

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

For: NOV 1987

Date: December 17, 1986

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1241 Management and Integration	390.496	390.497	445.615	.001	-55.119
1242 Development and Testing	569.000	569.001	602.000	.001	-32.999
1243 Facilities	60.100	60.100	29.000	.000	31.100
1244 Operations and Maintenance	24.700	24.700	26.000	.000	-1.300
1245 Decommissioning	2.100	2.100	.000	-.000	2.100
1246 Repository Performance Assessment	20.000	19.999	73.000	-.001	-53.001
124 REPOSITORY INVESTIGATIONS	1,066.396	1,066.397	1,175.615	.001	-109.218

MILESTONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	O	H	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		△										
N406	WMPO/ SNL	1.2.4.2	Horizontal Waste Emplacement Equipment Development Plan					△	◇						
N603	WMPO/ SNL	1.2.4.2	Initiate Drill Tests in G-Tunnel										△		
P403	WMPO/ SNL	1.2.4.2	Complete Fabrication of Development Prototype Boring Machine (DPBM) Waste Emplacement						△						
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 Retrieval 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/ SNL	1.2.4.6	Preliminary Study of the Effects of Uncertain Geologic Data on Design of the Underground Facility					△							

◇  
8/RR  
◇  
5/RR

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

## 1.2.5 REGULATORY AND INSTITUTIONAL INVESTIGATIONS

### OBJECTIVE

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

### ACTIVITIES

#### WBS 1.2.5.2 LICENSING

##### WBS 1.2.5.2.1 Regulatory Interactions

The schedule for NNWSI Project and NRC interactions was invalidated by the revised SCP preparation schedule and associated dedication of most Project personnel to that effort. As a result, the confirmation of meeting pre-requisites and their completion schedules were not completed as requested in September. Letters to Technical Project Officers (TPOs) will request specific commitments to provide NRC-required information, and an updated status will then be provided to the NRC, and schedules for the postponed interactions will be revised.

The following procedures for the Project Technical Data Management System continue to undergo development at SAIC:

- AP 2.8 "Monthly Technical Data Transfer Report."
- AP 6.1 "Requirements for Screening and Identification of Data and Information for Entry into the Technical Data Base."
- AP 6.4 "Requirements for Transfer of Data and Information of the Technical Records Centers and Management of the Technical Records Center."

Revision 1 of the Regulatory Document Manual was issued on November 30, 1986. Preparation of the revised Draft Regulatory Compliance Plan (RCP) continued at SAIC. At a November 20 meeting, reviewers' comments on Chapters 7, 8, and 9 of the RCP, which cover the Issue Hierarchy, Issues Resolution Strategies Management, and Documentation, were used to develop an action list for revisions to these chapters.

##### WBS 1.2.5.2.2 Site Characterization Plan

Staff members at USGS completed work on the shallow unsaturated zone section of the SCP.

USGS personnel completed a major revision to the geohydrology plans (in support of PIRC 3) to reflect new activity plans and provide an increased level of detail.

A reorganization of the USGS site geology plans for the SCP was completed by Science Applications International Corporation (SAIC)/Golden. No major technical changes were made during the Project review. The site geology plans were reviewed as a part of PIRC 2, concerned with rock characteristics. An issue resolution strategy was prepared. The methods, technical procedures, and milestones identified in the SCP were updated. The plans were integrated with the rest of Section 8.3 as a part of PIRC 15 activities.

USGS staff completed SCP climate-related tasks with most of the effort directed towards revisions of the future climate modeling study plans, and preparation of the climate issues resolution strategy.

A detailed review of the exploratory shaft test plans (ESTP) on hydrology was completed by SAIC/Golden. The review included recommendations for possible future unsaturated zone testing and analysis.

A draft list of SCP-supporting study plans was prepared by SAIC/Golden for review by USGS management. The draft list was reviewed and submitted to SAIC/Las Vegas and the Waste Management Project Office (WMPO). Planning for the development of the study plans were initiated with the preparation of an annotated outline.

LLNL staff completed drafts of all remaining sections of SCP Section 8.3 and participated in SCP review as PIRC members. PIRC 7, which covers the waste package, was not held, at HQ direction, so that a waste package compliance strategy could be developed.

SNL personnel completed text mark-up for safety-related sections of the SCP (Milestone P185) during November 1986.

Los Alamos contributions to Section 8.3.1.3 of the SCP were revised during the second week of November. These revisions were a result of the first PIRC 4 meeting held in August. A revised Section 8.3.1.3 was sent to SAIC for production and then was distributed to PIRC 4 members. A second PIRC 4 meeting was held November 19, 20, and 21. Section 8.3.1.3 was reviewed a second time, and the Issue Resolution Strategy (IRS) was reviewed for the first time.

#### **WBS 1.2.5.2.2.1 SCP Preparation**

DOE/HQ requested that the NNSI Project shorten the SCP preparation process to assume a date of April 1, 1987, for submission to the printers; therefore, PIRC revisions must be completed by the end of December 1986. To meet this deadline, there will not be enough time for the Technical Overview Committee (TOC) review as originally planned. Therefore, that committee will be replaced by a Project Overview Committee (POC), which will check for sensitivities relating to the Project and the program. An accelerated SCP schedule, together with a procedure for POC review, was distributed to participants November 10, 1986.



The POC was initiated the week of November 15, 1986, and the first POC review meeting (Chapter 4) was held in Las Vegas. By the end of the month POC reviews were completed for Chapters 2, 4, and 6 and Sections 8.3.2 and 8.3.3.

The PIRC process for completing the SCP is continuing. The status of the PIRCs is as follows:

- PIRC 1, Geology with Tectonics and Erosion: Sections 1.0-1.6 were submitted for POC review November 19, 1986. Section 1.7 was distributed to the POC on November 25, and Section 1.8 was distributed to the POC the last week of November. A meeting was held November 18, 1986, to revise the IRS for pre- and postclosure tectonics.
- PIRC 2, Geoengineering with Rock Characteristics: The draft IRS for Issues 1.15 and 4.7 were distributed for review November 12, 1986. A PIRC 2 comment response meeting (CRM) was held November 20 and 21, 1986, on the IRSs. Chapter 2 was distributed for POC review, and the POC review was completed on November 26, 1986.
- PIRC 3, Hydrology with Ground-Water Travel Time (GWTT): Chapter 3, except Section 3.6, was distributed for POC review, and revised Sections of 8.3.1.2 and 8.3.5.12 were submitted to PIRC 15 for review the last week of November.
- PIRC 4, Geochemistry with Dissolution and Total Releases: A PIRC CRM was held November 19 through 21, 1986, to review the geochemistry IRS and revised information needs. A CRM was held for Section 8.3, including the IRS and information needs for Issue 1.14.
- PIRC 5, Climate and Meteorology: A consolidated markup of Chapter 5 went to production November 19, 1986, and was distributed to POC for review the week of November 26, 1986.
- PIRC 6, Repository Design and Seals: Chapter 6 was revised to conform with the Comment Response Document (CRD) following the DOE/HQ review of the CRD November 20 and 21, 1986. After the DOE/HQ review, Chapter 6 was distributed for POC review.
- PIRC 7, Waste Package: A DOE/HQ meeting on waste package postclosure compliance strategy was held, and a one-page set of agreements was developed at the close of the meeting.
- PIRC 8, Radiological Safety: A CRM was held on November 17 through 19, 1986.
- PIRC 9, Reference Verification: WMP0 called for all references to be published by mid-December; otherwise, they will be deleted from the text.
- PIRC 10, Site Preparation and Decommissioning: The text of Sections 8.4 and 8.7 was revised.
- PIRC 11, Schedules: A format for Section 8.5 was developed.

PIRC 12, Performance Assessment: Revisions for the IRS for Issue 1.1 and a revised Issue 1.6 were distributed to PIRC 15.

PIRC 13, High-Level Findings: Issues 1.9 and 2.5 were revised.

PIRC 14, Project Strategy and Issues Hierarchy: D. Alexander and C. Hanlon (DOE/HQ) reviewed Sections 8.1 and 8.2.

PIRC 15, Chapter 8 Integration and Consistency: PIRC 15 was initiated, and the first PIRC 15 telecon was held November 7, 1986. A kick-off meeting was held November 13 and 14, 1986, in Albuquerque, NM. A second PIRC 15 meeting was held November 24 through 26, 1986, to begin resolution of the 22 concerns identified at the first meeting.

PIRC 16, Editorial Consistency Review: Editorial reviews of Chapters 1, 2, and 4 were completed in November.

PIRC 17, Quality Assurance: A CRM was held November 17 and 18, 1986. DOE/HQ requested that the NNWSI Project Structure Section 8.6 to be consistent with DOE/RL 8.6. A letter was sent by WMFO to DOE/HQ summarizing the inconsistencies between current DOE/HQ guidance for 8.6 and the Annotated Outline. A consolidated markup of Section 8.6 was distributed to PIRC 15 and POC on November 26, 1986.

#### WBS 1.2.5.3.2 Environmental Impact Statement

Initial planning at SAIC for the Environmental Impact Statement (EIS) support documents is underway. The EIS scoping will be delayed until August 1987. No EIS baseline monitoring will occur until after the scoping hearings in FY 1988. SAIC personnel reviewed the DOE/HQ EIS implementation Plan Working Document and provided comments to WMFO for submittal to DOE/HQ.

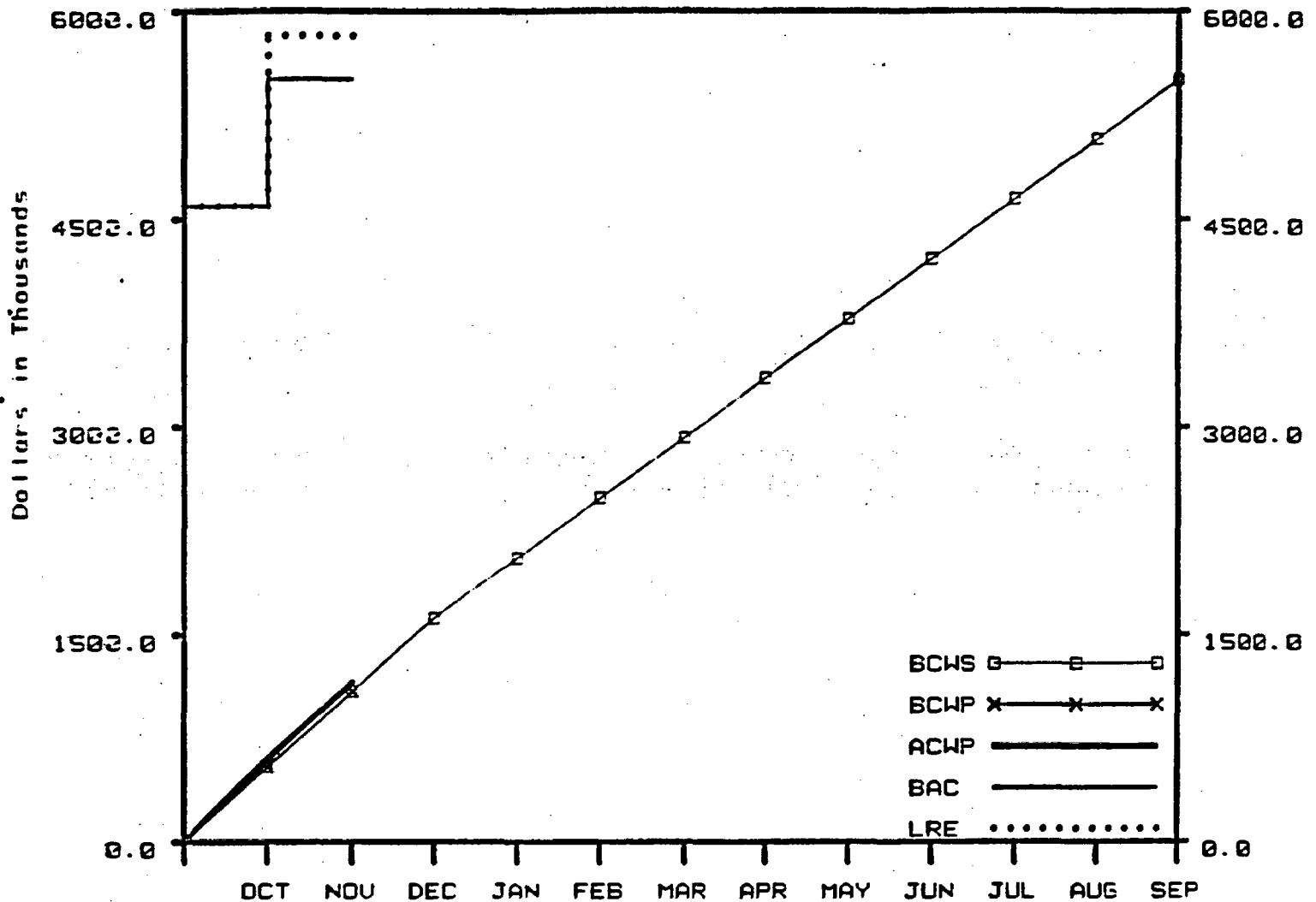
#### WBS 1.2.5.4.1 Institutional Studies

The SAIC Institutional Branch staff submitted a revised draft of the NNWSI Project Public Affairs Plan for WMFO review. The revised plan proposes an extensive number of public affairs activities for the NNWSI Project in FY 1987. They also forwarded Project slides and a tuff sample for use in production of a comprehensive NNWSI Project modular slide presentation by SAIC/Oak Ridge, which specializes in audio-visual and graphic presentations and is preparing a draft slide show.

The NNWSI Project News Clippings Data Base is available to SAIC cost account managers to review Project related news story clippings.

SAIC representatives attended the Nevada Commission on Nuclear Projects meeting on November 17, 1986, and the Nevada Legislative Committee on High-Level Nuclear Waste meeting on November 24, 1986, where WMFO and Nevada representatives gave reports on the high-level waste program.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR NOV 1926 WBS: 1.2.5



REGULATORY AND INSTITUTIONAL INVESTIGATIONS		
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	544.1	1088.2
B. BUDGETED COST OF WORK PERFORMED (BCWP)	544.1	1088.2
C. ACTUAL COST OF WORK PERFORMED (ACWP)	553.7	1151.1
D. BUDGET AT COMPLETION (BAC)		5505.0
E. LATEST REVISED ESTIMATE (LRE)		5818.5

VARIANCES (Year To Date)		
	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-62.9	-5.78
H. AT COMPLETION VARIANCE (D-E)	-313.5	-5.70

Remarks:

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

For: NOV 1987

Date: December 17, 1986

WBS NUMBER AND DESCRIPTION		YEAR TO DATE				
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
					SCHEDULE	COST
1251	Management and Integration	75.814	75.814	67.630	-.000	8.184
1252	Licensing	866.924	866.924	945.021	.000	-78.097
1253	Environmental Compliance	86.736	86.736	81.359	.000	5.377
1254	Communication and Liaison	58.746	58.746	57.075	.000	1.671
1255	Technology and Financial Assistance	.000	.000	.000	.000	.000
125	REGULATORY AND INSTITUTIONAL INVESTIGATIONS	1,088.220	1,088.220	1,151.086	.000	-62.866

MILE- STONE	RESP. AGENCY	WRS	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			△									
R994	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						△						

△ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

### 1.2.6 EXPLORATORY SHAFT INVESTIGATIONS

#### OBJECTIVE

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

#### ACTIVITIES

##### WBS 1.2.6.1 MANAGEMENT AND INTEGRATION

At the direction of the Waste Management Project Office (WMPO) Exploratory Shaft Facility Project engineer, the REECO Management and Integration staff worked with F&S and H&N on various proposals to refine the surface and underground layouts for presentation to the Technical Project Officers (TPOs) on December 10 and 11, 1986.

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

According to the WMPO, the quality assurance level assignments (QALAs) will not be included as Appendix A in the ESF Subsystems Design Requirements (SDR) document. Appendices B and C to the ESF SDR document will be transmitted to WMPO in their current format. Additional work will probably be required, however. Appendix B addresses the testing needs for the ESF, and Appendix C addresses the ESF core holes and boreholes.

A meeting was held on Thursday and Friday, November 13-14, at SAIC in Las Vegas to discuss the ESF QALAs. The fifth submittal will assume two 12-foot-diameter shafts, a main test facility at the 1,020-ft depth, and long exploratory drifts.

Los Alamos staff members completed and issued the first version of the data base on fluids and materials to be used in the ESF underground. However, to complete the study, a biological and chemical study, transport calculations, and performance assessment must be conducted to determine if any liquids or materials shown in the data base will adversely affect repository performance. If such liquids or materials are identified, suitable alternatives must be selected or justification must be given for not allowing alternative liquids and materials.

Study plans will not be required for prototype tests because these are not part of site characterization.

H&N, in conjunction with REECO and F&S, completed work on the Phase I Construction Schedule for the ESF. This included man loading, equipment loading, and material loading. Schedule is currently being entered into the F&S computer.

F&S staff members completed the final draft of the Controlled Blasting Study.

#### **WBS 1.2.6.9 TESTING**

##### **WBS 1.2.6.9.1 Exploratory Shaft Test Plan**

Los Alamos personnel prepared an outline of the rationale for prototype air coring equipment for the WMPO.

Los Alamos, SAIC, and WMPO personnel prepared a draft NNWSI Project position paper on the need to change the ESF design by adding a test of the 1,020-ft level and long drifts to investigate structures.

The PIRC 15 developed a plan for completing Section 8.3 of the SCP and for document integration.

All Project members at USGS involved in hydrologic testing completed first drafts of their input into SIPs documentation for the exploratory shaft.

##### **WBS 1.2.6.9.2 Exploratory Shaft**

###### **WBS 1.2.6.9.2.4 Geochemical Testing**

The ES Test Plan Committee met in Las Vegas on November 20 and discussed several items that could affect the prototype testing for the ES Diffusion Test. One was the requirement for a detailed test plan by February. Another was the completion of a characterization matrix for each prototype test to help determine the priorities in implementing testing. A third potentially significant impact could occur if weapons testing is resumed near the proposed prototype test location.

##### **WBS 1.2.6.9.3 Integrated Data System**

The Los Alamos draft Integrated Data System Requirements document was approved by the WMPO.

##### **WBS 1.2.6.9.4 Prototype Testing**

###### **WBS 1.2.6.9.4.1 Prototype Geologic Testing**

The prototype SIP documents for geologic mapping were completed by USBR and are ready for transmittal to WMPO. An interim exploratory shaft SIP document was prepared.

Comments and replies were prepared by USBR for Project-wide critiques of exploratory shaft mapping.

#### **WBS 1.2.6.9.4.2 Prototype Hydrologic Testing**

USGS responses to review comments on prototype hydrologic tests by SNL, SAIC, F&S, and Battelle were completed in first draft and submitted for internal Project review. Ongoing literature reviews, schedule preparation, and several interagency meetings were held regarding planning and preparation for prototype testing. All Project members assigned as PIs for hydrologic prototype tests have received and reviewed the SIP documents for their tests from USBR.

The prototype SIP documentation for perched water was completed by USBF and transmitted to USGS.

Draft prototype SIPs for drillhole stemming, intact fracture (field), infiltration and cross hole testing are in the USGS review process or are being finalized.

The schedule and budget for the ES were revised by USBR to comply with the May 1988 construction start date and U.S. Department of Interior needs.

#### **WBS 1.2.6.9.4 Prototype Testing**

##### **WBS 1.2.6.9.4.3 Prototype Geomechanical Testing**

A draft of an SNL experiment procedure titled "Prototype Thermal Stress Testing" was prepared and distributed to the Exploratory Shaft Test Plan Committee on November 20, 1986, as an experiment procedure example. The draft is to be reviewed and revised.

#### **PLANNED WORK**

Los Alamos will submit the ESF QALAs for the fifth time and modify Appendix B to the ESF SDR so it can be issued to the architect-engineers allowing them to proceed with the design.

Los Alamos staff members will prepare a detailed test plan for geochemical prototype testing by the February deadline.

#### **PROBLEM AREAS**

Los Alamos received a letter from the WMPO concerning the study on the use of and restriction on the use of certain liquids and materials in the ESF. The WMPO requested that the study be completed by December 1, 1986. This request is impossible to comply with; a detailed schedule of the necessary activities indicates that the work cannot be completed until June 1987.

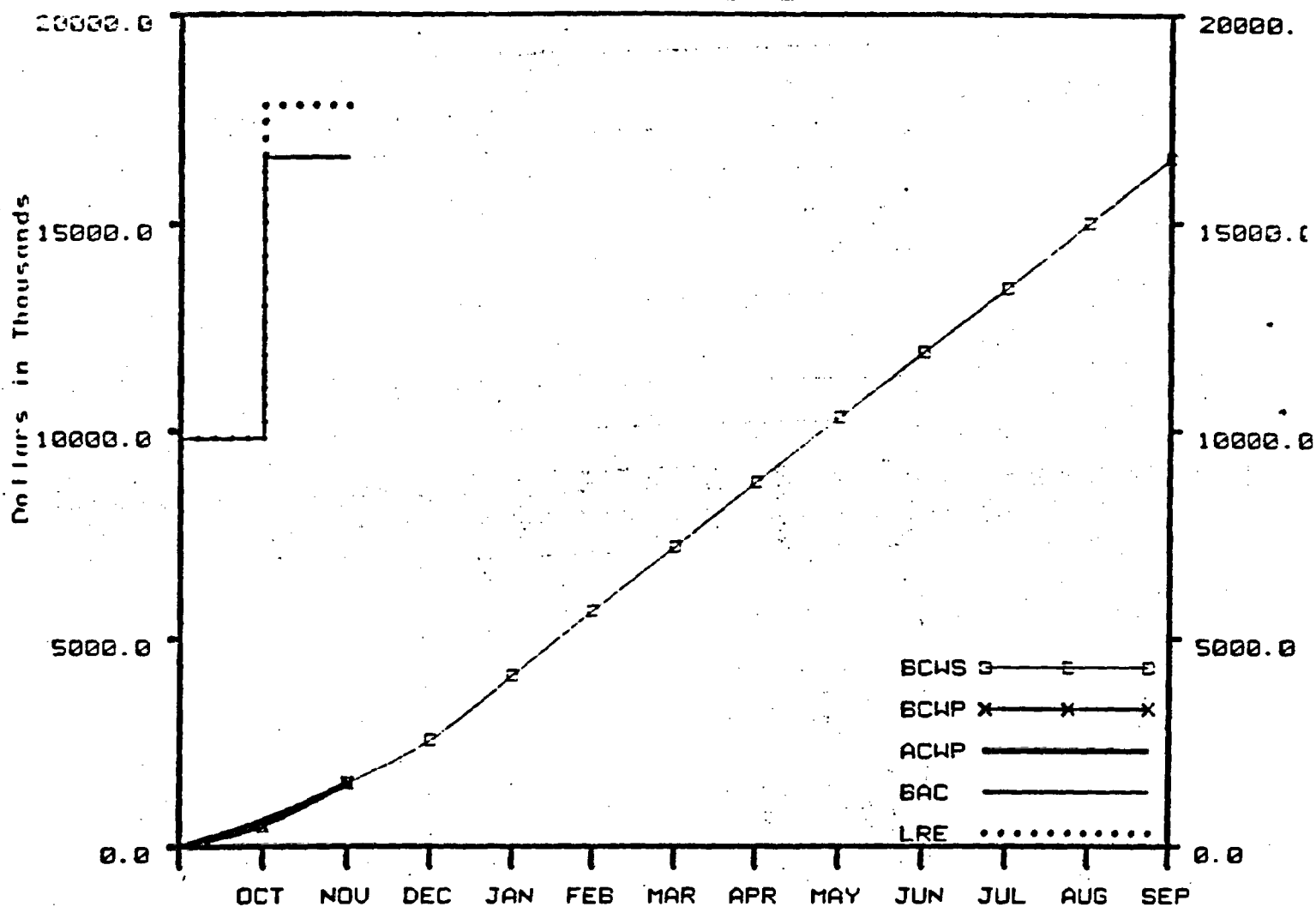
H&N needs a determination from WMPO on the reclassification of several special studies from QA Level II to QA Level III.



### MILESTONE PROGRESS

A draft of SNL Milestone R086, Definition of Technical Procedures Required to be Prepared for Exploratory Shaft Testing, is in WMPO review.

# NNWSI PROJECT COST PERFORMANCE GRAPH, FOR NOV 1986 WBS: 1.2.6



## EXPLORATORY SHAFT INVESTIGATIONS

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1033.9	1520.5
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1033.9	1520.5
C. ACTUAL COST OF WORK PERFORMED (ACWP)	888.3	1502.5
D. BUDGET AT COMPLETION (BAC)		16550.0
E. LATEST REVISED ESTIMATE (LRE)		17790.3

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	18.0	1.18
H. AT COMPLETION VARIANCE (D-E)	-1240.3	-7.49

Remarks:

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

For: NOV 1987

Date: December 17, 1986

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1261 Management and Integration	647.488	647.489	690.974	.001	-43.485
1262 Site Preparation	.000	.000	.100	.000	-.100
1263 Surface Facilities	.000	.000	2.200	.000	-2.200
1264 First Shaft	7.462	7.462	10.298	.000	-2.836
1265 Second Shaft	.000	.000	.155	.000	-.155
1266 Subsurface Excavations	90.912	90.912	91.890	-.000	-.978
1267 Underground Service Systems	4.200	4.200	7.650	.000	-3.450
1268 Operations	2.700	2.700	4.900	.000	-2.200
1269 Testing	767.720	767.720	694.320	-.000	73.400
126 EXPLORATORY SHAFT INVESTIGATIONS	1,520.482	1,520.482	1,502.487	.000	17.996

MILE STONE	RESP AGENCY	WBS	MILESTONE DESCRIPTION	D	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					Δ							
M243	WMPO/ LANL	1.2.6.1	Complete Exploratory Shaft Readiness Review												Δ
R841	WMPO/ SAIC	1.2.6.1	DOE/HQ Receives Final FY 89 Project Validation Material						Δ						
M282	WMPO/ LANL	1.2.6.1	Start Field Prototype Testing in G-Tunnel						Δ						
R241	WMPO/ LANL	1.2.6.1	Exploratory Shaft Facility (ESF) Subsystems Design Requirements Document			Δ		◇							
M773	WMPO/ SAIC	1.2.6.1	Final ESF Title II Design Requirements Document Submitted To DOE/HQ								Δ				
P763	WMPO/ SAIC	1.2.6.1	Exploratory Shaft Title I Design Summary Submitted to WMPO								Δ				

Δ PLANNED MILESTONE COMPLETION DATE

◇ REVISED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◆ COMPLETED AS REVISED

## 1.2.7 TEST FACILITIES

### OBJECTIVE

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

### ACTIVITIES

#### WBS 1.2.7.2 TESTING

U.S. Geological Survey (USGS) personnel evaluated pressure measurements on vented and unventilated air on November 6, 1986. This is preliminary work for exploratory shaft prototype testing.

##### WBS 1.2.7.2.1 Climax

The LLNL topical report on posttest thermomechanical calculations was printed and distributed. The reports on thermal and geomechanical analyses are being prepared for printing.

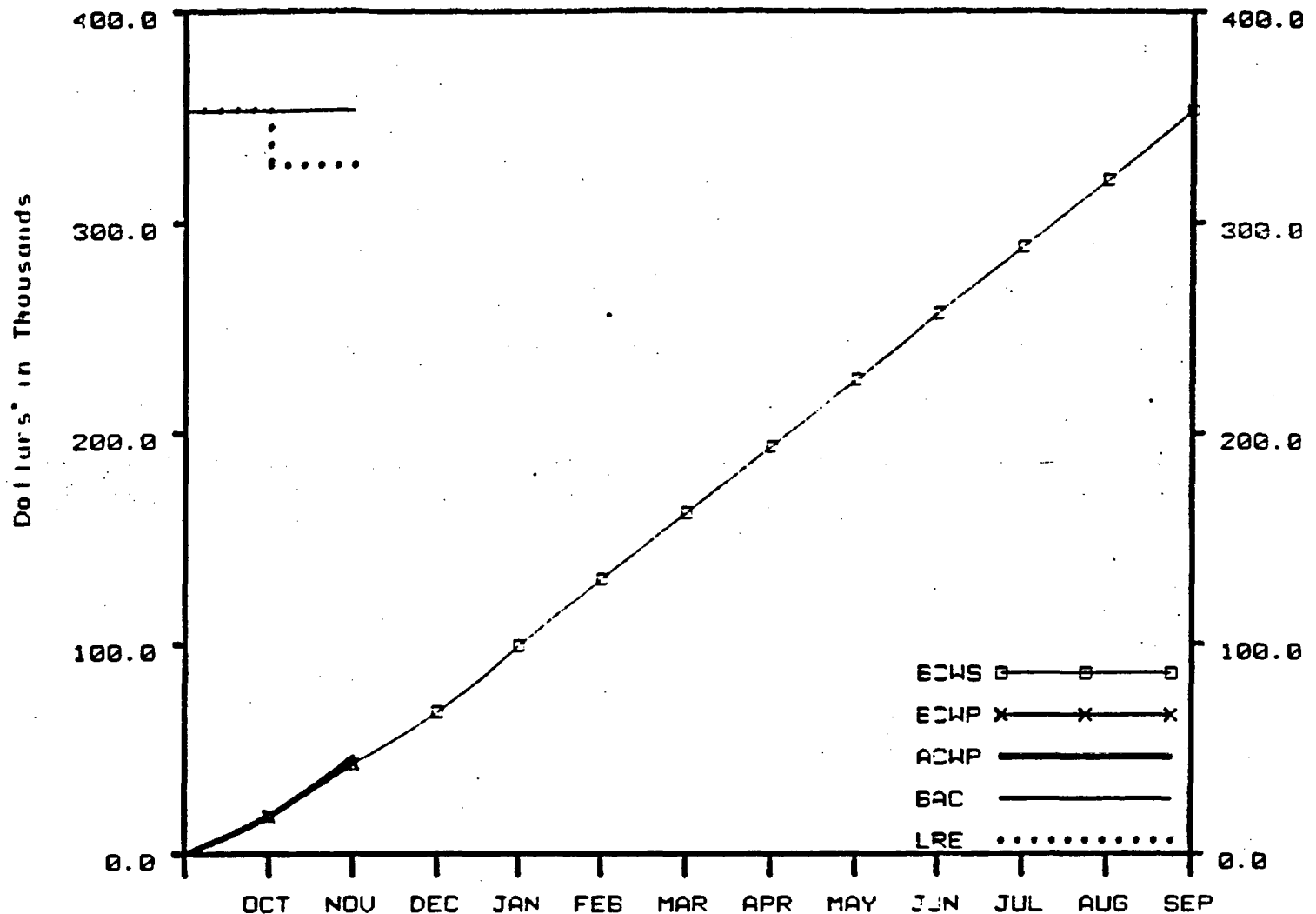
##### WBS 1.2.7.2.3 G-Tunnel

H&N nondestructive testing personnel completed radiography tests on the flat jacks from G-Tunnel, and are currently preparing a report of the results for submission to SNL.

# NNWSI PROJECT

## COST PERFORMANCE GRAPH FOR NOV 1986

### WBS: 1.2.7



#### TEST FACILITIES

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	24.8	42.6
B. BUDGETED COST OF WORK PERFORMED (BCWP)	24.8	42.6
C. ACTUAL COST OF WORK PERFORMED (ACWP)	27.7	45.5
D. BUDGET AT COMPLETION (BAC)		353.0
E. LATEST REVISED ESTIMATE (LRE)		327.4

#### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-2.9	-6.75
H. AT COMPLETION VARIANCE (D-E)	25.6	7.26

Remarks:

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

For: NOV 1987

Date: December 17, 1988

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	42.642	42.642	45.521	-.000	-2.879
1273 New Facility Acquisitions	.000	.000	.000	.000	.000
127 TEST FACILITIES	42.642	42.642	45.521	-.000	-2.879

### 1.2.8 LAND ACQUISITION

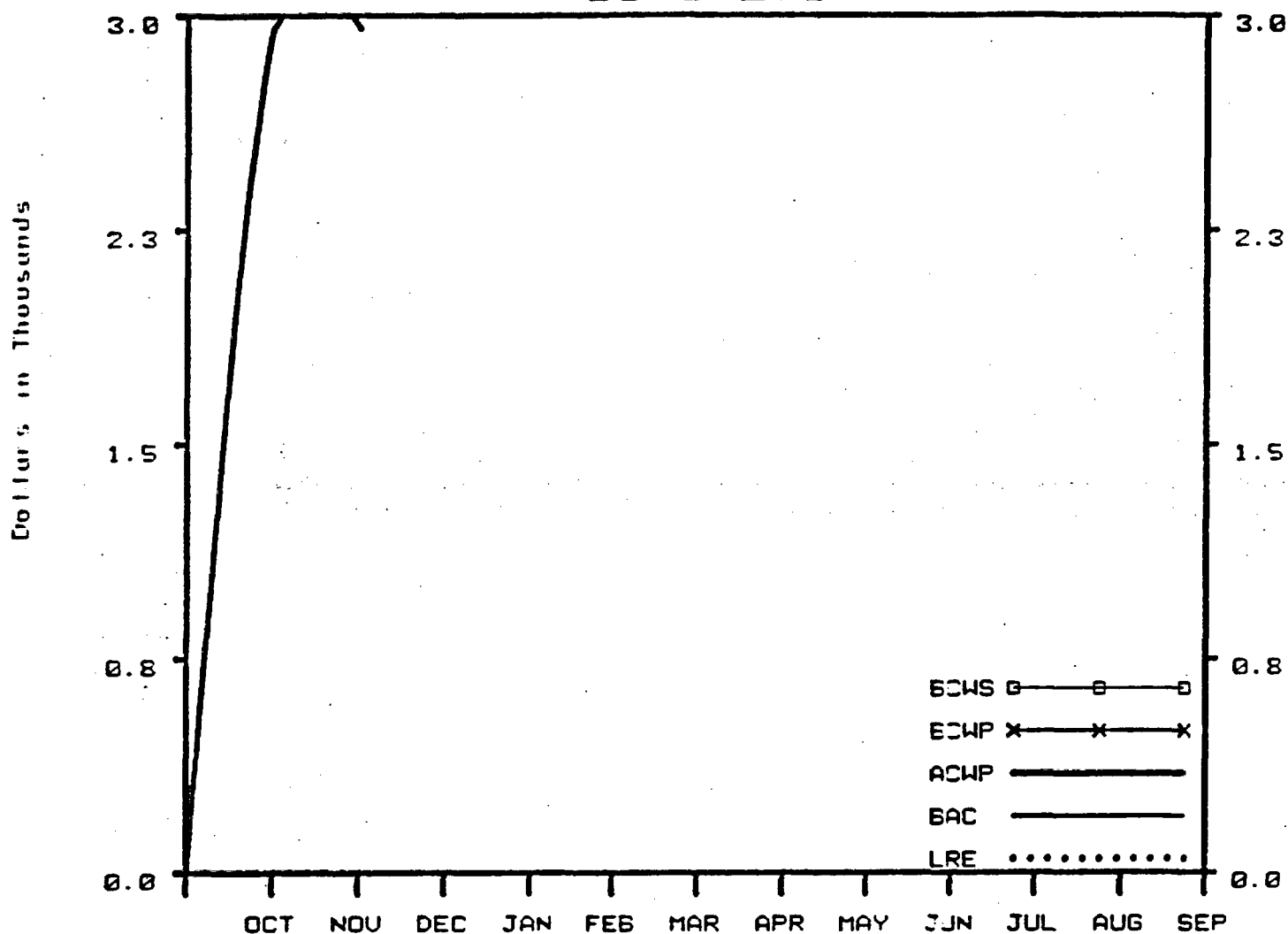
#### OBJECTIVE

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

#### ACTIVITIES

None to report.

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR NOV 1986 WBS: 1.2.8



## LAND ACQUISITION

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	0.0	0.0
B. BUDGETED COST OF WORK PERFORMED (BCWP)	0.0	0.0
C. ACTUAL COST OF WORK PERFORMED (ACWP)	0.0	3.0
D. BUDGET AT COMPLETION (BAC)		0.0
E. LATEST REVISED ESTIMATE (LRE)		0.0

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-3.0	0.00
H. AT COMPLETION VARIANCE (D-E)	0.0	0.00

Remarks:



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

For: NOV 1987

Date: December 17, 1986

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1281 Land Acquisition	.000	.000	2.956	.000	-2.956
128 LAND ACQUISITION	.000	.000	2.956	.000	-2.956

## 1.2.9 PROJECT MANAGEMENT

### OBJECTIVE

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

### ACTIVITIES

#### WBS 1.2.9.1 MANAGEMENT AND INTEGRATION

##### WBS 1.2.9.1.1 Management

A listing of SNL Level 1 milestones and their Level 2 precursors was submitted to the Change Control Board (CCB) for the December 1986 meeting.

H&N graphics personnel completed work on the assembly and mounting of a three-dimensional wall map for WMPO and are currently working on five topographic maps for WMPO.

An LLNL procurement plan was prepared and submitted to WMPO in response to a HQ request for contractor and subcontractor information.

The data base for the LLNL milestones has been reworked and a milestone listing is being prepared. Several weeks of effort were put into the upgrade of this data base to make it easier to use.

At LLNL, all but three of the major contracts intended for FY 87 have been put in place. With funding now available, several of the contracts will be increased in work scope.

On November 17, Larry R. Hayes officially became the new Technical Project Officer for the NNWSI Project at the USGS.

The SAIC Computer Support Services staff installed the XYPLEX communications equipment on the VAXcluster.

##### WBS 1.2.9.1.4 Records Management

H&N MASSF personnel completed microfilming of all available, properly prepared documents. SAIC personnel are expected at the H&N Engineering Records Library during the week of December 1, 1986, to discuss the status and to update equipment.

All efforts by SNL staff members in November 1986 were directed toward completing the SNL records management system department operating procedure which included the document-type listed as an appendix. Several other procedures were issued through the controlled document system being implemented by the records management staff.

REECo implementing procedures for the Local Records Center and the Quality Assurance Records Type List have been finalized. These documents, along with a copy of the document and package type codes contained in the REECo Quality Assurance Records Management System data base, are being submitted to WMPO for review and approval.

REECo personnel furnished information regarding the impact on subcontractors of providing socioeconomic reports to WMPO on November 1, 1986. A suggested matrix for reporting was included along with several questions that would need to be answered prior to including such requirements in the solicitation package.

REECo personnel attended a meeting with WMPO, regarding possible use of warehouses 1 and 2 in Area 25 as a Core Storage Facility for the NNWSI Project. REECo was tasked to provide estimates for proposed modifications to these buildings.

As a result of an Office of Management and Budget (OMB) review of the FY 88 Budget, DOE/HQ requested the NNWSI Project to provide a cost/benefit analysis for the NNWSI Project Information Management System (IMS). SAIC personnel prepared the cost/benefit analysis in accordance with the Federal Information Processing Standard Publication No. 64 as directed, and reflected current DOE/HQ direction with regard to implementation of the IMS.

As a result of guidance received from DOE/HQ regarding immediate implementation of portions of the IMS, a baseline date of December 1, 1986, was established to begin processing of all QA records generated. QA records generated prior to December 1, 1986, should then be processed starting with the most recent and working back.

#### WBS 1.2.9.2 PROJECT CONTROL

The ES prototype budget was prepared by USBR and presented at the TPO meeting.

All completed SIP documents have received USBR review including QA review.

A rough draft of the management work book was prepared by SAIC/Golden for instruction to the USGS/NNWSI Project management staff on the review and update of material necessary to update work plans for FY 1987. The purpose of the manual focuses on the verification of activities for FY 1987.

SNL provided schedule data on SNL milestones to SAIC to be used to update Project networks.

#### WBS 1.2.9.3 QUALITY ASSURANCE

REECo received WMPO approval of their NNWSI Project Quality Assurance Program Plan as having met the requirements of NVO-196-17, Revision 4.

REECo staff members assisted SAIC in the development of a procurement procedure for the WMPO.

The F&S Director of QA reviewed and approved revisions to sixteen Design Control Procedures for the Tulsa ESF Design Effort.

One of the 18 sections of the SNL Quality Assurance Program Plan was approved by WMPO in November 1986. Fifteen other sections, as well as the introductory material (Introduction, Purpose, Scope, and Policy), had been approved earlier, leaving two sections to be submitted and approved to complete the document. Those sections were submitted for review and comment by the quality assurance support contractor.

Eleven department operating procedures and quality assurance procedures implementing aspects of the SNL Quality Assurance Program Plan were approved or issued during November 1986, bringing the total to 19.

An NNWSI Project familiarization program was initiated for SNL Project personnel. This familiarization training is divided into a "General" portion, for all personnel, and a "Task-Specific" portion, tailored to each individual's job, background, and tenure in the organization.

The Los Alamos report for the Lawrence Berkeley Laboratory (LBL) audit, conducted in October, was completed, reviewed, and sent to LBL. The audit team report did not contain any findings but did note two observations.

Representatives from the Waste Management Project Office (WMPO), SAIC, and Los Alamos met on November 13-14. Discussions centered on the last submittal of the exploratory shaft facility (ESF) quality level assignments. Some agreements were reached on how to proceed with assigning quality levels to ESF construction and design-related activities.

The writing session for the revised Los Alamos NNWSI Quality Assurance Program Plan was delayed and rescheduled for December 4-5.

The stop-work order was lifted for all ongoing Los Alamos NNWSI Project activities.

The Los Alamos implementing procedure for Records Management, Revision 1, was submitted to WMPO for review and approval. A writing session for Revision 2 of this procedure is scheduled for December 11.

Two Los Alamos quality assurance orientation training meetings were held for new research groups being added to the Los Alamos NNWSI Project effort. The meetings were attended by research and Project management personnel.

USGS hydrology staff completed writing QALAs for all shallow unsaturated zone investigation work.

Preparation of the USGS QA training program continued by SAIC/Golden with completion of a second draft of the slides that describe the basics of the QA Manual.

In excess of ten hours of QA Manual training for the entire QA staff was completed, including an introduction and in-depth explanation of the entire QA Manual. The USGS QA Manual is printed and ready for distribution.

Initially, the bulk of the distribution will take place during the planned training sessions.

All of the USBR QA Manual procedures are being revised by SAIC/Golden to incorporate review comments from the USGS QA Manual. Three procedures required additional revision as a result of the the recent TPO meeting and decision regarding USBR participation in SIP documentation for the USGS. Progress on this manual revision has been impacted by priorities of the SCP and study plans.

The draft H&N Administrative Procedure addressing Project participant interfaces for the calibration of instruments and equipment was submitted to SAIC for QASC review.

Work continued at LLNL on the design of the QA training program.

LLNL staff issued the first draft of a procedure for peer review for internal review.

The LLNL performance assessment SIP documentation and QALAs were approved on November 3, 1986.

Two more boxes of LLNL spent-fuel test records were sent to the NTS for microfilming. Completion of the processing of these records is scheduled for mid-February.

#### WBS 1.2.9.3.1 Quality Assurance

Formal comments for the WMPO review of Revision 3 of the T&MSS QAPP and supporting procedures were received September 11 and have been incorporated as appropriate. Revisions to the QAPP and supporting procedures were completed by T&MSS and submitted to WMPO for approval on November 3, 1986.

Monitoring of the Site Characterization Plan activities continued in November. As a result of an Audit Finding Report (AFR), Revision 1 to the SCP Management Plan for changes in organization and method of operation was drafted and transmitted to WMPO on October 31, 1986. WMPO approved Revision 1 on November 5, 1986.

Six additional SAIC QALAs were submitted to WMPO on November 7 and three more on November 21, 1986. One more QALAs (Socioeconomics) is required and should be submitted for approval in early December 1986. Contingent upon a timely WMPO review and approval, this issue should be closed by mid-January 1987.

The following significant administrative activities were accomplished by the SAIC staff under the QA task for November: Provided a description of the NNWSI QA Program, status of stop-work orders, and audit and surveillance activities input to the GAO auditors from DOE/HQ.

The first audit for FY 1987 is scheduled for March 1987. This schedule allows time for the participants and support contractors to implement their newly revised QAPPs and QMPs, and where applicable, satisfy the requirements established for lifting stop-work orders.

Of the five audits conducted in FY 1986, four remain open. Of the 15 audits in FY 1985, seven audits remain open.

As a result of the stop-work orders issued to all Project participants, activities for surveillances in November 1986 were limited; therefore, only two surveillances were conducted during the month of November. To date, a total of three surveillances have been conducted in FY 1987 and 14 items or activities monitored. During this effort, no nonconformances have been recorded.

#### VBS 1.2.9.3.6 NNWSI Project Quality Assurance Overview and Implementation

SAIC personnel began development of a WMPO Project Office Training Program Plan to address training requirements for the WMPO and QA support contractor staff. The Training Program will use "performance based training" as its approach for assuring the WMPO and QASC personnel's knowledge of the NNWSI Project commitments, Program Plans, and procedures.

The T&MSS QAPP and implementing procedures were approved for use on the NNWSI Project on November 25.

#### PROBLEM AREAS

Quality assurance procedures that were worked on jointly by WMPO, SAIC, and Los Alamos personnel are again experiencing extended delays in receiving WMPO approval. Four of these coordinated-effort procedures were submitted a month and a half ago; to date, no response or approvals have been received.

#### MILESTONE PROGRESS

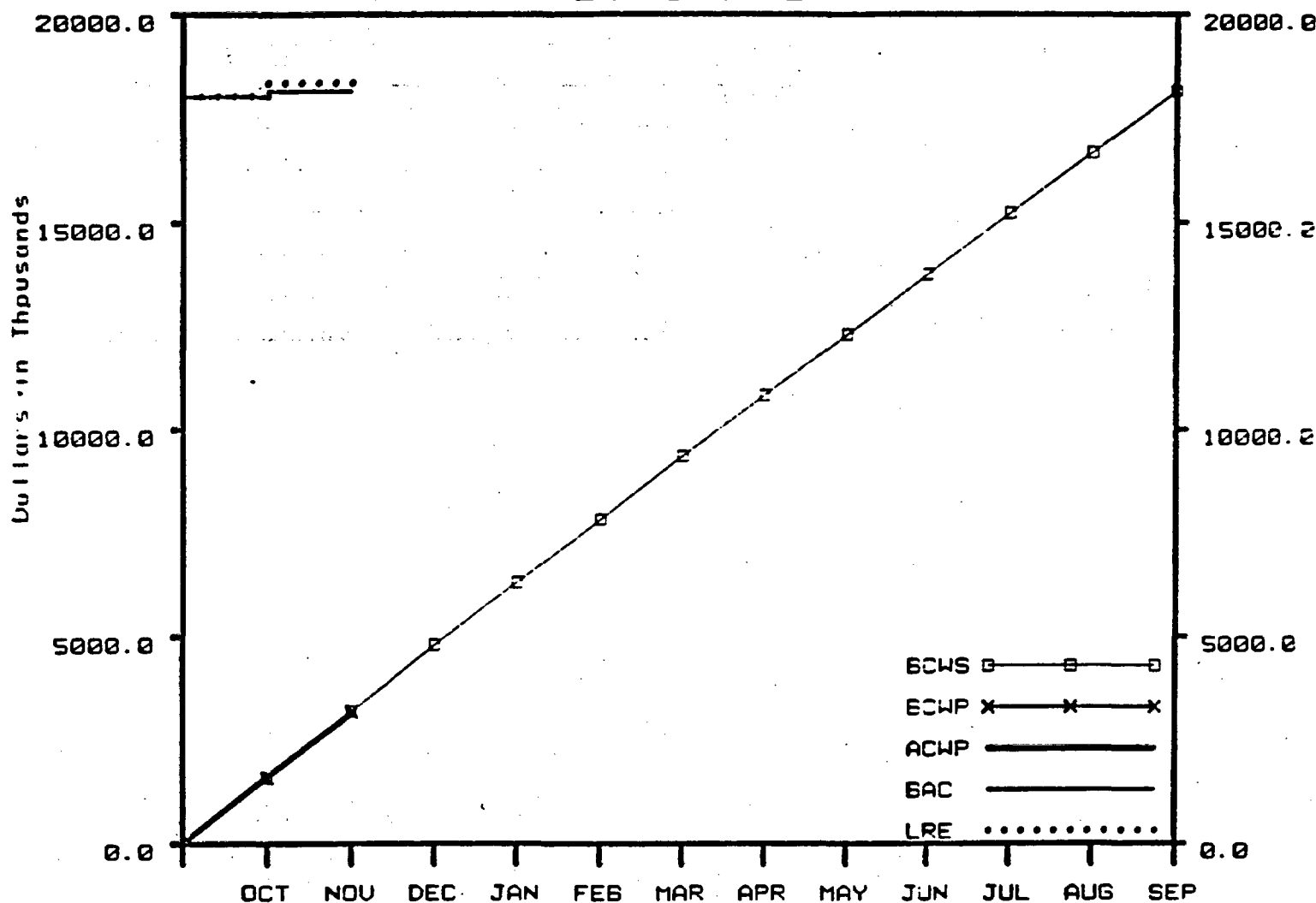
SNL Milestone R890, "Developing and Issuing a Schedule for Internal and External SNL NNWSI Project Quality Assurance Audits During FY 1987," is delayed and the new estimated date of completion is December 10, 1986.

The new completion date for SNL Milestone R892, "Satisfy Quality Assurance Requirements to Release SNL Stop-work Order," is December 19, 1986.

# NNWSI PROJECT

## COST PERFORMANCE GRAPH FOR NOV 1986

### WBS: 1.2.9



#### PROJECT MANAGEMENT

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1605.5	3193.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1605.5	3193.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1532.6	3141.3
D. BUDGET AT COMPLETION (BAC)		18143.0
E. LATEST REVISED ESTIMATE (LRE)		18336.1

#### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	51.8	1.62
H. AT COMPLETION VARIANCE (D-E)	-193.1	-1.06

Remarks:

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

For: NOV 1987

Date: December 17, 1986

WBS NUMBER AND DESCRIPTION	YEAR TO DATE				
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES	
				SCHEDULE	COST
1291 Management and Integration	1,690.228	1,690.228	1,701.230	.000	-11.002
1292 Project Control	546.840	546.840	500.495	-.000	46.345
1293 Quality Assurance	792.786	792.786	776.377	.000	16.409
1299 NTS Allocation	163.200	163.200	163.200	.000	.000
129 PROJECT MANAGEMENT	3,193.054	3,193.054	3,141.302	.000	51.752

MILE- STONE	RESP. AGENCY	WBS	MILESTONE DESCRIPTION	U	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			△				◇					
RB49	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							△					
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												△
RB42	WMPO/ SAIC	1.2.9.1	Implement Document Collection for the Licensing Support System										△		

△ PLANNED MILESTONE COMPLETION DATE

▲ COMPLETED AS SCHEDULED

◇ REVISED MILESTONE COMPLETION DATE

◆ COMPLETED AS REVISED



U.S. DEPARTMENT OF ENERGY

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## **PARTICIPANT**

## **BUDGET vs COST**

#### 1.2.10 FINANCIAL AND TECHNICAL ISSUES

##### OBJECTIVE

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

##### ACTIVITIES

None to report.

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

PAGE

CONTRACTOR MWHI Project		CONTRACT TYPE NO :		PROJECT NAME/NUMBER NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS		REPORT FISCAL MONTH AND YEAR MAY 1987		SIGNATURE	
LOCATION P.O. Box 14100 Las Vegas, NV 89114								TITLE PROJECT MANAGER Date December 17, 1986	

WBS NUMBER AND DESCRIPTION	CURRENT PERIOD						YEAR TO DATE						FISCAL YEAR COMPLETION	
	BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES		BASELINED BUDGET	LATEST REVISED ESTIMATE	VARIANCE	
				SCHEDULE	COST				SCHEDULE	COST				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
121 SYSTEMS	446 188	446 189	399 768	001	55 421	848 378	848 378	781 832	002	57 546	7,457 000	7,419 852	37 148	
122 WASTE PACKAGE	487 982	487 982	376 050	- 000	111 924	914 982	914 983	737 004	001	177 978	8,323 000	7,997 719	325 281	
123 SITE INVESTIGATIONS	1,602 800	1,602 807	1,675 168	- 001	-72 471	3,205 344	3,205 341	3,305 787	- 003	-100 446	20,521 000	21,327 822	-806 822	
124 REPOSITORY INVESTIGATIONS	554 148	554 148	599 784	001	-36 635	1,066 398	1,066 397	1,175 815	001	-109 418	10,324 000	10,100 953	223 047	
125 REGULATORY AND INSTITUTIONAL INVESTIGATIONS	544 110	544 110	553 695	000	-9 585	1,008 228	1,008 228	1,151 886	000	-82 658	5,505 000	5,818 548	-313 548	
126 EXPLORATORY SHAFT INVESTIGATIONS	1,033 991	1,033 991	898 509	- 000	145 582	1,520 482	1,520 482	1,582 487	000	62 005	18,550 000	17,790 287	759 713	
127 TEST FACILITIES	24 821	24 821	27 790	- 000	-2 879	42 642	42 642	45 571	- 000	-2 929	353 000	327 381	25 619	
128 LAND ACQUISITION	000	000	000	000	000	000	000	2 958	000	-2 958	000	000	000	
129 PROJECT MANAGEMENT	1,605 480	1,605 489	1,532 615	000	72 874	3,193 854	3,193 854	3,149 302	000	51 752	18,143 000	18,336 101	-193 101	
1210 FINANCIAL & TECHNICAL ASSISTANCE	273 500	273 501	852 813	001	-378 512	546 910	546 911	825 423	001	-378 512	3,785 000	6,378 700	-2,593 700	
12 MWHI SUBTOTAL	8,572 837	8,572 838	8,687 000	001	-114 252	12,418 486	12,418 486	12,770 215	003	-351 805	90,941 000	94,503 948	-3,562 948	
UNLIMITED BUDGET											1 500 000	1 500 000	000	
MWHI TOTAL											92 500 000	95,003 948	-2,503 948	

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

Page 1

CONTRACTOR		CONTRACT TYPE NO. :		PROJECT NAME/NUMBER		REPORT FISCAL MONTH AND YEAR		SIGNATURE					
MWS Project				NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS		NOV 1987							
LOCATION P.O. Box 14100 Las Vegas, NV 89114								TITLE PROJECT MANAGER					
								Date December 17, 1986					
WBS NUMBER AND DESCRIPTION		CURRENT PERIOD				YEAR TO DATE				FISCAL YEAR COMPLETION			
		BUD. COST OF WORK SCHEDULED	BUD. COST OF WORK PERFORMED	ACTUAL COST OF WORK PERFORMED	VARIANCES SCHEDULE 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)
1211	Systems Management and Integration	16 000	16 000	5 000	000	11 000	22 000	22 000	11 000	450 000	220 167	20 833	
1212	Systems Engineering	100 500	100 500	140 700	000	31 070	540 770	540 770	509 812	34 744	2 047 821	16 170	
1213	Technical Data Base Management	105 000	105 000	61 000	000	44 000	100 000	100 000	147 000	44 000	1 276 812	12 120	
1214	Total Systems Performance Assessment	144 000	144 001	176 000	001	31 990	200 000	200 001	152 000	12 909	3 065 902	16 002	
121	SYSTEMS	446 100	446 100	390 700	001	55 421	840 576	840 576	701 812	57 146	7 457 000	7 410 652	46 348
1221	Management and Integration	53 982	53 982	37 450	000	16 524	86 982	86 982	85 000	21 976	733 000	503 949	229 051
1222	Package Environment	80 000	80 000	83 500	000	3 500	100 000	100 000	150 100	21 000	800 000	800 000	0
1223	Waste Form & Materials Testing	220 000	220 000	185 000	000	34 100	405 000	405 000	347 000	57 101	5 030 000	4 533 054	496 946
1224	Design, Fabricate, and Prototype Testing	45 000	45 000	29 700	000	15 300	85 000	85 000	73 000	12 000	800 000	592 507	207 493
1225	Performance Assessment	70 000	70 000	30 500	000	39 500	150 000	150 000	93 000	65 000	800 000	517 871	282 129
122	WASTE PACKAGE	487 982	487 982	376 650	000	111 924	814 982	814 983	737 000	177 970	8 323 000	7 007 710	1 315 290
1231	Management & Integration	336 070	336 070	315 744	000	20 282	872 052	872 053	852 770	19 274	4 202 000	4 240 430	38 430
1232	Geology	373 000	372 000	336 700	001	36 299	746 000	745 000	709 400	36 598	4 207 000	4 135 530	71 470
1233	Hydrology	347 450	347 450	334 812	000	12 638	604 000	604 000	607 000	17 550	3 007 000	3 751 236	744 236
1234	Geochemistry	200 000	200 001	102 700	001	111 000	561 000	561 001	691 000	131 390	4 233 000	5 040 810	807 810
1235	Drilling	102 340	102 347	99 650	001	2 697	204 650	204 650	190 001	6 547	2 222 000	2 173 740	48 260
1236	Environment	81 003	81 003	80 322	000	681	121 001	121 001	150 000	28 999	850 000	747 451	102 549
1237	License Commitment	30 071	30 071	31 140	000	1 069	76 142	76 142	80 000	13 457	554 000	654 261	100 261
1238	Geotechnical Modeling Code EQ3/6	84 000	84 000	44 300	000	39 700	127 000	127 000	124 000	1 001	554 000	562 221	8 221
1239	Deferred Site Close Out	0	0	0	000	0	0	0	0	0	0	0	0
123	SITE INVESTIGATIONS	1 002 000	1 002 007	1 675 100	001	72 471	3 205 344	3 205 345	3 305 707	100 445	20 521 000	21 322 821	801 821
1241	Management and Integration	195 240	195 240	202 764	000	7 516	300 400	300 407	445 615	55 110	3 252 000	3 303 852	51 852
1242	Design and Testing	200 000	200 000	111 000	000	89 000	400 000	400 001	407 000	12 000	3 252 000	3 045 111	206 889
1243	Excavation	11 100	11 100	7 000	000	4 100	80 100	80 100	70 000	11 100	1 070 000	903 000	167 000
1244	Excavation and Maintenance	17 700	17 700	10 000	000	7 700	24 100	24 100	21 000	3 100	870 000	1 193 200	323 200
1245	Decontamination	2 100	2 100	0	000	2 100	2 100	2 100	0	2 100	70 000	0	67 900
1246	Repository Performance Assessment	10 000	10 000	31 000	000	21 000	20 000	19 999	73 000	53 001	1 421 000	804 000	617 000
124	REPOSITORY INVESTIGATIONS	554 140	554 140	500 764	001	36 815	1 066 706	1 066 707	1 175 615	109 210	10 374 000	10 100 911	273 089
1251	Management and Integration	37 907	37 907	29 337	000	8 570	75 814	75 814	87 830	0 104	816 000	816 000	0
1252	Excavation	433 462	433 462	456 450	000	22 988	866 924	866 924	945 021	78 097	3 043 000	3 935 811	892 811
1253	Environmental Compliance	43 300	43 300	40 505	000	2 795	86 736	86 736	81 150	5 572	466 000	808 514	342 514
1254	Communication and Liaison	20 373	20 373	27 403	000	1 970	50 746	50 746	57 075	1 671	470 000	464 401	5 599
1255	Technology and Financial Assistance	0	0	0	000	0	0	0	0	0	0	0	0
125	REGULATORY AND INSTITUTIONAL INVESTIGATIONS	544 110	544 110	551 605	000	8 505	1 008 270	1 008 270	1 151 006	62 864	5 505 000	5 810 540	305 540
1261	Management and Integration	335 004	335 004	302 792	000	32 212	647 400	647 400	600 974	46 426	5 056 000	6 502 314	1 446 314
1262	Site Preparation	0	0	100	000	100	0	0	0	100	202 000	202 000	0
1263	Surface Facilities	0	0	2 200	000	2 200	0	0	0	2 200	131 000	131 000	0
1264	First Shaft	3 731	3 731	5 853	000	2 122	7 462	7 462	10 200	2 738	233 000	205 195	27 805
1265	Second Shaft	0	0	0	000	0	0	0	0	0	187 000	167 000	20 000
1266	Subsurface Excavations	45 450	45 450	48 434	000	2 984	90 812	90 812	81 000	9 812	410 000	422 500	12 500
1267	Underground Service Systems	2 100	2 100	5 500	000	3 400	4 200	4 200	7 650	3 450	1 010 000	928 701	81 299
1268	Operations	500	500	2 700	000	2 200	2 700	2 700	6 000	2 700	5 000	0	2 300
1269	Testing	847 020	847 020	442 600	000	204 420	767 720	767 720	894 170	71 400	9 242 000	8 972 401	269 599
126	EXPLORATORY SHAFT INVESTIGATIONS	1 031 001	1 031 001	849 100	000	181 901	1 520 402	1 520 402	1 502 402	17 000	18 550 000	17 700 207	849 793
1271	Management and Integration	0	0	0	000	0	0	0	0	0	0	0	0
1272	Testing	24 821	24 821	27 100	000	2 279	42 642	42 642	45 521	2 879	353 000	327 101	25 899
1273	New Facility Requirements	0	0	0	000	0	0	0	0	0	0	0	0

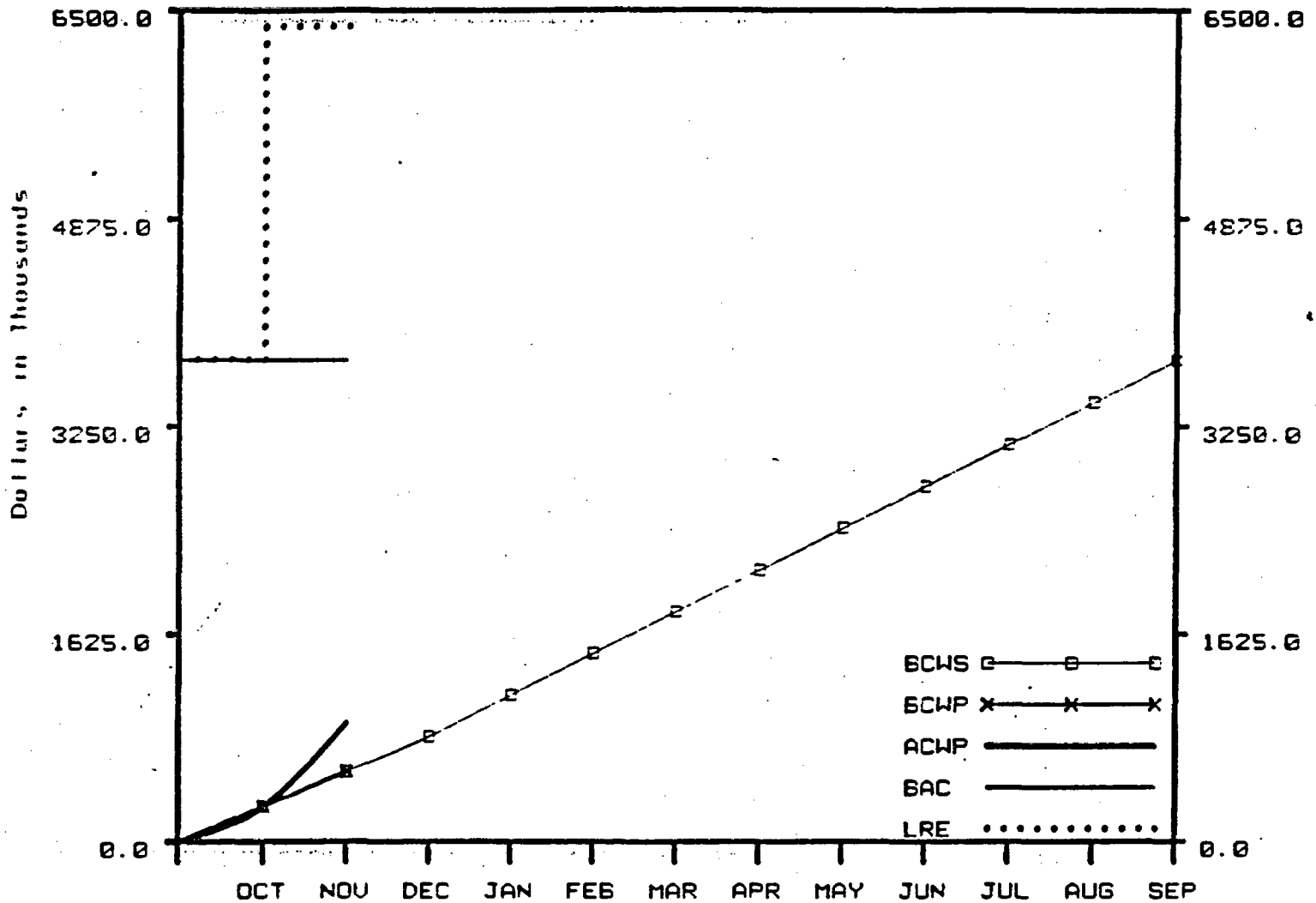
**COST PERFORMANCE REPORT - LEVEL 4  
WORK BREAKDOWN STRUCTURE (FORMAT 1)  
U.S. DEPARTMENT OF ENERGY**

PMT

CONTRACTOR		CONTRACT TYPE NO.:		PROJECT NAME/NUMBER		REPORT FISCAL MONTH AND YEAR		SIGNATURE	
NMWSI Project				NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS		NEW 1987			
LOCATION								TITLE	
P O Box 14100								PROJECT MANAGER	
Las Vegas, NV 89114								Date December 17, 1988	

WBS NUMBER AND DESCRIPTION	CURRENT PERIOD						YEAR TO DATE						FISCAL YEAR COMPLETION			VARIANCE
	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				
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)			
127 TEST FACILITIES	24 821	24 821	27 700	- 000	-2 879	42 642	42 642	45 521	- 000	2 879	353 000	327 581	- 410			
1281 Land Acquisition	000	000	000	000	000	000	000	2 956	000	-2 956	000	000	000			
128 LAND ACQUISITION	000	000	000	000	000	000	000	2 956	000	2 956	000	000	000			
1291 Management and Integration	851 576	851 576	844 479	000	7 097	1,690 228	1,690 228	1,701 250	000	11 022	8,791 000	8,347 000	- 444 000			
1292 Project Control	275 920	275 920	232 895	- 000	43 025	546 810	546 810	500 495	- 000	46 315	3,283 000	2,871 000	- 412 000			
1293 Quality Assurance	396 383	396 383	373 642	000	22 751	782 786	782 786	776 577	000	6 209	5,049 000	4,877 916	- 171 084			
1299 NIS Allocation	81 000	81 000	81 000	000	000	163 200	163 200	163 200	000	000	1,020 000	1,020 000	000			
129 PROJECT MANAGEMENT	1,605 409	1,605 409	1,532 615	000	72 874	3,193 054	3,193 054	3,141 502	000	51 752	18,143 000	18,336 181	- 193 181			
12101 Financial & Technical Assistance	273 500	273 501	652 813	001	-378 512	546 810	546 811	825 423	001	-378 512	3,765 000	8,370 700	- 4,605 700			
1210 FINANCIAL & TECHNICAL ASSISTANCE	273 500	273 501	652 813	001	-378 512	546 810	546 811	825 423	001	-378 512	3,765 000	8,370 700	- 4,605 700			
12 NMWSI - SUBTOTAL	6,572 837	6,572 838	6,647 000	001	-114 252	12,418 406	12,418 408	12,770 215	003	-351 805	98,841 000	94,583 840	- 4,257 160			
UNDISTRIBUTED BUDGET											1,398 000	1,398 000	000			
NMWSI TOTAL											92,339 000	85,981 840	- 6,357 160			

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



## FINANCIAL & TECHNICAL ASSISTANCE

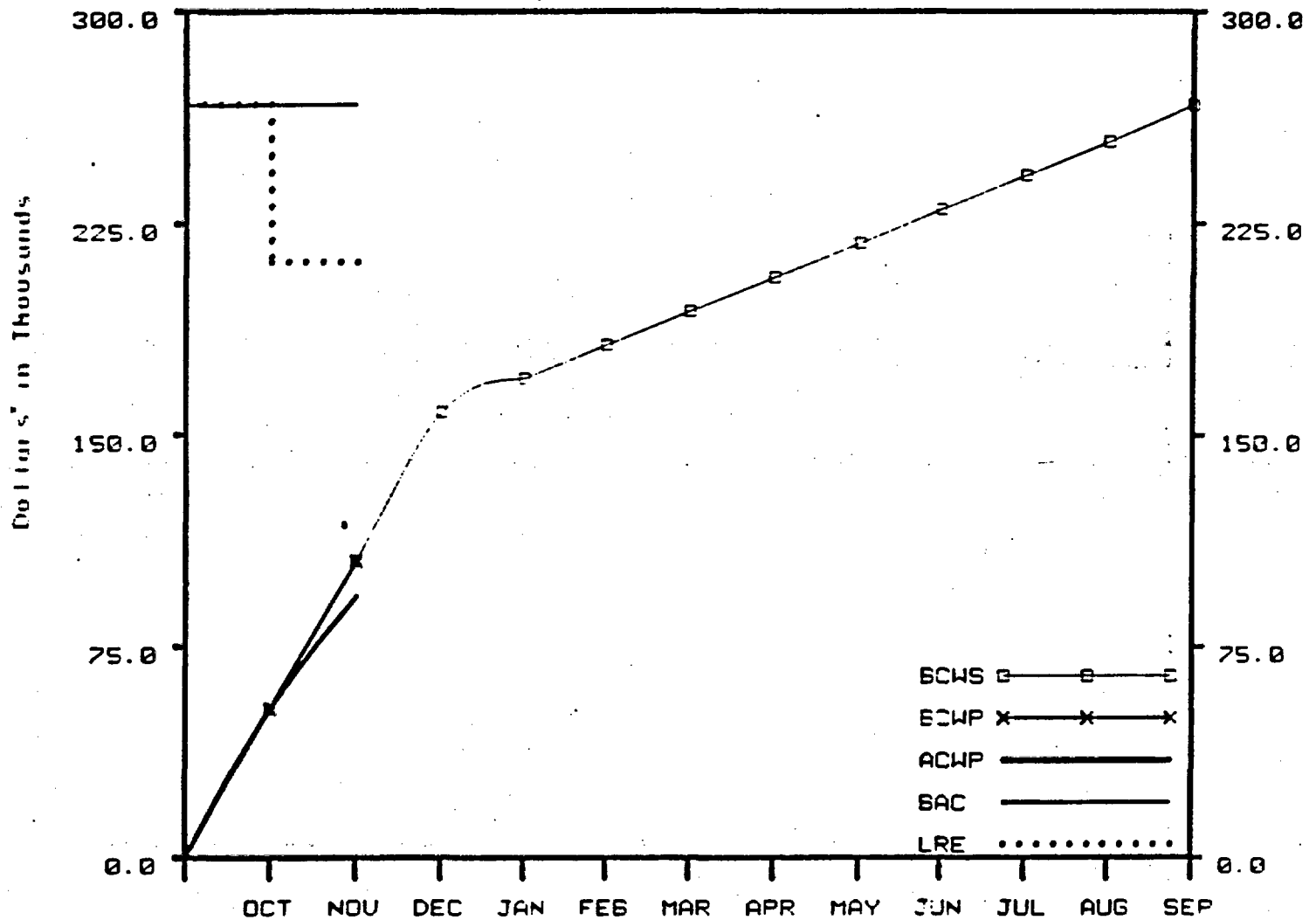
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	273.5	546.9
B. BUDGETED COST OF WORK PERFORMED (BCWP)	273.5	546.9
C. ACTUAL COST OF WORK PERFORMED (ACWP)	652.0	925.4
D. BUDGET AT COMPLETION (BAC)		3765.0
E. LATEST REVISED ESTIMATE (LRE)		6370.7

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-378.5	-69.21
H. AT COMPLETION VARIANCE (D-E)	-2605.7	-69.21

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR NOV 1986 WBS: 1.2.6



## LBL - TOTAL

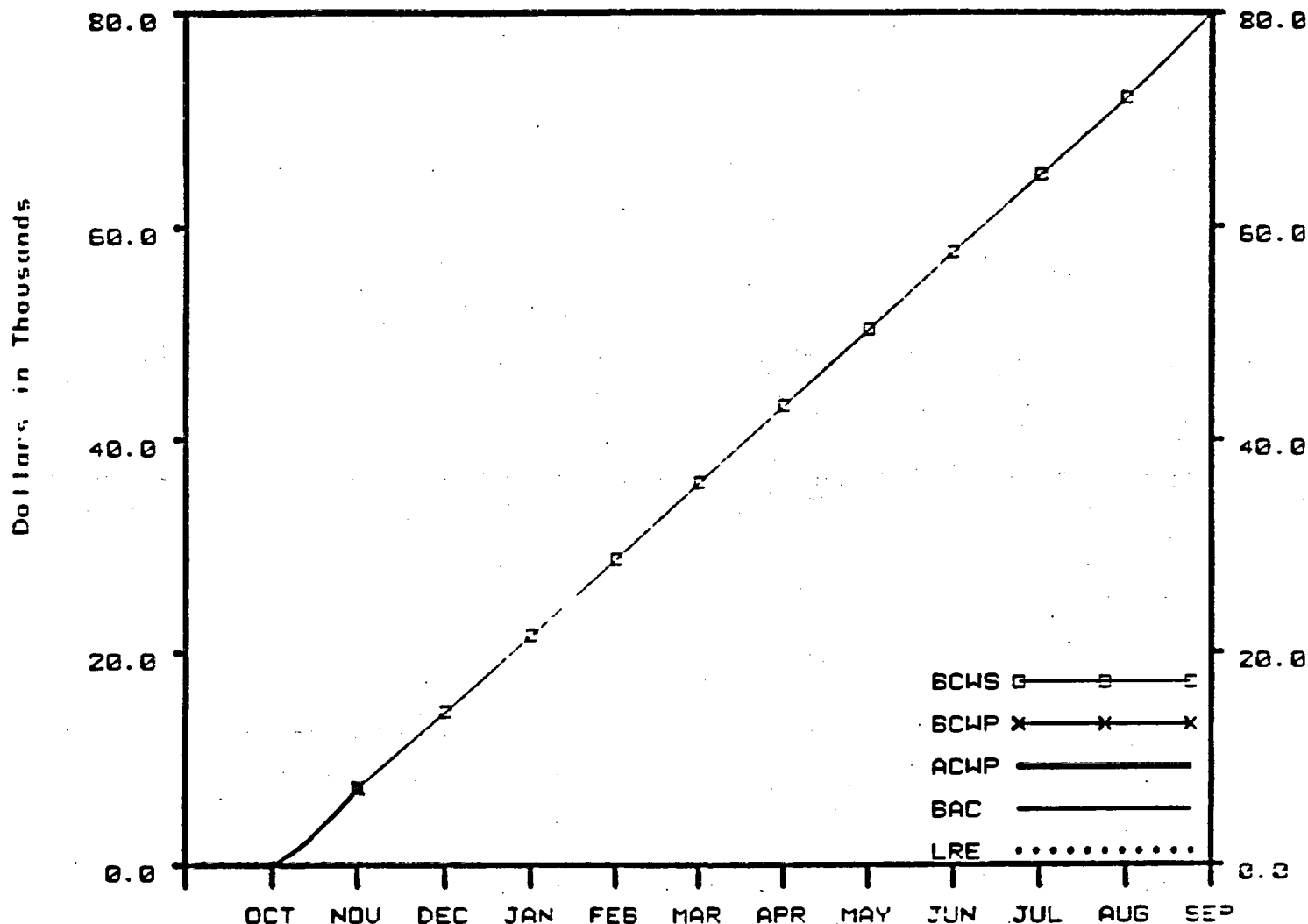
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	52.7	105.3
B. BUDGETED COST OF WORK PERFORMED (BCWP)	52.7	105.3
C. ACTUAL COST OF WORK PERFORMED (ACWP)	39.8	92.5
D. BUDGET AT COMPLETION (BAC)		267.0
E. LATEST REVISED ESTIMATE (LRE)		211.2

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	12.8	12.19
H. AT COMPLETION VARIANCE (D-E)	55.8	20.89

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR NOV 1986 WBS: 1.2.C



## CSC-TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	7.2	7.2
B. BUDGETED COST OF WORK PERFORMED (BCWP)	7.2	7.2
C. ACTUAL COST OF WORK PERFORMED (ACWP)	0.0	0.0
D. BUDGET AT COMPLETION (BAC)		80.0
E. LATEST REVISED ESTIMATE (LRE)		0.0

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	7.2	100.00
H. AT COMPLETION VARIANCE (D-E)	80.0	100.00

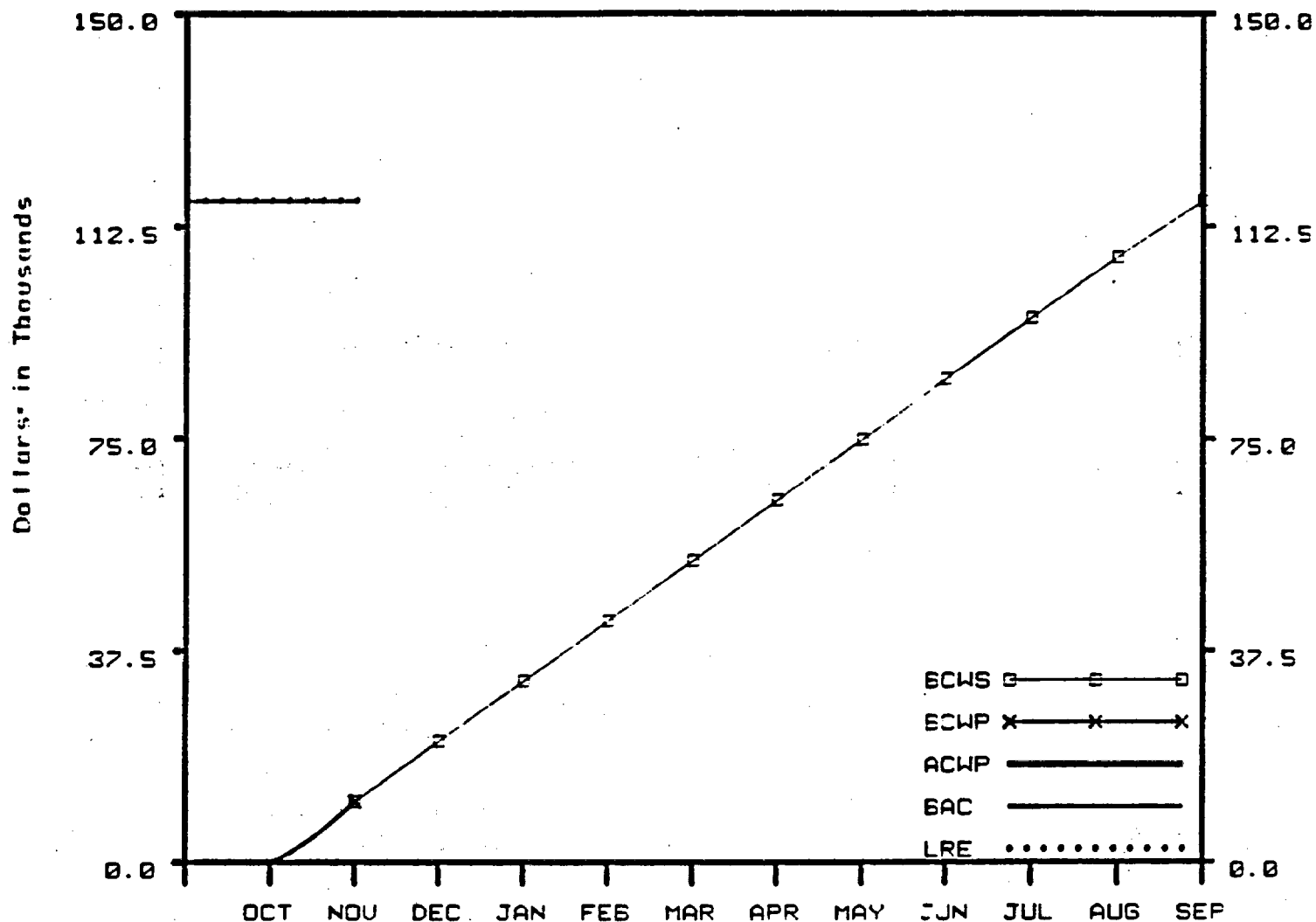
Remarks:



# NNWSI PROJECT

## COST PERFORMANCE GRAPH FOR NOV 1986

### WBS: 1.2.D



#### HEDL-TOTAL

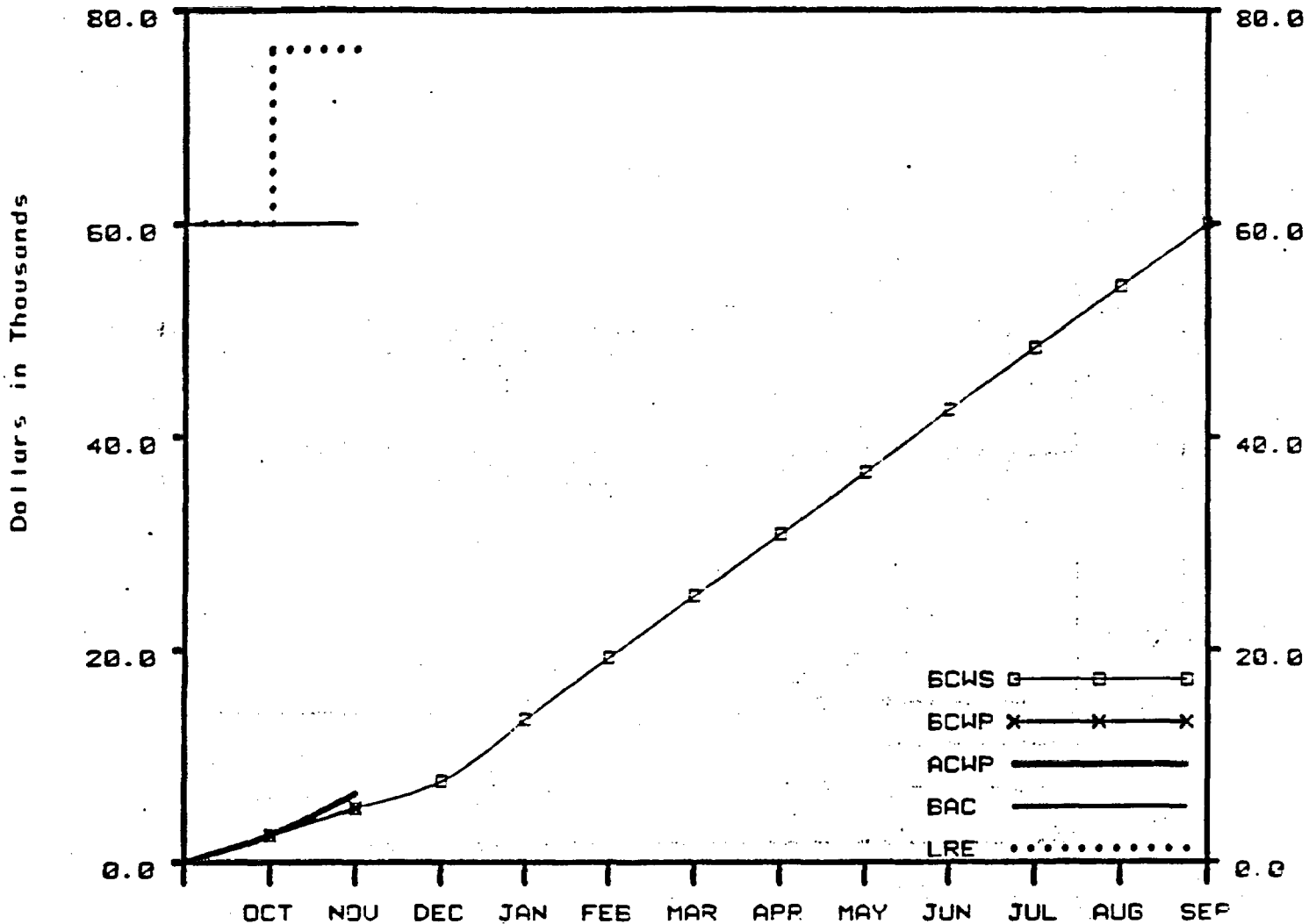
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	10.7	10.7
B. BUDGETED COST OF WORK PERFORMED (BCWP)	10.7	10.7
C. ACTUAL COST OF WORK PERFORMED (ACWP)	0.0	0.0
D. BUDGET AT COMPLETION (BAC)		117.0
E. LATEST REVISED ESTIMATE (LRE)		117.0

#### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	10.7	100.00
H. AT COMPLETION VARIANCE (D-E)	0.0	0.00

Remarks:

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



## EG&G - TOTAL

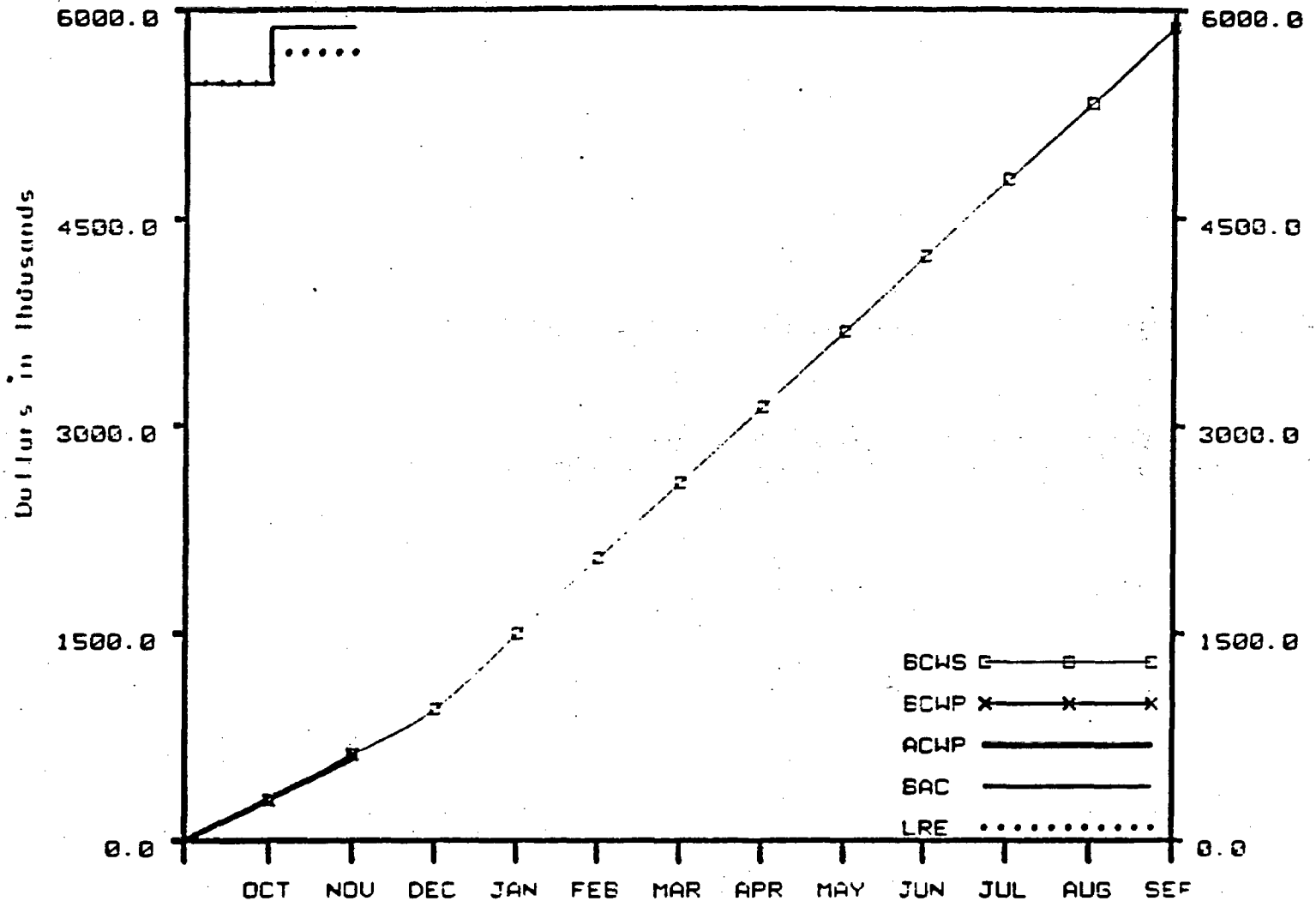
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	2.5	5.1
B. BUDGETED COST OF WORK PERFORMED (BCWP)	2.5	5.1
C. ACTUAL COST OF WORK PERFORMED (ACWP)	3.9	6.5
D. BUDGET AT COMPLETION (BAC)		60.0
E. LATEST REVISED ESTIMATE (LRE)		76.2

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-1.4	-27.02
H. AT COMPLETION VARIANCE (D-E)	-16.2	-27.02

Remarks:

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



## F&S - TOTAL

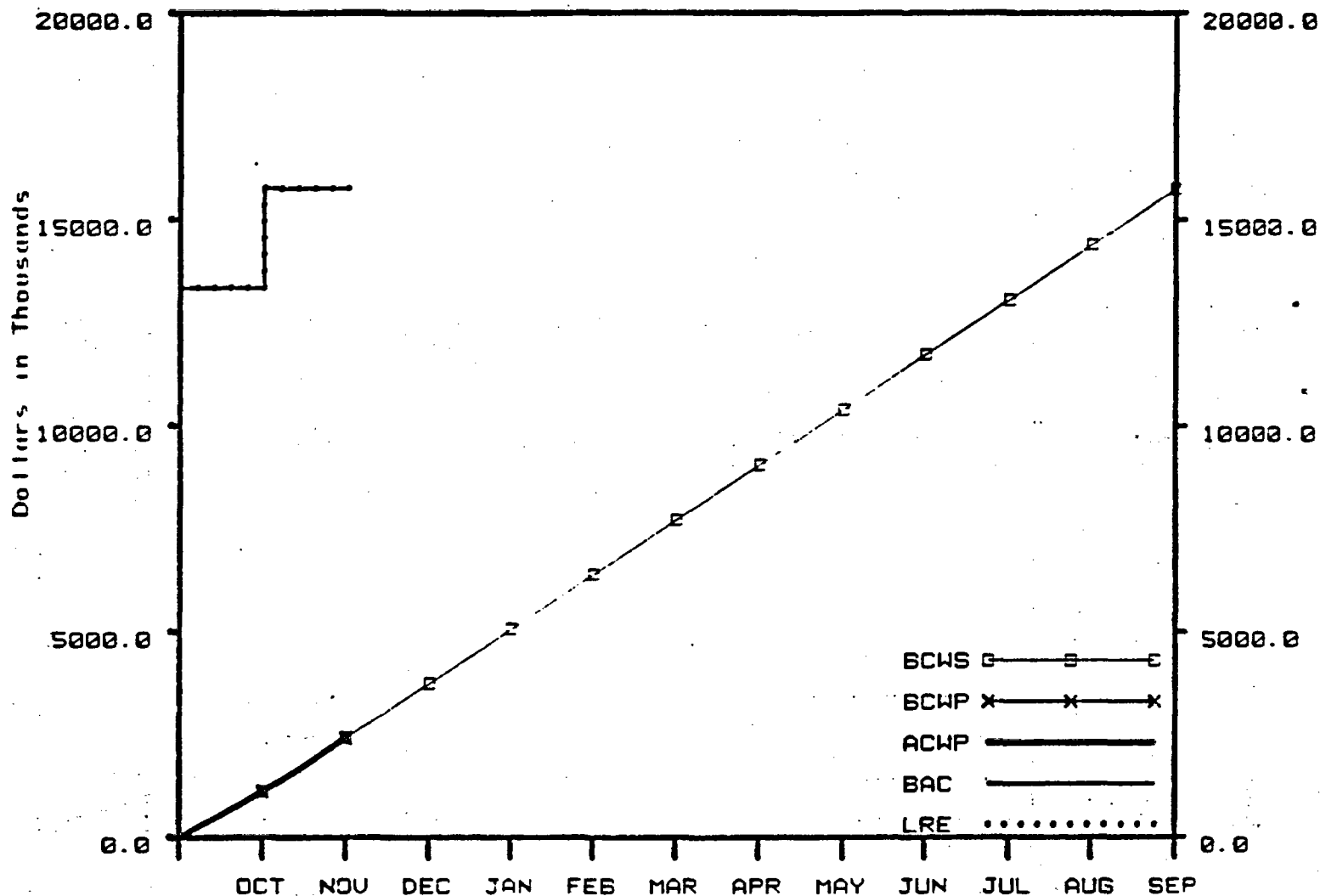
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	328.8	621.5
B. BUDGETED COST OF WORK PERFORMED (BCWP)	328.8	621.5
C. ACTUAL COST OF WORK PERFORMED (ACWP)	297.4	593.1
D. BUDGET AT COMPLETION (SAC)		5871.0
E. LATEST REVISED ESTIMATE (LRE)		5688.6

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	28.5	4.58
H. AT COMPLETION VARIANCE (D-E)	182.4	3.11

Remarks:

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



## USGS - TOTAL

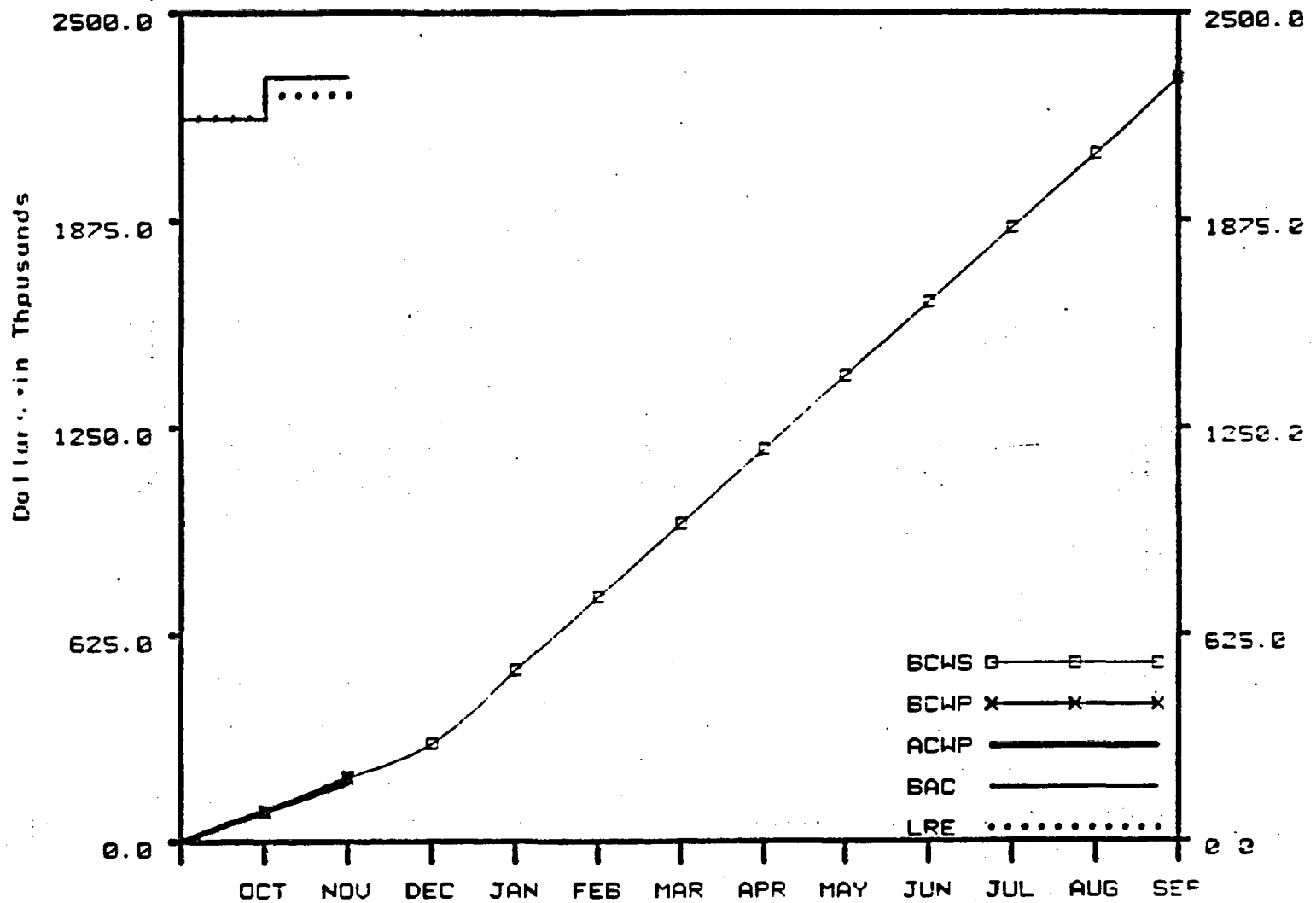
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1311.8	2422.2
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1311.8	2422.2
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1311.8	2422.2
D. BUDGET AT COMPLETION (BAC)		15739.0
E. LATEST REVISED ESTIMATE (LRE)		15739.0

## 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:

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



## H&N - TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	102.3	193.7
B. BUDGETED COST OF WORK PERFORMED (BCWP)	102.3	193.7
C. ACTUAL COST OF WORK PERFORMED (ACWP)	86.5	177.9
D. BUDGET AT COMPLETION (BAC)		2304.0
E. LATEST REVISED ESTIMATE (LRE)		2250.4

## VARIANCES (Year To Date)

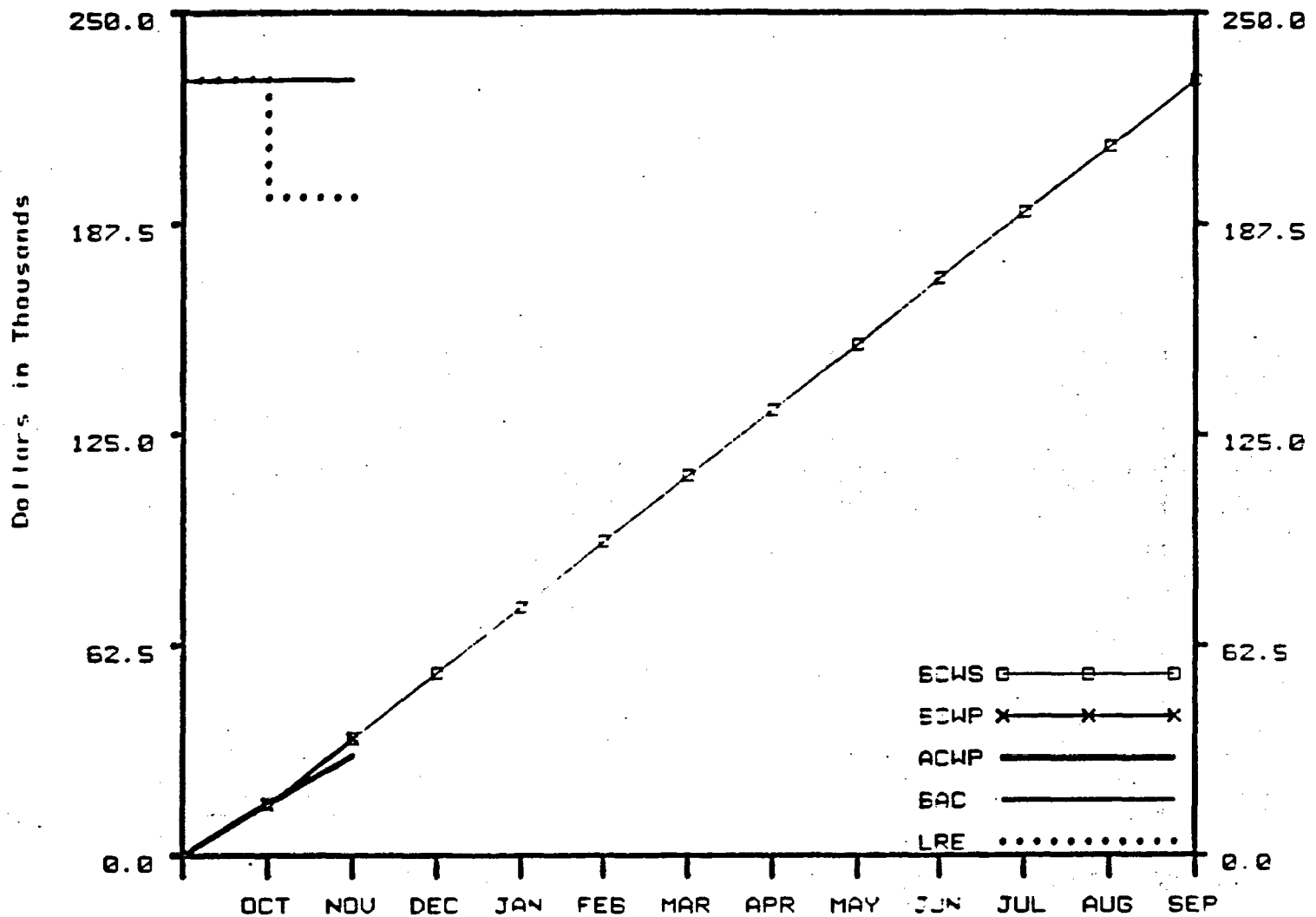
	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	15.8	8.17
H. AT COMPLETION VARIANCE (D-E)	53.6	2.33

Remarks:

# NNWSI PROJECT

## COST PERFORMANCE GRAPH FOR NOV 1986

### WBS: 1.2.1



#### WSI - TOTAL

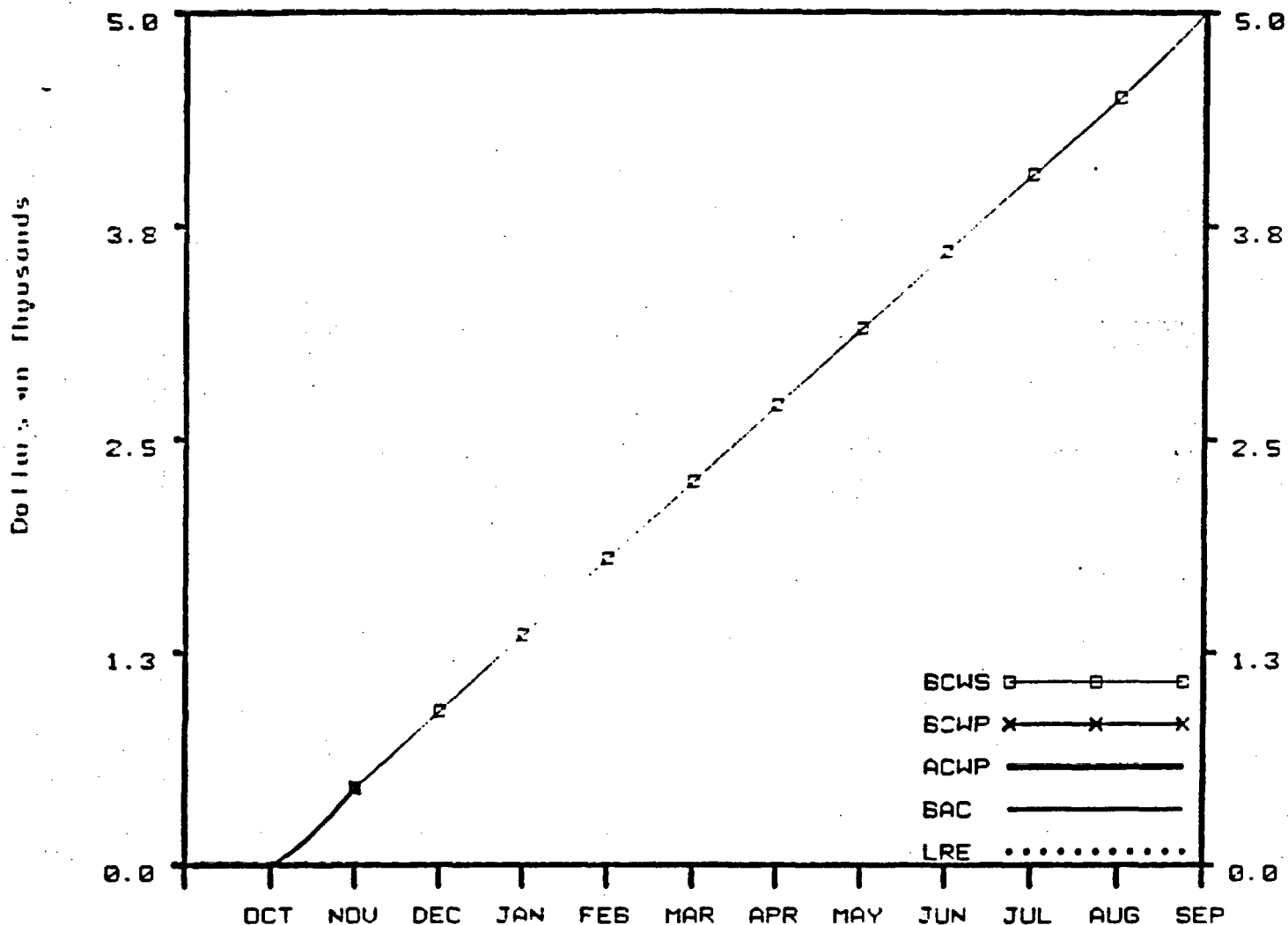
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	19.5	34.8
B. BUDGETED COST OF WORK PERFORMED (BCWP)	19.5	34.8
C. ACTUAL COST OF WORK PERFORMED (ACWP)	14.3	29.5
D. BUDGET AT COMPLETION (BAC)		230.0
E. LATEST REVISED ESTIMATE (LRE)		195.3

#### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	5.2	15.10
H. AT COMPLETION VARIANCE (D-E)	34.7	15.10

Remarks:

# NNWSI PROJECT COST PERFORMANCE GRAPH FOR NOV 1986 WBS: 1.2.J



## OSTI/TC-TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	0.4	0.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	0.4	0.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	0.0	0.0
D. BUDGET AT COMPLETION (BAC)		5.0
E. LATEST REVISED ESTIMATE (LRE)		0.0

## VARIANCES (Year To Date)

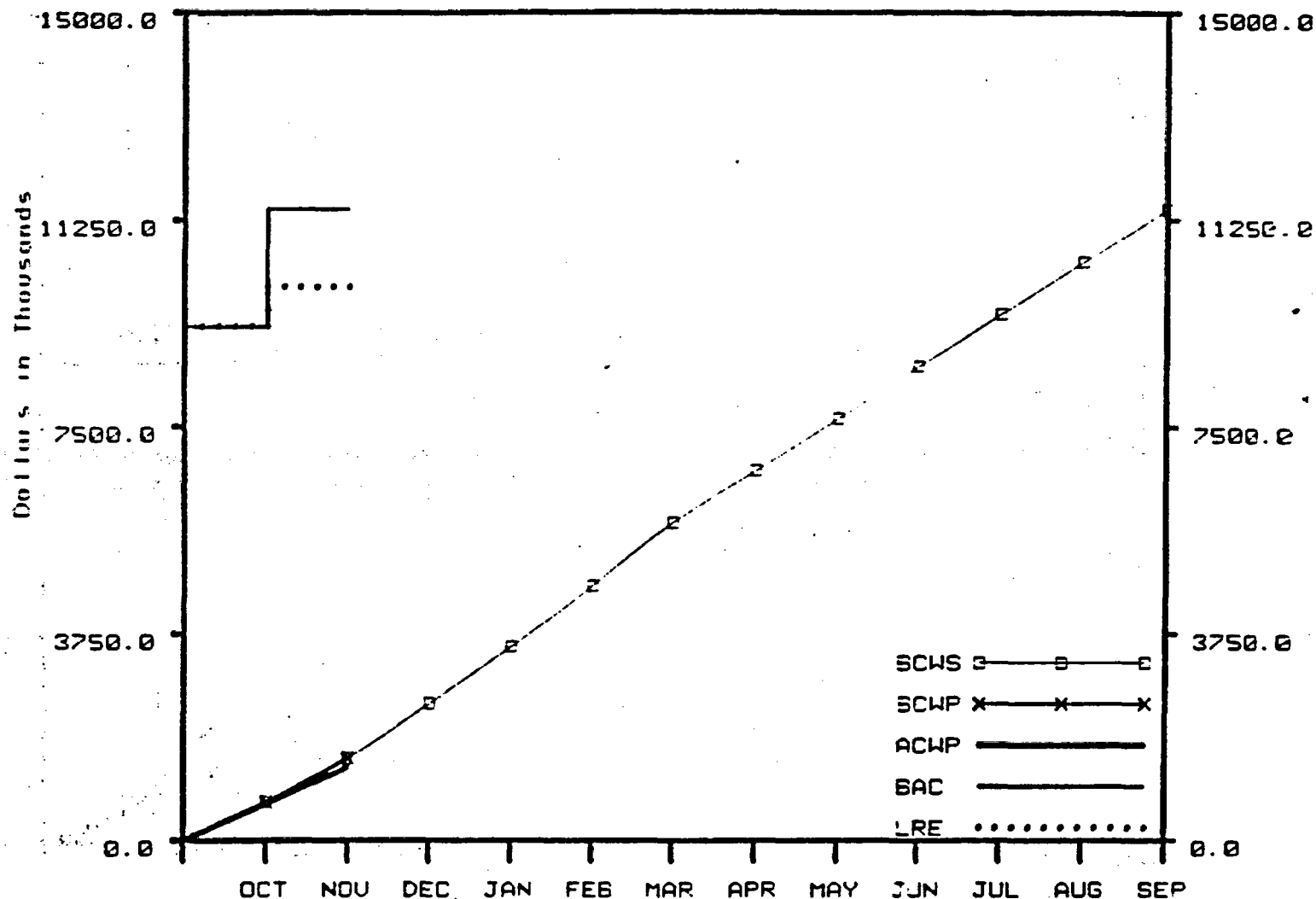
	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	0.4	100.00
H. AT COMPLETION VARIANCE (D-E)	5.0	100.00

Remarks:

# NNWSI PROJECT

## COST PERFORMANCE GRAPH FOR NOV 1986

### WBS: 1.2.L



#### LLNL - TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	795.2	1485.2
B. BUDGETED COST OF WORK PERFORMED (BCWP)	795.2	1485.2
C. ACTUAL COST OF WORK PERFORMED (ACWP)	659.3	1321.8
D. BUDGET AT COMPLETION (BAC)		11440.0
E. LATEST REVISED ESTIMATE (LRE)		10022.8

#### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	163.4	11.00
H. AT COMPLETION VARIANCE (D-E)	1417.2	12.39

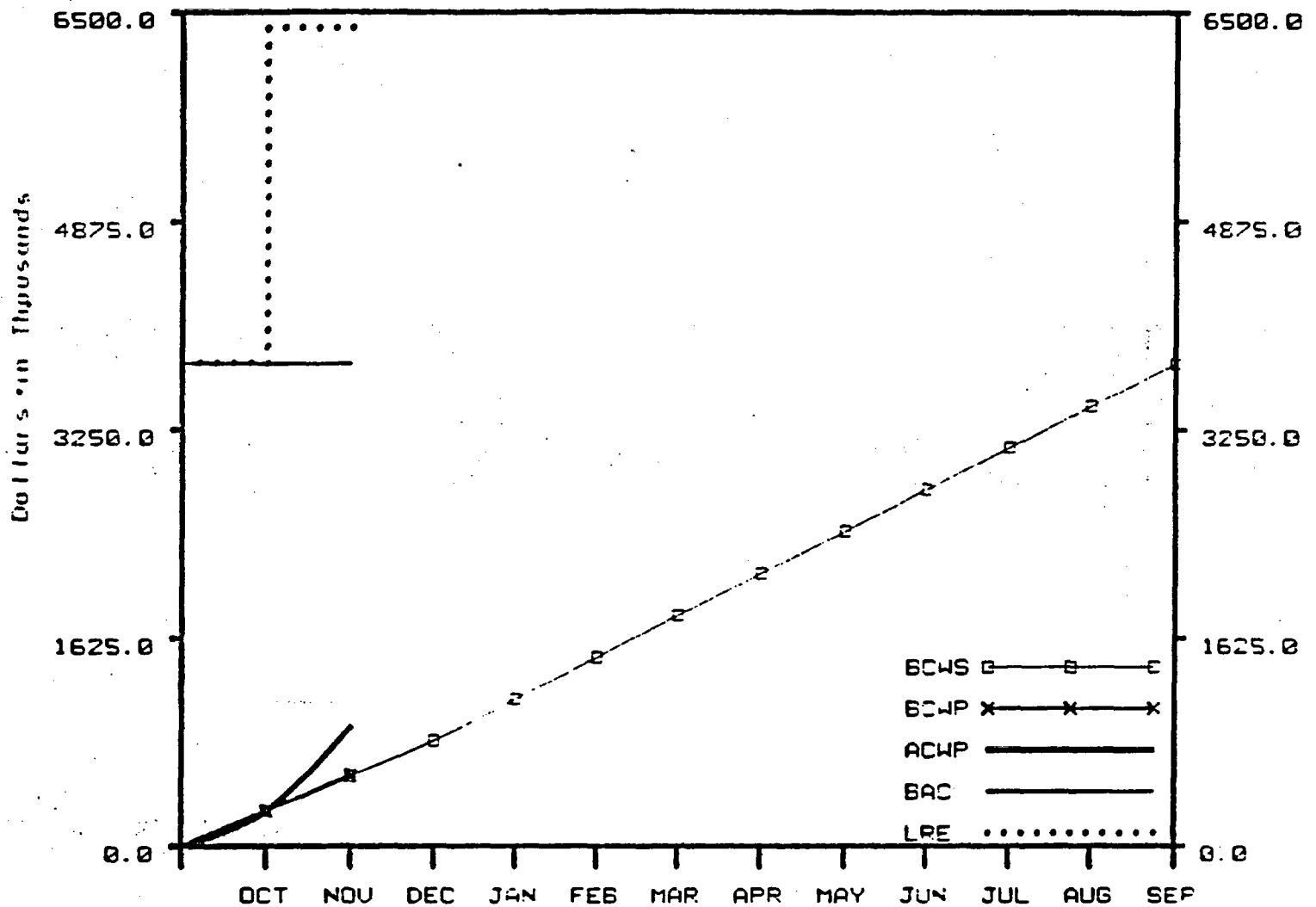
Remarks:



# NNWSI PROJECT

## COST PERFORMANCE GRAPH FOR NOV 1986

### WBS: 1.2.N



#### STATE - TOTAL

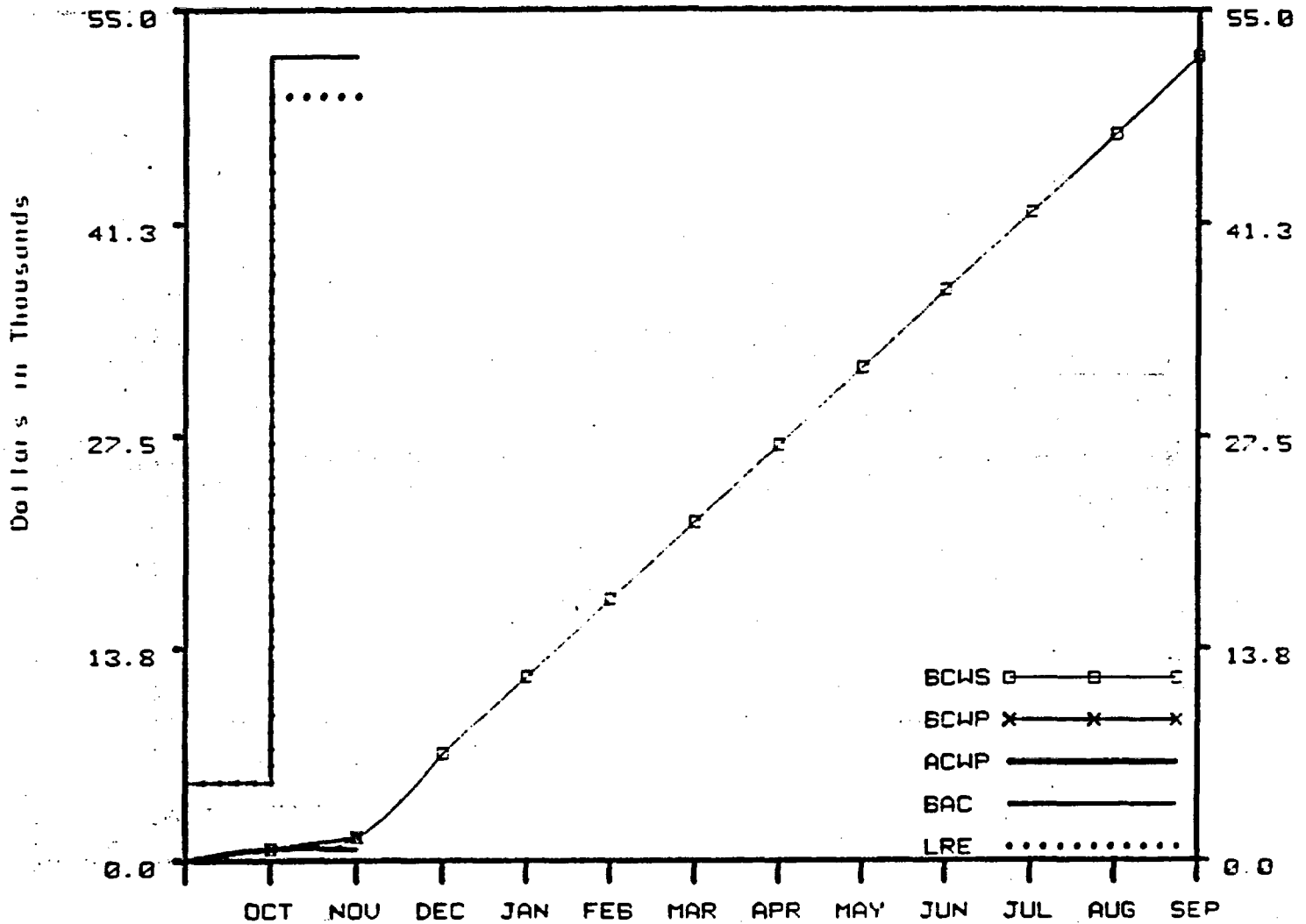
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	273.5	546.9
B. BUDGETED COST OF WORK PERFORMED (BCWP)	273.5	546.9
C. ACTUAL COST OF WORK PERFORMED (ACWP)	652.0	925.4
D. BUDGET AT COMPLETION (BAC)		3765.0
E. LATEST REVISED ESTIMATE (LRE)		6370.7

#### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-378.5	-69.21
H. AT COMPLETION VARIANCE (D-E)	-2605.7	-69.21

Remarks:

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



## PAN AM - TOTAL

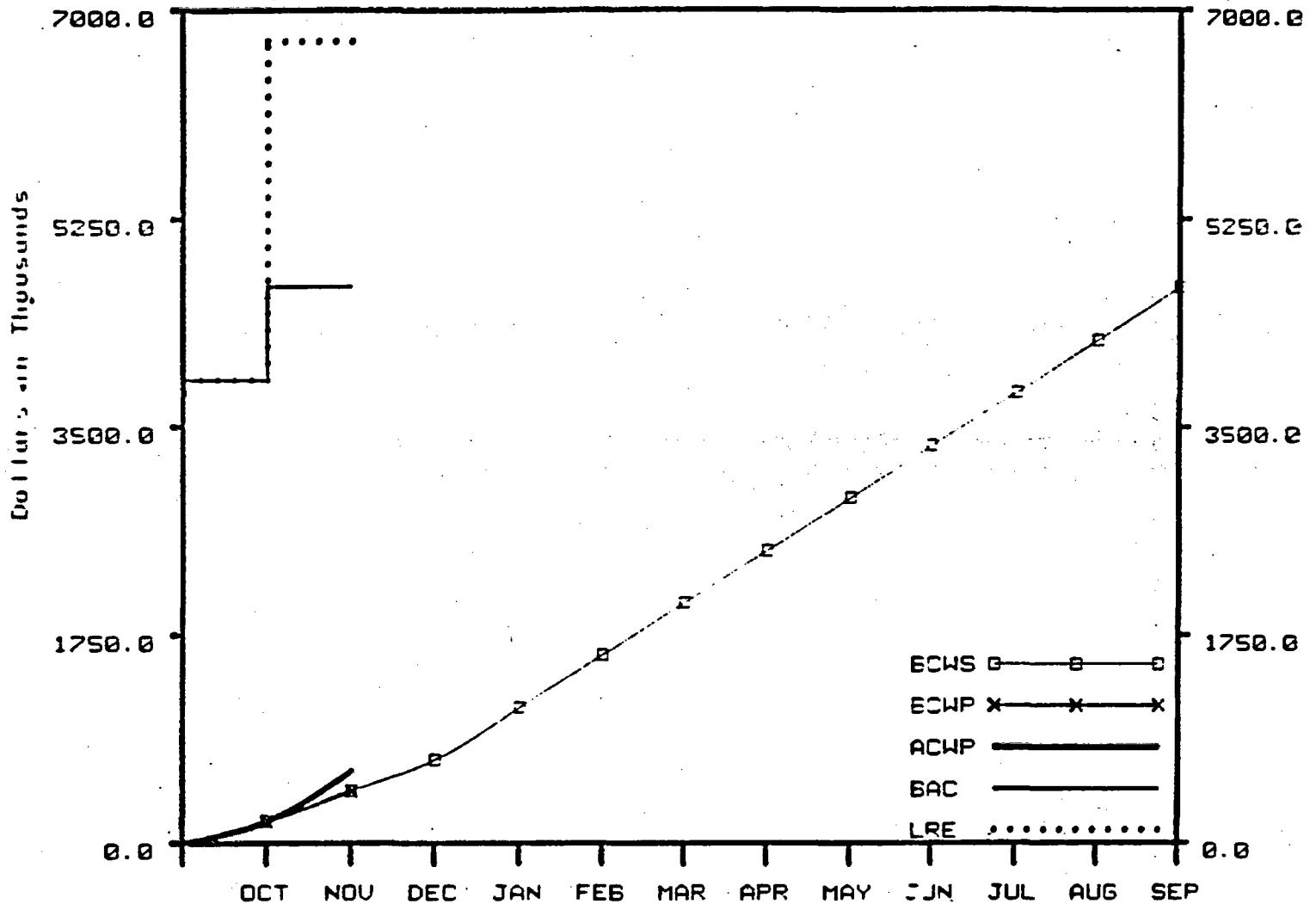
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	0.8	1.5
B. BUDGETED COST OF WORK PERFORMED (BCWP)	0.8	1.5
C. ACTUAL COST OF WORK PERFORMED (ACWP)	0.0	0.7
D. BUDGET AT COMPLETION (BAC)		52.0
E. LATEST REVISED ESTIMATE (LRE)		49.4

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	0.8	51.26
H. AT COMPLETION VARIANCE (D-E)	2.6	4.93

Remarks:

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



## REECO - TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	259.9	441.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	259.9	441.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	422.7	602.8
D. BUDGET AT COMPLETION (BAC)		4678.0
E. LATEST REVISED ESTIMATE (LRE)		6732.2

## VARIANCES (Year To Date)

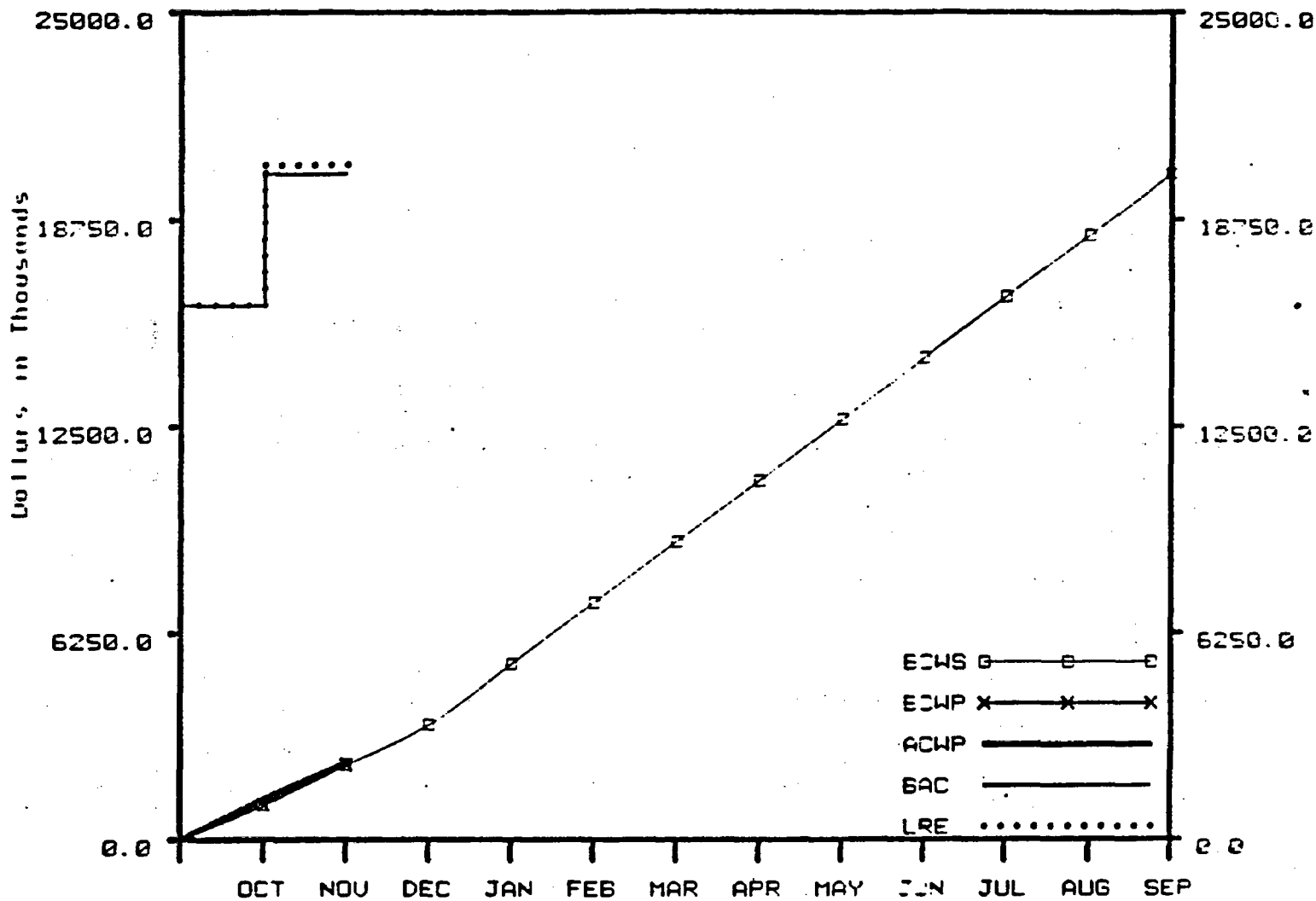
	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-161.4	-36.57
H. AT COMPLETION VARIANCE (D-E)	-2054.2	-43.91

Remarks:

# NNWSI PROJECT

## COST PERFORMANCE GRAPH FOR NOV 1986

### WBS: 1.2.5



#### SNL - TOTAL

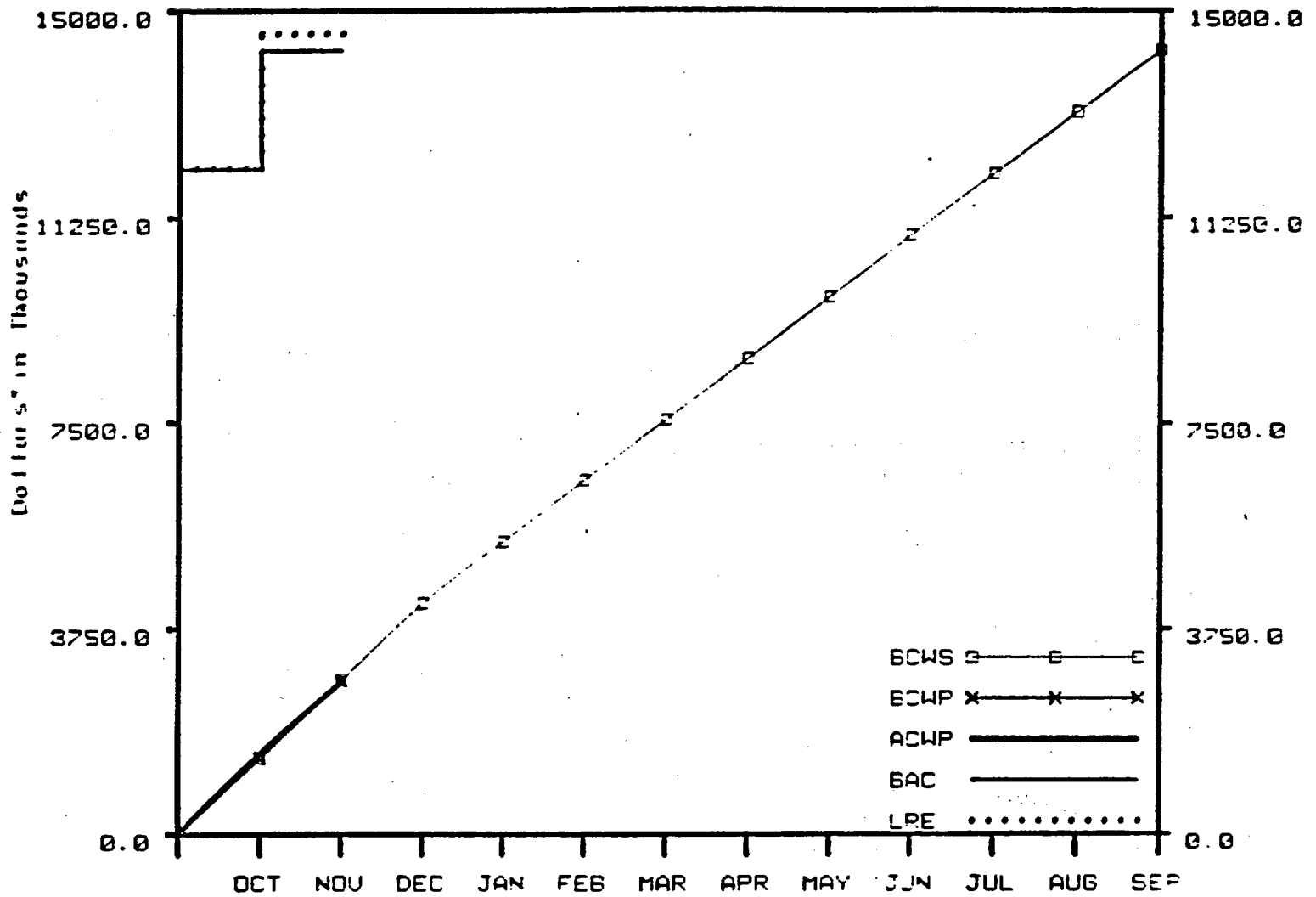
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1212.7	2266.7
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1212.7	2266.7
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1106.0	2318.0
D. BUDGET AT COMPLETION (BAC)		20131.0
E. LATEST REVISED ESTIMATE (LRE)		20392.5

#### VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	-51.3	-2.26
H. AT COMPLETION VARIANCE (D-E)	-261.5	-1.30

Remarks:

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



## SAIC - TOTAL

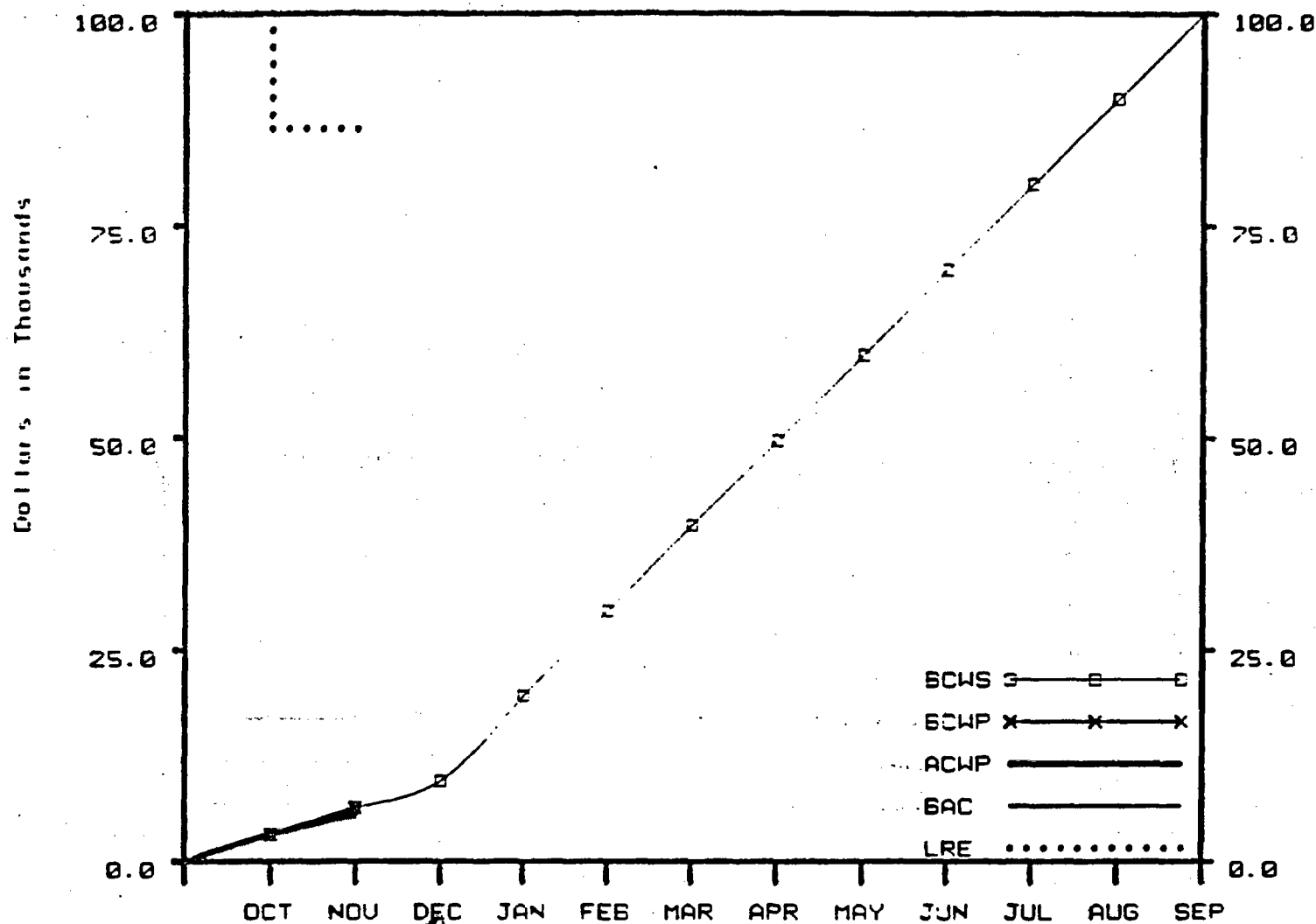
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	1417.8	2799.4
B. BUDGETED COST OF WORK PERFORMED (BCWP)	1417.8	2799.4
C. ACTUAL COST OF WORK PERFORMED (ACWP)	1320.7	2777.2
D. BUDGET AT COMPLETION (BAC)		14272.0
E. LATEST REVISED ESTIMATE (LRE)		14568.5

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	22.2	0.79
H. AT COMPLETION VARIANCE (D-E)	-295.5	-2.08

Remarks:

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



## DRI - TOTAL

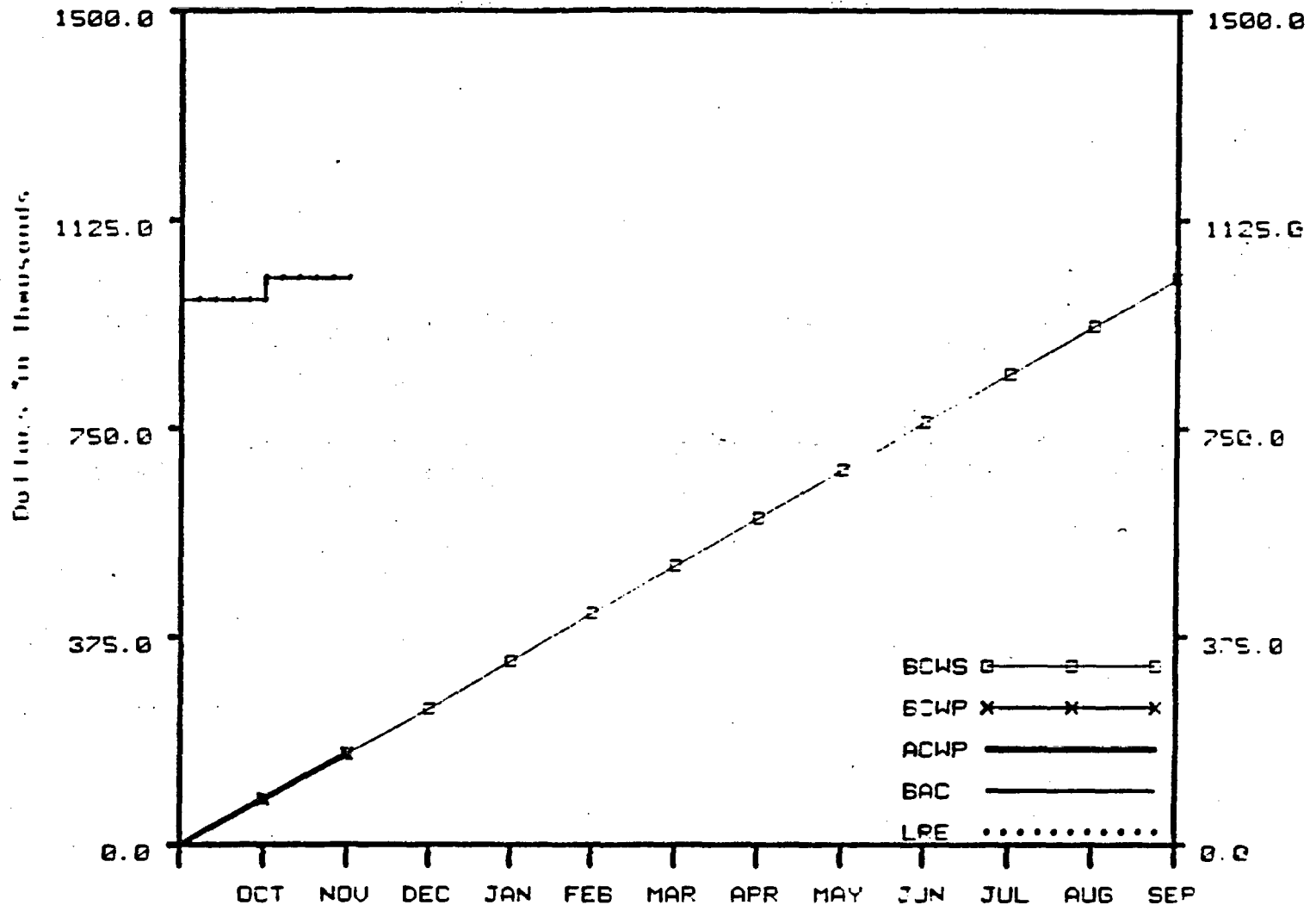
	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	3.2	6.3
B. BUDGETED COST OF WORK PERFORMED (BCWP)	3.2	6.3
C. ACTUAL COST OF WORK PERFORMED (ACWP)	2.3	5.4
D. BUDGET AT COMPLETION (BAC)		100.0
E. LATEST REVISED ESTIMATE (LRE)		86.4

## VARIANCES (Year To Date)

	Dollars	Percent
F. SCHEDULE VARIANCE (B-A)	0.0	0.00
G. COST VARIANCE (B-C)	0.9	13.65
H. AT COMPLETION VARIANCE (D-E)	13.6	13.65

Remarks:

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



## NTS - TOTAL

	Current Period	Year To Date
A. BUDGETED COST OF WORK SCHEDULED (BCWS)	81.6	163.2
B. BUDGETED COST OF WORK PERFORMED (BCWP)	81.6	163.2
C. ACTUAL COST OF WORK PERFORMED (ACWP)	81.6	163.2
D. BUDGET AT COMPLETION (BAC)		1020.0
E. LATEST REVISED ESTIMATE (LRE)		1020.0

## 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:

Run Date: 01 Dec 1986

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	BASLINE DATE	FORECAST (F) or ACTUAL (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	P109 (P)	26 Nov 86	16 Feb 87 (F)
WMPO submits letter report on Studies of Performance Allocation Included in SCP to OGR	1.2.1.1	Robson	1	WMPO/SNI	P108 (B)	16 Feb 87	
WMPO submits Annual PASS Program Interaction Letter Report for FY87 to OGR	1.2.1.1	Robson	1	WMPO/SNI	P132 (B)	30 Sep 87	
Yucca Mountain Mined Geologic Disposal System (MGDS) Requirements	1.2.1.2.1	Robson	1	WMPO/SNI	M120 (B)	31 Mar 87	15 May 87 (F)
Draft Yucca Mountain Site-Specific Mined Geologic Disposal System (MGDS) Description	1.2.1.2.1	Robson	1	WMPO/SNI	M261 (B)	30 Jun 87	
System Engineering Management Plan (SEMP)	1.2.1.2.4	Robson	1	WMPO/SNI	M108 (B)	16 Feb 87	
OGR Systems Engineering Review of the NNWSI Project	1.2.1.2.4	Robson	1	WMPO/SNI	P074 (B)	15 Mar 87	
WMPO submits hard copy (1987 Annual) version of the Reference Information Base to INR	1.2.1.3.3	Livingston	1	WMPO/SNI	P092 (B)	29 May 87	
Waste Package Postclosure Compliance Strategy Document	1.2.2.1	Valentine	1	WMPO/LLNL	P001 (B)	30 Jan 87	
Progress Report on the Results of Testing Advanced Conceptual Design Metal Barrier Materials Under Relevant Environmental Conditions for a Luff Repository	1.2.2.3.2	Valentine	1	WMPO/LLNL	M236 (B)	30 Jan 87	30 Apr 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	
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	14 Aug 87 (F)
Initiate Waste Package Advanced Conceptual Design	1.2.2.4	Valentine	1	WMPO/LLNL	M253 (B)	30 Sep 87	
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 (F)
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 Jul 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	
Recommendation to Proceed With Deep Regional Seismic Survey to OGR for Approval	1.2.3.2.2	Rotert	1	WMPO/USGS	P845 (B)	31 Aug 87	



Run Date: 01 Dec 1986

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

(R)-Rebaseline  
(P)-Planned

MILESTONE DESCRIPTION	WBS NO.	WMPO	RESP LEVEL	RESP ORG	MILESTONE	BASLINE 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/IANI	M325 (R)	26 Nov 86	27 Feb 87 (F)
Preliminary Report on Sorption Modeling	1.2.3.4.1	Livingston	1	WMPO/IANI	R309 (R)	30 Jan 87	
Report: Completion of Trench Preparation at Surface Facilities Site	1.2.3.5.2	Rotert	1	WMPO/REIC	P509 (P)	31 Mar 87	
Complete Drilling Shallow Unsaturated Zone	1.2.3.5.2	Rotert	1	WMPO/SAIC	P519 (P)	31 Jul 87	
Final Radiological Monitoring Plan Complete	1.2.3.6.1	Jankus	1	WMPO/SAIC	M897 (R)	27 Feb 87	
Submit Air Quality Monitoring Plan to DOE/HQ	1.2.3.6.1	Jankus	1	WMPO/SAIC	R327 (R)	30 Apr 87	
Begin Air Quality Monitoring	1.2.3.6.1	Blanchard	1	WMPO/SAIC	N345 (R)	30 Sep 87	
Submit Working Draft Site Characterization Socioeconomic Monitoring and Mitigation Plan (SMMP)	1.2.3.7	Dixon	1	WMPO/SAIC	R945 (R)	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 (R)	02 Apr 87	
Start Repository Advanced Conceptual Design	1.2.4.1.1	Zvada	1	WMPO/SNL	N430 (R)	30 Sep 87	
Initial Subsystem Design Requirement (SDR)	1.2.4.1.2	Skousen	1	WMPO/SNL	N433 (R)	30 Apr 87	
Repository Conceptual Design in Support of Site Characterization	1.2.4.1.3	Skousen	1	WMPO/SNL	N432 (R)	27 Feb 87	31 Mar 87 (F)
Report on G-Tunnel Underground Facility (GTUF) Summary	1.2.4.2.1	Skousen	1	WMPO/SNL	M455 (R)	30 Jan 87	
Feasibility Analysis of Horizontal Emplacement and Retrieval - Letter Report	1.2.4.2.2	Skousen	1	WMPO/SNL	M295 (R)	30 Nov 86	05 Sep 86 (A)
Initiate Procurement of Development Prototype Boring Machine	1.2.4.2.2	Skousen	1	WMPO/SNL	N437 (R)	30 Nov 86	30 Jun 87 (F)
Horizontal Waste Emplacement Equipment Development Plan	1.2.4.2.2	Skousen	1	WMPO/SNL	N406 (R)	27 Feb 87	20 Mar 87 (F)
Complete Fabrication of Development Prototype Boring Machine (DPBM) Waste Emplacement	1.2.4.2.2	Skousen	1	WMPO/SNL	P403 (P)	29 May 87	16 May 88 (F)
Initiate Drill Tests in G-Tunnel	1.2.4.2.2	Skousen	1	WMPO/SNL	N603 (P)	31 Jul 87	15 Aug 88 (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 (R)	27 Feb 87	31 Mar 87 (F)

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Run Date: 01 Dec 1986

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)
Prepare "Technical Basis for Performance Goals, Design Requirements and Material Recommendation for the NNSG Project Repository Sealing Program Report"	1.2.4.2.3	Skousen	1	WMPO/SNI	P404 (B)	31 Mar 87
Final Report on Spent Fuel Rod Consolidation	1.2.4.4	Skousen	1	WMPO/SNI	R267 (B)	31 Dec 86 16 Feb 87 (F)
Submit Retrievability Compliance Strategy Plan to OCR for Review and Comment	1.2.4.4	Skousen	1	WMPO	RR48 (P)	31 Mar 87 15 Jul 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
Submit Draft Seismic/Tectonic Summary Position Paper to WMPO/NV	1.2.5.2.1	Szymanski	1	WMPO/SAIC	R583 (B)	15 Jun 87
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
Draft Site Characterization Plan (SCP)	1.2.5.2.2	Clanton	1	WMPO/SAIC	M521 (B)	16 Jan 87 14 Jan 87 (F)
Site Characterization Plan (SCP)	1.2.5.2.2	Clanton	1	WMPO/SAIC	M522 (B)	27 Feb 87 01 Apr 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
Environmental Field Study Plans Received at HQ For Baselineing	1.2.5.3	Jankus	1	WMPO/SAIC	R799 (B)	31 Aug 87
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 27 Mar 87 (F)
Environmental Regulatory Compliance Plan Issued	1.2.5.3.3	Jankus	1	WMPO/SAIC	R795 (B)	31 May 87
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 (F)
Submit Environmental Monitoring and Mitigation Plan (EMMP) to DOE/HQ	1.2.5.3.4	Jankus	1	WMPO/SAIC	P034 (B)	30 Apr 87
Complete and Sign C&C Agreement with State	1.2.5.4.1	Dixon	1	WMPO	M795 (P)	31 Mar 87
Exploratory Shaft Facility (ESF) Subsystems Design Requirements Document	1.2.6.1.1	Irby	1	WMPO/LANL	R241 (B)	30 Dec 86 27 Feb 87 (F)
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
DOE/HQ receives Final FY89 Project Validation Material	1.2.6.1.1	Irby	1	WMPO/SAIC	RR41 (B)	15 Mar 87

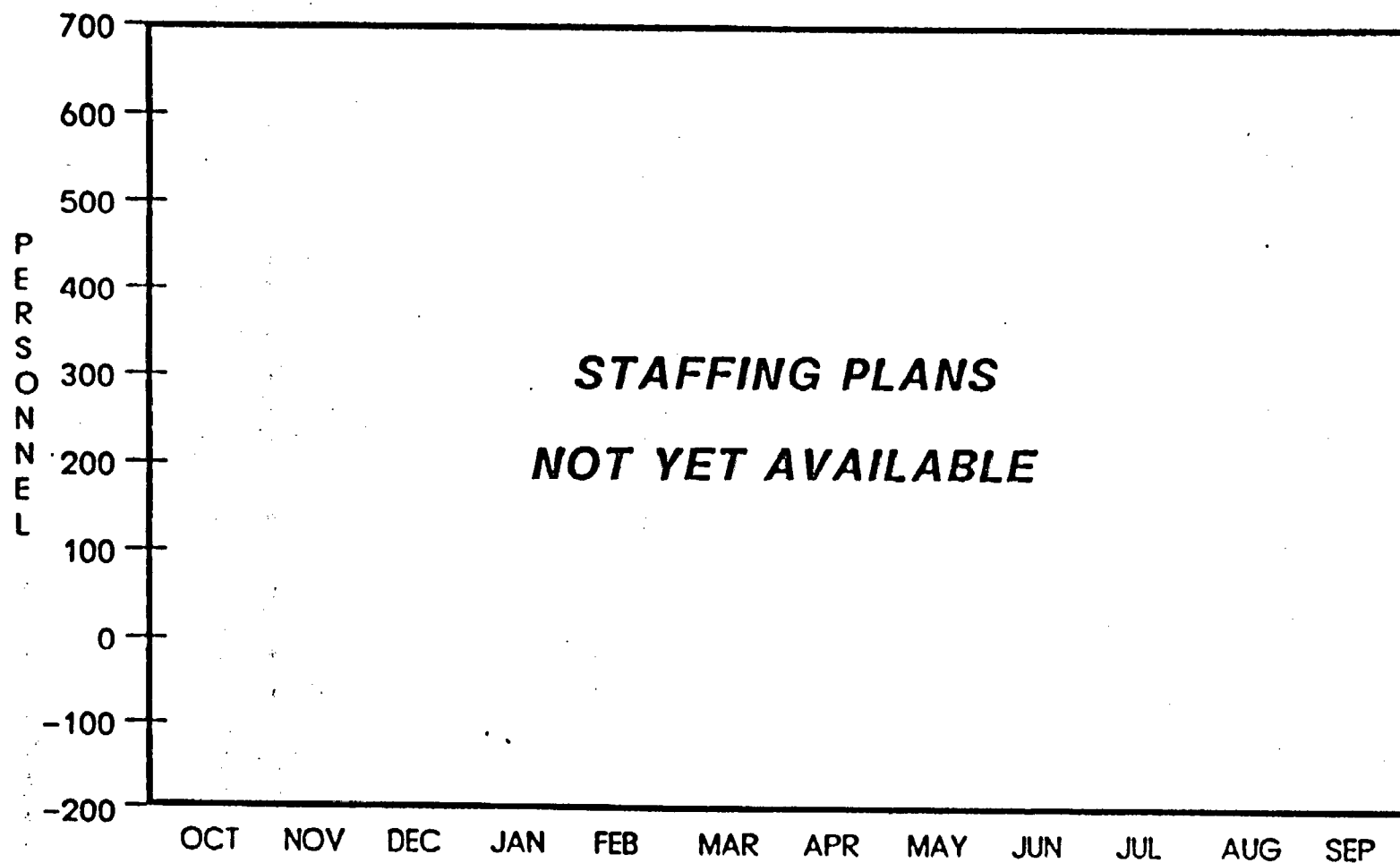
Run Date: 01 Dec 1986

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)	
	Start Field Prototype Testing in G-Tunnel	1.2.6.1.1	Irby	1	WMPO/LANI M282 (B)	30 Mar 87		
	Final ESF Title II Design Requirements Document submitted to DOE/HQ	1.2.6.1.1	Irby	1	WMPO/SAIC M273 (B)	29 May 87		
	Exploratory Shaft Title I Design Summary Submitted to WMPO	1.2.6.1.1	Irby	1	WMPO/SAIC M263 (B)	29 May 87		
	Complete Exploratory Shaft Readiness Review	1.2.6.1.1	Irby	1	WMPO/LANI M243 (B)	30 Sep 87		
	Submit FY 87 Baseline Budget Information and Cost Plans to O&R for Information	1.2.9.1.1	Kunich	1	WMPO/SAIC RH49 (B)	30 Dec 86	22 Dec 86 (F)	
	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	01 Apr 87 (F)	
	Approved Revised Project Charter	1.2.9.1.1	Vieith	1	WMPO/SAIC RH50 (B)	30 Jan 87		
	Submit NNWSI Project Plan to WMPO/NV and DOE/HQ	1.2.9.1.1	Dixon	1	WMPO/SAIC RH10 (B)	30 Sep 87		
	Submit FY 89 Budget to DOE/HQ	1.2.9.1.2	Dixon	1	WMPO/SAIC M712 (B)	13 Mar 87		
11-25	Licensing Support System Document Collection Procedure to Headquarters for Approval	1.2.9.1.4	Hatch	1	WMPO/SAIC RG47 (B)	30 Apr 87		
5	Implement Document Collection for the Licensing Support System	1.2.9.1.4	Hatch	1	WMPO/SAIC RR42 (P)	31 Jul 87		
	Implement Phase II of Earned Value System	1.2.9.2	Dixon	1	WMPO/SAIC M725 (B)	30 Nov 86	31 Mar 87 (F)	

NNWSI PROJECT STAFFING  
FISCAL YEAR 1987



PLANNED NNWSI PROJECT FIELD ACTIVITIES  
FOR JANUARY

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	Jan. 5-7 Jan. 14-16	8-4
	Monitoring of test well USW UZ-1	Test well USW UZ-1	Jan. 5, 15, and 26	8-11 4-5
	Monitoring of neutron test holes	Yucca Mountain and vicinity	Continuous throughout month	8-4
	Service equipment Paleohydrology analog sites	South Central Nevada	Dec. 29 - Jan. 1	Daylight hours