ornl

OAK RIDGE NATIONAL LABORATORY

MARTIN MARIETTA

ORNL/TM-12935

FY 1995 Program Management Plan Pretreatment Program Tank Focus Area

M. I. Morrison
C. P. McGinnis
W. T. Wilkenson
R. D. Hunt

[MA]NAGED BY
[MAR]TIN MARIETTA ENERGY SYSTEMS, INC.
[FOR] THE UNITED STATES
[DEPA]RTMENT OF ENERGY

DISCLAIMER

ORNL/TM-12935

FY 1995 PROGRAM MANAGEMENT PLAN PRETREATMENT PROGRAM TANK FOCUS AREA

M. I. Morrison*
C. P. McGinnis†
W. T. Wilkenson‡
R. D. Hunt†

*Midwest Technical, Inc., Oak Ridge, Tennessee
†Chemical Technology Division, Martin Marietta Energy Systems, Inc.
‡Hazardous Waste Remedial Actions Program, Martin Marietta Energy Systems, Inc.

Date Published—February 1995

Prepared by
HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM
Environmental Restoration and Waste Management Programs
Oak Ridge, Tennessee 37831-7606

Prepared for
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831-6285
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the U.S. Department of Energy
under contract DE-AC05-84OR21400

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS, ABBREVIATIONS, AND INITIALISMS

ANL	Argonne National Laboratory
CEA	Commissariat à l' Energie Atomique (France)
DOE	U.S. Department of Energy
DOE-ORO	U.S. Department of Energy Oak Ridge Operations Office
EM	Environmental Restoration and Waste Management
ESP-IP	Efficient Separations and Processing—Integrated Program
FIU	Florida International University
HLW	high-level waste
LLLW	liquid low-level waste
MVST	Melton Valley Storage Tank
NAC	Nitrate to Ammonia and Ceramic
NAG	Nitrate to Ammonia and Glass
NEPA	National Environmental Policy Act
ORNL	Oak Ridge National Laboratory
OTD	Office of Technology Development
PCT	Product Consistency Test
PI	principal investigator
PMP	Program Management Plan
PNL	Pacific Northwest Laboratory
PTS	Project Tracking System
QA	quality assurance
SRS	Savannah River Site
SRTC	Savannah River Technology Center
TCLP	Toxicity Characteristic Leaching Procedure
TIM	Technical Integration Manager
TFA	Tank Focus Area
TPM	Technical Program Manager
TPO	Technical Program Officer
TRUEX	transuranium extraction
TTP	Technical Task Plan
UST	underground storage tank
WMRAD	Waste Management and Remedial Action Division (ORNL)

ABSTRACT

This program management plan (PMP) describes the FY 1995 project plans for the Pretreatment Program of the Tank Focus Area.

The Tank Focus Area is one of five areas of environmental concerns originally identified by the Deputy Assistant Secretary for Technology Development (EM-50). Projects in the Tank Focus Area relate to the remediation of liquid waste stored in underground storage tanks at various U.S. Department of Energy sites.

The Pretreatment Program is an organizational unit performing work within the Tank Focus Area. The function of the Pretreatment Program is to develop, test, evaluate, and demonstrate new technologies, with emphasis on separations.

The 11 Pretreatment Program projects for FY 1995 are (1) Cesium Extraction Testing, (2) Comprehensive Supernate Treatment, (3) Hot Cell Studies, (4) Cesium Removal Demonstration, (5) Out-of-Tank Evaporator Demonstration, (6) Crossflow Filtration, (7) Technical Interchange with CEA, (8) TRUEX Applications, (9) NAC/NAG Process Studies (conducted at Oak Ridge National Laboratory), (10) NAC/NAG Process and Waste Form Studies (conducted at Florida International University), and (11) Program Management.

Section 2 of this PMP contains a separate subsection for each FY 1995 project. A brief description of the project, a schedule of major milestones, and a breakdown of costs are provided for each project. The PMP also contains sections that describe the project controls that are in place. Quality assurance, document control, the project management system, and the management organization are described in these sections.

1. INTRODUCTION

Through the production of nuclear materials over the past five decades, the U.S. Department of Energy (DOE) and its predecessor agencies have produced a substantial quantity of hazardous, radioactive, and mixed wastes of all types. To address the problem of remediating these wastes, DOE organized the Office of Environmental Restoration and Waste Management (EM) in 1989. Headquartered in the Washington, D.C., area, this agency provides centralized management of waste cleanup and minimization activities.

At EM, five areas of environmental concern have been designated as "focus areas." Specifically, these focus areas are (1) High-Level Waste Tank Remediation (also known as Tank Focus Area, or TFA); (2) Contaminant Plume Containment and Remediation; (3) Mixed Waste Characterization, Treatment, and Disposal; (4) Landfill Stabilization; and (5) Facility Transitioning, Decommissioning, and Final Disposition.

This Program Management Plan (PMP) relates only to FY 1995 projects within the TFA. TFA projects involve the remediation of liquid waste that has been stored in underground storage tanks (USTs).

The liquid wastes that have been generated over the years are presently stored in USTs located at four DOE sites: (1) Oak Ridge, (2) Hanford, (3) Savannah River, and (4) Idaho. In total, remediation efforts will require the processing of 1×10^8 gal of radioactive waste from 334 USTs at the four DOE sites. DOE is committed to remediating all UST sites that are not in compliance with state and federal regulations.

Remediation presents special problems, however. First, the cleanup of these tanks is prohibitively expensive using some of the current technologies. And second, major gaps exist in the needed technology. Within EM, the Office of Technology Development (OTD) was organized to create the new technologies needed to meet remediation objectives. At OTD, remediation technologies are under development that are safer, faster, better, and cheaper than those presently available.

OTD has consulted with all DOE sites to characterize the waste from their underground storage tanks and to determine their site-specific needs before finalizing the waste treatment development plan. By doing so, the technologies to be developed will apply to more than one site. Thus, redundant research can be prevented and the resulting cost for the all-site remediation programs will be minimized.

Six organizational units have been formed to complete TFA remediation objectives. These six units are (1) Safety, (2) Characterization, (3) Retrieval, (4) Pretreatment, (5) Immobilization, and (6) Closure. These six organizational units are located at different sites across the DOE system. Each of the units is managed by a Technical Integration Manager (TIM). The projects in this PMP pertain to the Pretreatment Program only.

The function of the Pretreatment Program is to develop, test, evaluate, and demonstrate efficient pretreatment technologies, with emphasis on separations. A primary source of the new separations technologies used by the Pretreatment Program is the OTD organization known as Efficient Separations and Processing—Integrated Program (ESP-IP).

After the Pretreatment Program group completes its technology validation role, the new technologies are ready for implementation at DOE waste management sites. Full-scale operation of newly developed equipment and technologies will be performed by the Waste Management and Remedial Action Division (WMRAD) at ORNL, by the Tank Waste Remediation System Division at Hanford, and by similar groups at the other sites.

2. PROJECT SUMMARY—PRETREATMENT PROGRAM

In total, 11 projects are scheduled for FY 1995 for the Pretreatment Program. (See Fig. 2.1 for a pictorial representation of the relation between these projects.)

Four of the 11 projects relate to cesium removal. They are (1) Cesium Extraction Testing, (2) Comprehensive Supernate Treatment, (3) Hot Cell Studies, and (4) Cesium Removal Demonstration. (See Fig. 2.2 for a pictorial representation of the relation between these projects.)

The other seven projects, which are stand-alone projects, are (1) Out-of-Tank Evaporator Demonstration, (2) TRUEX Applications, (3) Technical Interchange with CEA, (4) TRUEX Applications, (5) NAC/NAG Process Studies (conducted at ORNL), (6) NAC/NAG Process and Waste Form Studies [conducted at Florida International University (FIU)], and (7) Program Management.

The two projects, NAC/NAG Process Studies (ORNL) and NAC/NAG Process and Waste Form Studies (FIU), are currently managed by the Pretreatment Program—TIM. Future plans call for the management of these projects to be transferred to the Immobilization-TIM.

Project work for FY 1995 will take place at three sites. The sites are (1) ORNL, (2) Savannah River Technology Center (SRTC), and (3) Argonne National Laboratory (ANL). In addition, subcontracted projects are being performed at Clark Atlanta University, FIU, Purdue University, and Spring College of Illinois.

For the 11 projects in the Pretreatment Program, a Mid-Year Technical Review will be available on 3/31/95 and an End-of-Year Report will be available on 9/30/95.

The total budget for FY 1995 for the 11 projects in the Pretreatment Program is $4,600,000. (See Table 2.1 for a breakdown of the total budget by project.)

For each of the 11 FY 1995 Pretreatment Program projects shown in Sects. 2.1–2.11, there is a description of the project, a breakdown of costs, and a schedule of milestones. The description of each project starts at the top of a new page to enhance the reader's ability to access, review, and update project information.

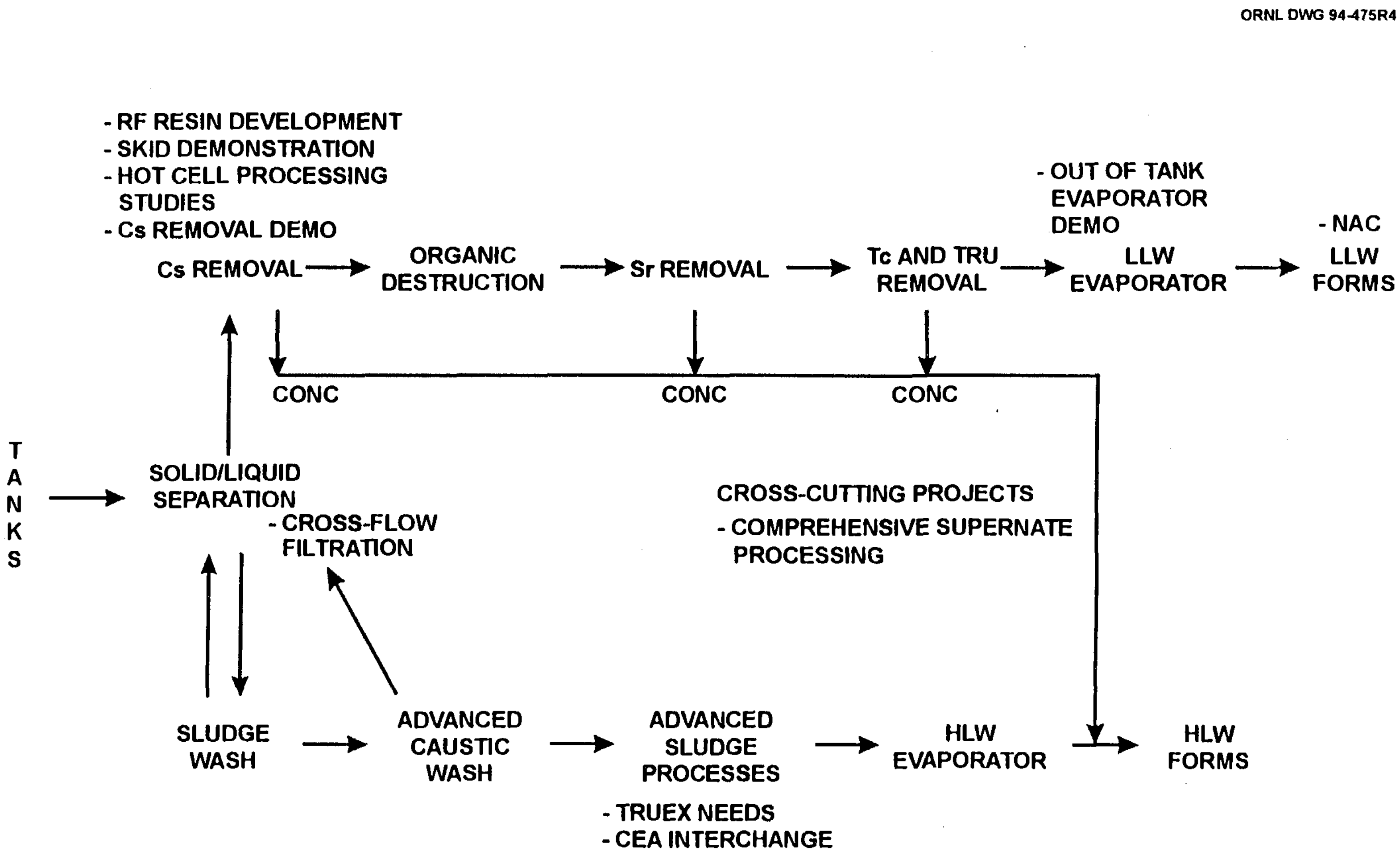


Fig. 2.1. Relationship diagram for all projects in the Pretreatment Program.

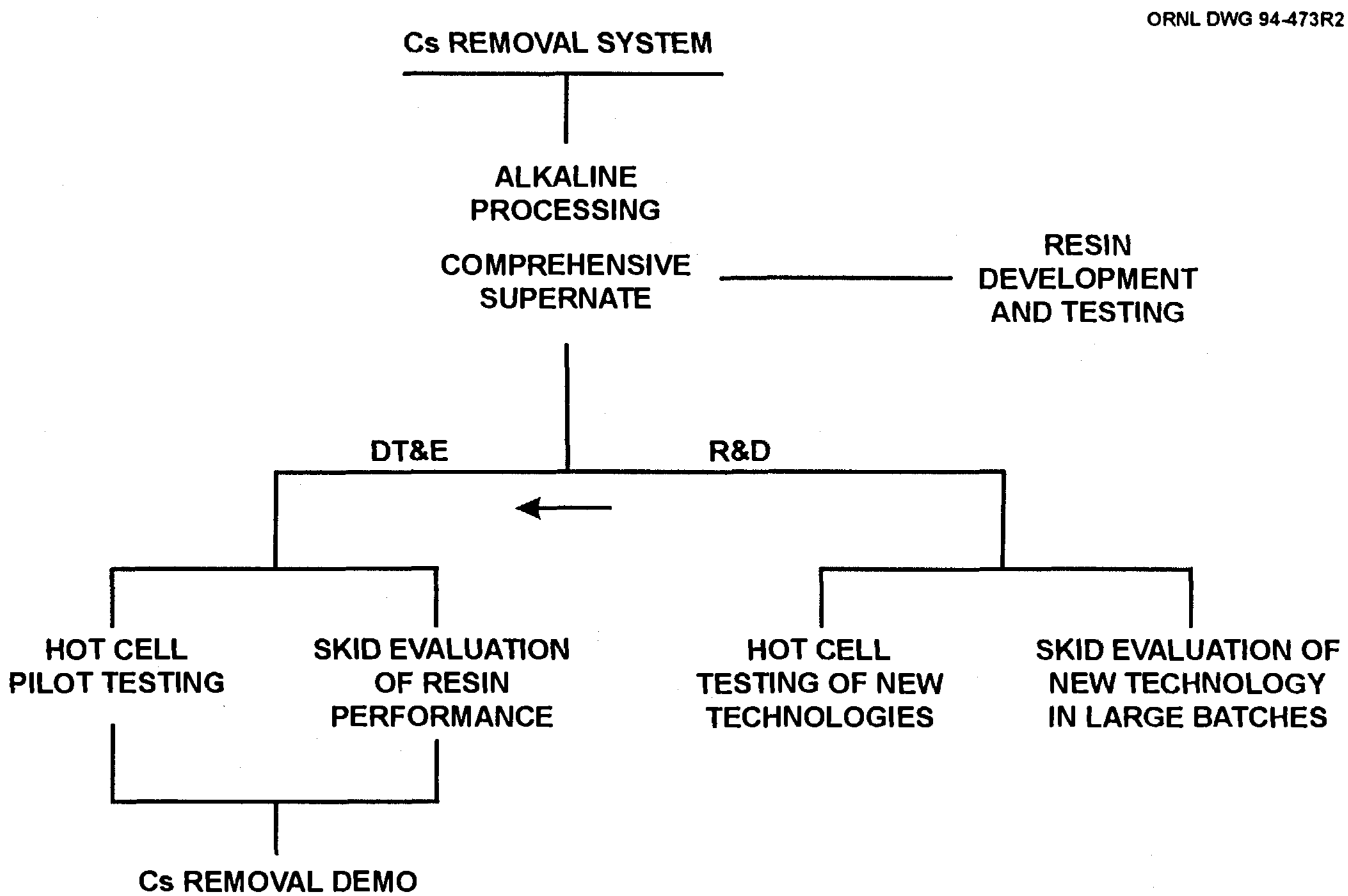


Fig. 2.2. Relationship diagram for cesium removal projects.

Table 2.1. Breakdown of Pretreatment Program budget for FY 1995 by project

Project	Cost ($)
Cesium Extraction Testing (SRTC)	200,000
Comprehensive Supernate Testing (ORNL)	554,000
Hot Cell Studies (ORNL)	588,000
Cesium Removal Demonstration (ORNL)	928,000
Out-of-Tank Evaporator Demonstration (SRTC)	1,100,000
Crossflow Filtration Testing (SRTC)	300,000
Technical Interchange with CEA (ORNL)	330,000
TRUEX Applications	50,000
NAC/NAG Process Studies (ORNL)	100,000
NAC/NAG Process and Waste Form Studies (FIU)	200,000
Program Management (ORNL)	250,000
Total for Pretreatment Program	4,600,000

Note: ANL = Argonne National Laboratory, FIU = Florida International University, ORNL = Oak Ridge National Laboratory, SRTC = Savannah River Technology Center.

2.1 CESIUM EXTRACTION TESTING

The testing in the Cesium Extraction Testing project will be coordinated by J. P. Bibler, the project's principal investigator (PI), at Savannah River site (SRS). Total budgeted cost for this project is $200K. A Mid-Year Technical Review of the project will be available on 3/31/95. The End-of-Year report on this project will be available on 9/30/95. The project is expected to conclude on 7/31/96. The final report is expected on 7/31/96. A description of the project, breakdown of costs, and schedule of milestones are provided in Sects. 2.1.1–2.1.3.

2.1.1 Description

The purpose of this project is to complete development and validation of resorcinol-formaldehyde resin as an ion-exchange material for cesium extraction This objective will be achieved by overseeing (1) the resin degradation studies being performed at Clark Atlanta University and (2) the VERSE modeling of ion-exchange processes at Purdue University. In addition, this project will assist an EM-30 (Waste Management Operations) project that will test the hydraulic properties (transport, pumping, and pressure drops in a column) of the resorcinol-formaldehyde resin on a large-scale basis.

Small-scale testing of the resorcinol-formaldehyde resin has been ongoing for the past several years in projects at SRS, Pacific Northwest Laboratory (PNL), Oak Ridge, and Los Alamos. Results of these studies show that the resorcinol-formaldehyde resin can hold up to 10 times as much cesium as Duolite CS-100, a resin that was previously available from commercial sources. The extra capacity of the resorcinol-formaldehyde resin will permit a reduction in process equipment size. It will also enable a reduction in secondary waste volume.

For laboratory-scale confirmation at the Savannah River High Level Caves facility, small samples of UST waste from SRS will be modified to represent Hanford UST waste. The sample UST waste will also be used in its unmodified form to represent the SRS waste. For large-scale testing, surrogate waste that chemically mimics the waste at Hanford will be used.

Hanford and Oak Ridge are considering the use of ion exchange to remove cesium (and possibly strontium and technetium as well) from their UST waste.

Savannah River currently plans to use in-tank precipitation for removal of these radioactive elements. However, Savannah River will retain the option of using ion exchange in the event that the results of in-tank precipitation do not meet expectations. Use of the ion-exchange process would eliminate safety and environmental concerns associated with benzene production during in-tank precipitation.

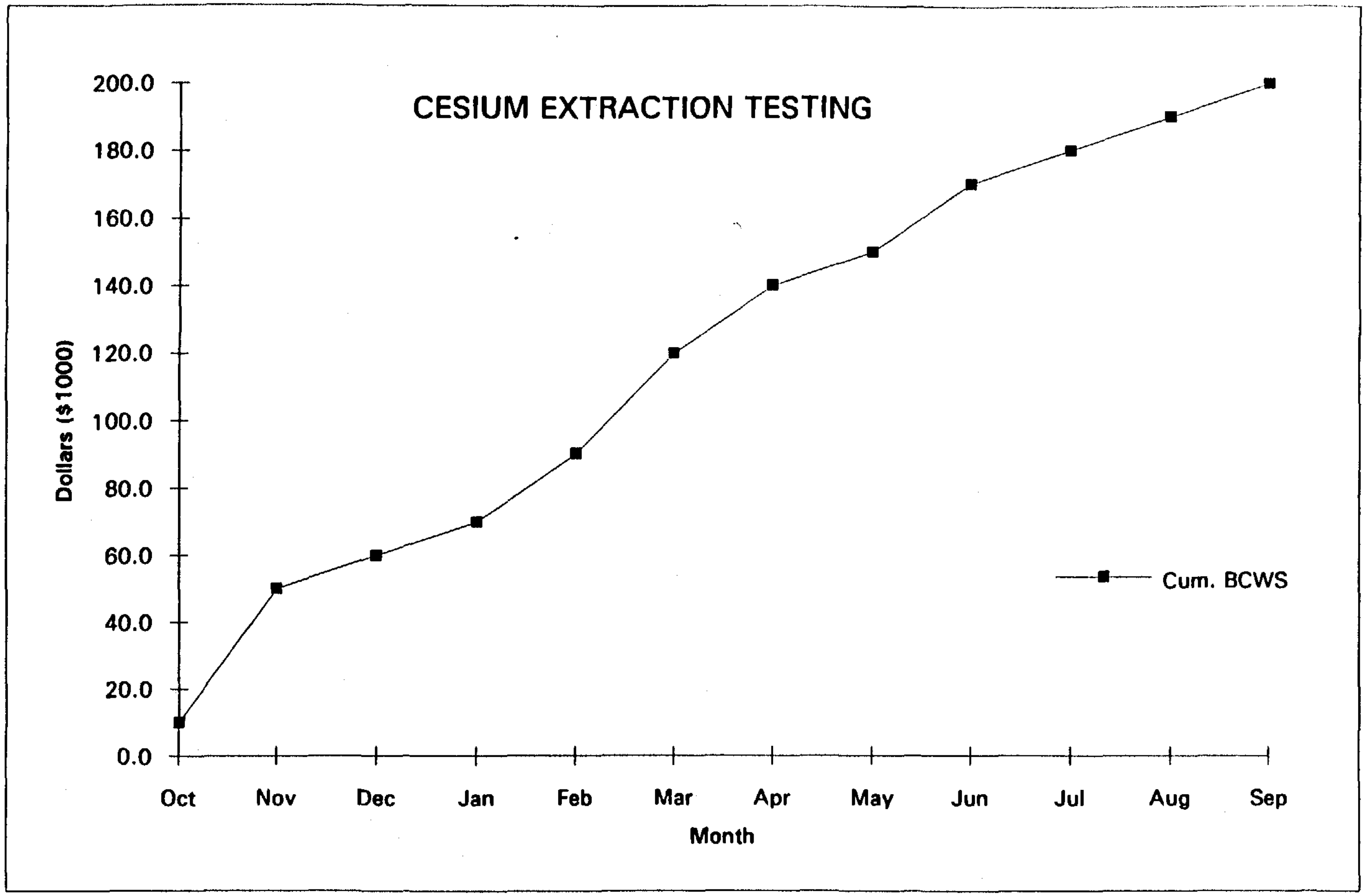
This project will be complete when the results of this project have been transferred to Oak Ridge and Hanford for their use in large-scale remediation efforts.

2.1.2 Milestones

Issue Technical Task Plan	11/15/94
Complete Clark Atlanta study on resorcinol-formaldehyde degradation	12/31/94
Initiate resorcinol-formaldehyde evaluation	1/31/95
Prepare OTD Mid-Year Technical Review	3/31/95
Procure second-year contract for Purdue modeling study	7/31/94
Complete the Purdue model IX process	9/30/94
Prepare End-of-Year Report	9/30/95

2.1.3 Costs

The costs for this project have been broken down by month and are displayed in Fig. 2.3.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BCWS	10.0	40.0	10.0	10.0	20.0	30.0	20.0	10.0	20.0	10.0	10.0	10.0
ACWP												
Cum. BCWS	10.0	50.0	60.0	70.0	90.0	120.0	140.0	150.0	170.0	180.0	190.0	200.0
Cum. ACWP												
Cum. VAR												
EAC												
EVAC												

Fig. 2.3. Cost breakdown by month—Cesium Extraction Testing. BCWS = budgeted cost of the work scheduled.

2.2 COMPREHENSIVE SUPERNATE TREATMENT

The Comprehensive Supernate Treatment project is coordinated by B. Z. Egan, the project's PI, at ORNL. The total budget for this project is $554K. A Mid-Year Technical Review will be available 3/31/95. An End-of-Year Report will be available on 9/30/95. The project is expected to conclude on 6/30/96. A final report is expected to be available on 9/30/96. A description of the project, breakdown of costs, and schedule of major milestones are provided in Sects. 2.2.1–2.2.3.

2.2.1 Description

The purpose of this task is to batch test both sorbents and ion-exchange materials for the task of removing the radioactive elements (primarily cesium, strontium, and technetium) from UST waste and then to select the best material(s) for the job. This work is done in hot cells using real UST wastes from Oak Ridge. Hanford has plans to provide real waste to ORNL in FY 1995 for evaluation by this program.

Materials to be used in this project are sorbents and ion-exchange materials proposed by ESP-IP and other technology developers.

The materials that are the top candidates for cesium removal are four sorbents: resorcinol-formaldehyde resin, crystalline sodium silicotitanate (developed at Sandia National Laboratory and Texas A&M), potassium cobalt hexacyanoferrate, and Duolite CS-100.

Primary candidates for strontium removal are the two sorbents (sodium titanate and crystalline sodium silicotitanate) and anion-exchange material (Amberlite IRC-718).

Reillex HPQ, 402 ion-exchange resins, and crown ethers have been proposed for technetium removal.

The testing for this project will be performed in small batch mode in a hot cell at ORNL. Specifically, the batch test involves 5 to 10 mL of liquid waste mixed with 1 to 100 mg of sorbent or ion-exchange material. Determining the rate of removal and assessing the loading capacity of each material are two important objectives of this testing.

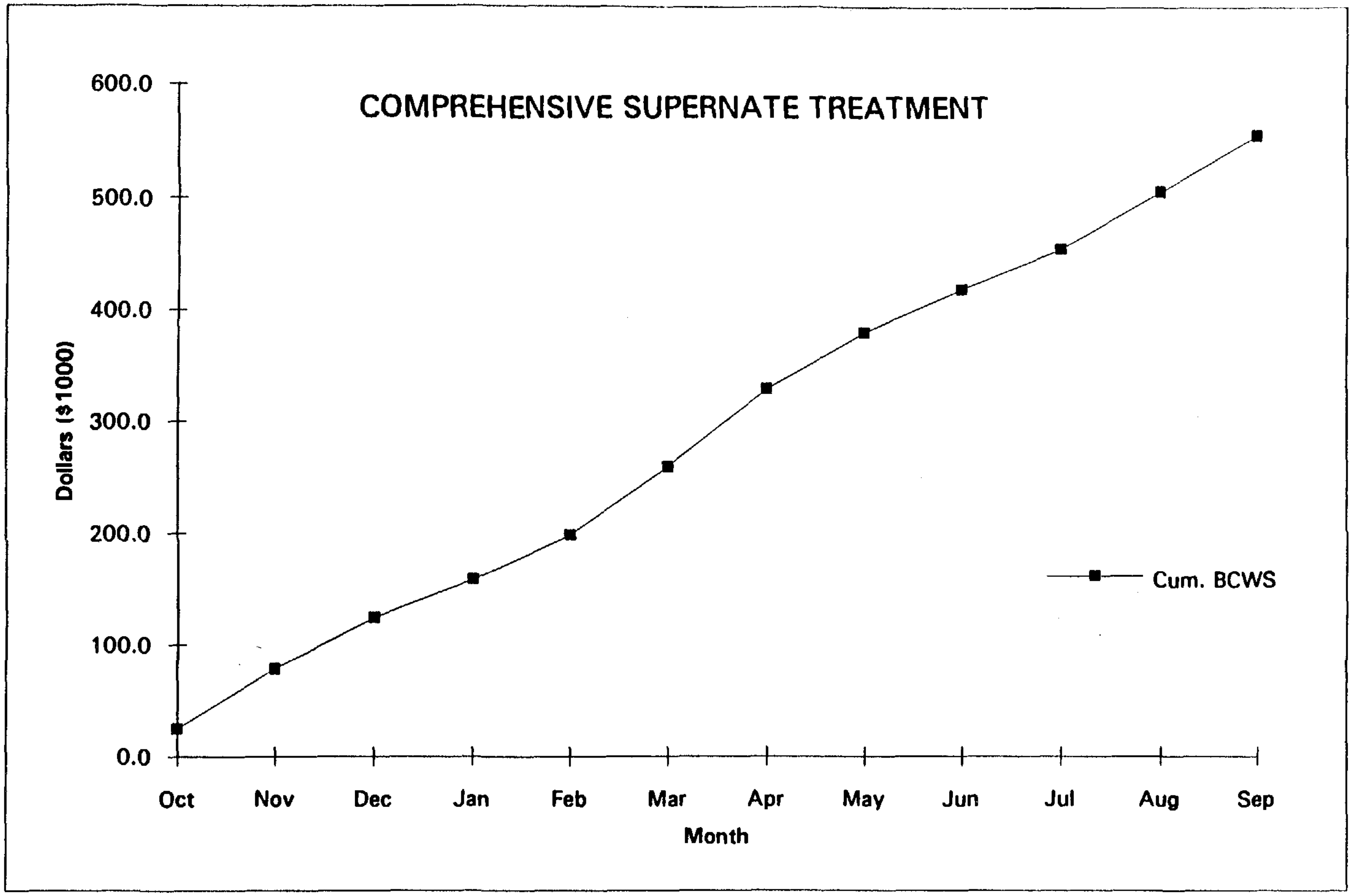
The ion-exchange materials selected in this project for cesium removal will be used in the subsequent Hot Cell Studies project to perform small-scale, continuous-flow tests.

2.2.2 Milestones

Issue Technical Task Plan	11/15/94
Complete cesium batch tests	12/30/94
Complete strontium batch tests	3/30/95
Prepare OTD Mid-Year Technical Review	3/30/95
Complete technetium batch tests	6/30/95
Complete cesium column tests	9/30/95
Prepare End-of-Year Report	9/30/95
Complete small column tests	6/30/96
Complete cleanup and documentation	9/30/96

2.2.3 Costs

The costs for this project have been broken down by month and are displayed in Fig. 2.4.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BCWS	25.0	54.0	45.0	34.0	40.0	61.0	70.0	50.0	39.0	36.0	50.0	50.0
ACWP												
Cum. BCWS	25.0	79.0	124.0	158.0	198.0	259.0	329.0	379.0	418.0	454.0	504.0	554.0
Cum. ACWP												
Cum. VAR												
EAC												
EVAC												

Fig. 2.4. Cost breakdown by month—Comprehensive Supernate Treatment. BCWS = budgeted cost of the work scheduled.

2.3 HOT CELL STUDIES

The Hot Cell Studies project is coordinated by D. D. Lee, the project's PI, at ORNL. The total budget for this project is $588K. A Mid-Year Technical Review of this project will be available on 3/31/95. An End-of-Year Report will be available on 9/30/95. The project is expected to conclude on 6/30/96. A final report is expected on 9/30/96. A description of the project, breakdown of costs, and schedule of major milestones are shown in Sects. 2.3.1–2.3.3.

2.3.1 Description

The purpose of this project is to perform small-scale, continuous-flow tests on ion-exchange materials used for the removal of cesium from UST waste. The data from this small-scale testing will be used to design the large-scale testing in the Cesium Removal Demonstration project.

The ion-exchange materials used in this project were initially evaluated in the Comprehensive Supernate Treatment project. Specific ion-exchange materials to be evaluated in this project include resorcinol-formaldehyde resin, potassium cobalt hexacyanoferrate, and any ESP-IP–supplied sorbent that has been prepared in an engineering form.

The ion-exchange equipment used in this study is a small column-type unit. Because radioactive waste is involved, special facilities are needed to house the ion-exchange equipment and experiment. The facility for conducting this project is a hot cell located in Building 4501 at ORNL. (A hot cell is a small room enclosed by thick concrete walls and containing a small window. The experiment is performed by using a pair of mechanical hands known as manipulators.)

The actual tests will be conducted as follows. Waste samples will be passed through the small column-type unit at a prescribed flow rate. Effluent from the column-type unit will be passed through a gamma detector for on-line analysis of radioactive content. Liquid waste will continue to be passed through the column-type unit until the 50% breakthrough and 100% breakthrough points are determined. [Breakthrough occurs when the loaded ion-exchange material fails to "trap" the radioactivity. Specifically, the 50% breakthrough point is the point at which the effluent (from the column-type ion-exchange unit) reaches a radioactivity level that is 50% of the radioactivity level of the liquid that was poured in. A 100% breakthrough means that no cesium is removed by the loaded resin (i.e., the radioactivity level of the effluent from the unit is the same as the radioactivity level of the liquid that was poured in).]

The liquid waste used in this study comes from the Melton Valley Storage Tanks (MVSTs) at ORNL. Unmodified samples of this liquid waste are used to represent waste from ORNL USTs. The MVST liquid waste can be appropriately modified to create samples that represent waste found in Hanford and Savannah River USTs.

For testing ESP-IP–supplied ion-exchange materials, 1 to 2 L of liquid waste per test will be used. For both the resorcinol-formaldehyde and the potassium cobalt hexacyanoferrate ion-exchange materials, 5 to 50 L of liquid waste will be used.

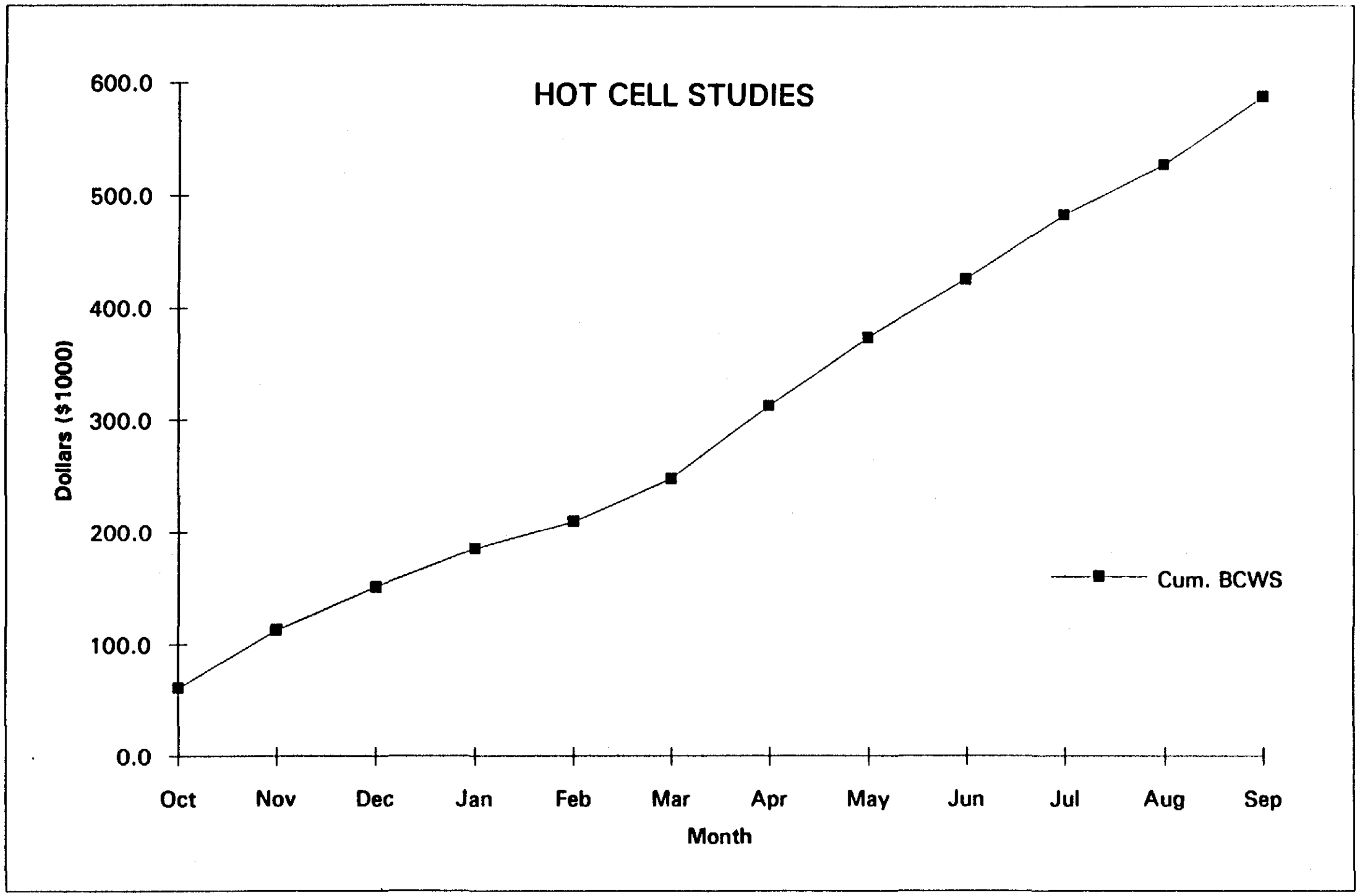
The results of this project will be used to design the ion-exchange equipment for the Cesium Removal Demonstration project and to determine initial operating parameters for that equipment. This testing will also investigate the robustness of the process. Operational problems will be investigated and resolved.

2.3.2 Milestones

Issue Technical Task Plan 11/15/94
Complete hot cell modifications and install test equipment 2/28/95
Perform OTD Mid-Year Technical Review 3/31/95
Complete initial cesium removal tests with MVST supernate 4/30/94
Complete End-of-Year Report 9/30/95
Complete ESP-IP module tests 6/30/96
Complete cleanup and documentation 9/30/96

2.3.3 Costs

The costs for this project have been broken down by month and are displayed in Fig. 2.5.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BCWS	61.0	52.0	38.0	34.0	25.0	38.0	65.0	61.0	52.0	57.0	45.0	60.0
ACWP												
Cum. BCWS	61.0	113.0	151.0	185.0	210.0	248.0	313.0	374.0	426.0	483.0	528.0	588.0
Cum. ACWP												
Cum. VAR												
EAC												
EVAC												

Fig. 2.5. Cost breakdown by month—Hot Cell Studies. BCWS = budgeted cost of the work scheduled.

2.4 CESIUM REMOVAL DEMONSTRATION

The Cesium Removal Demonstration project will be coordinated by J. F. Walker, the project's PI, at ORNL. The total budget for this project is $928K. A Mid-Year Technical Review of the project will be available on 3/31/95. An End-of-Year Report will be available on 9/30/95. The conclusion of this project will be determined later in FY 1995. A final report on the project is expected in FY 1997. A description of the project, breakdown of costs, and schedule of major milestones are provided in Sects. 2.4.1–2.4.3.

2.4.1 Description

The purpose of this project is to demonstrate the ion-exchange system that will subsequently be used on a large-scale basis for removal of cesium from UST waste.

The ion-exchange material to be used in this project will be selected through work performed in the Comprehensive Supernate Treatment project and the Hot Cell Studies project.

The ion-exchange equipment to be used for this project does not currently exist: it will have to be constructed. Basic requirements for the equipment are that it be modular, with each module skid-mounted for easy transport. Preliminary design for the unit will be performed by Martin Marietta Energy Systems Central Engineering Services.

Final design and construction of the ion-exchange unit will be performed by a commercial vendor with expertise in the area of radioactive materials handling. The unit will be placed in an existing containment facility. Selection of the facility must be finalized, and requests for applicable permits must be prepared.

Much of the equipment design information and the initial operating parameters for this demonstration will come from the small-scale, continuous-flow studies in the Hot Cell Studies project.

For this demonstration, up to 25,000 gal of waste from ORNL's MVSTs will be used. The demonstration will be conducted by the ORNL Chemical Technology Division. Current plans call for the loaded ion-exchange material from this demonstration to be stored as solid secondary waste. Vitrification of the loaded ion-exchange material is the treatment that is being proposed for use during full-scale remediation efforts by the Immobilization-TIM of the TFA.

2.4.2 Milestones

Project Management:
- Issue Technical Task Plan 11/15/94
- Prepare OTD Mid-Year Technical Review 3/31/95
- Report on project scope and planning 4/30/95
- Issue schedule for system construction and demonstration 9/30/95

System Design:
- Prepare test plan 11/30/94
- Complete design alternatives study 1/31/95
- Complete column studies with nonradioactive waste 7/31/95
- Complete system design 9/30/95

Permitting and Safety Documentation:
- Prepare permits and safety documents . . . . Third Quarter of FY 1996

Procurement:
- Begin preparation of procurement specifications 8/1/95
- Other milestones . . . . To Be Determined (TBD)

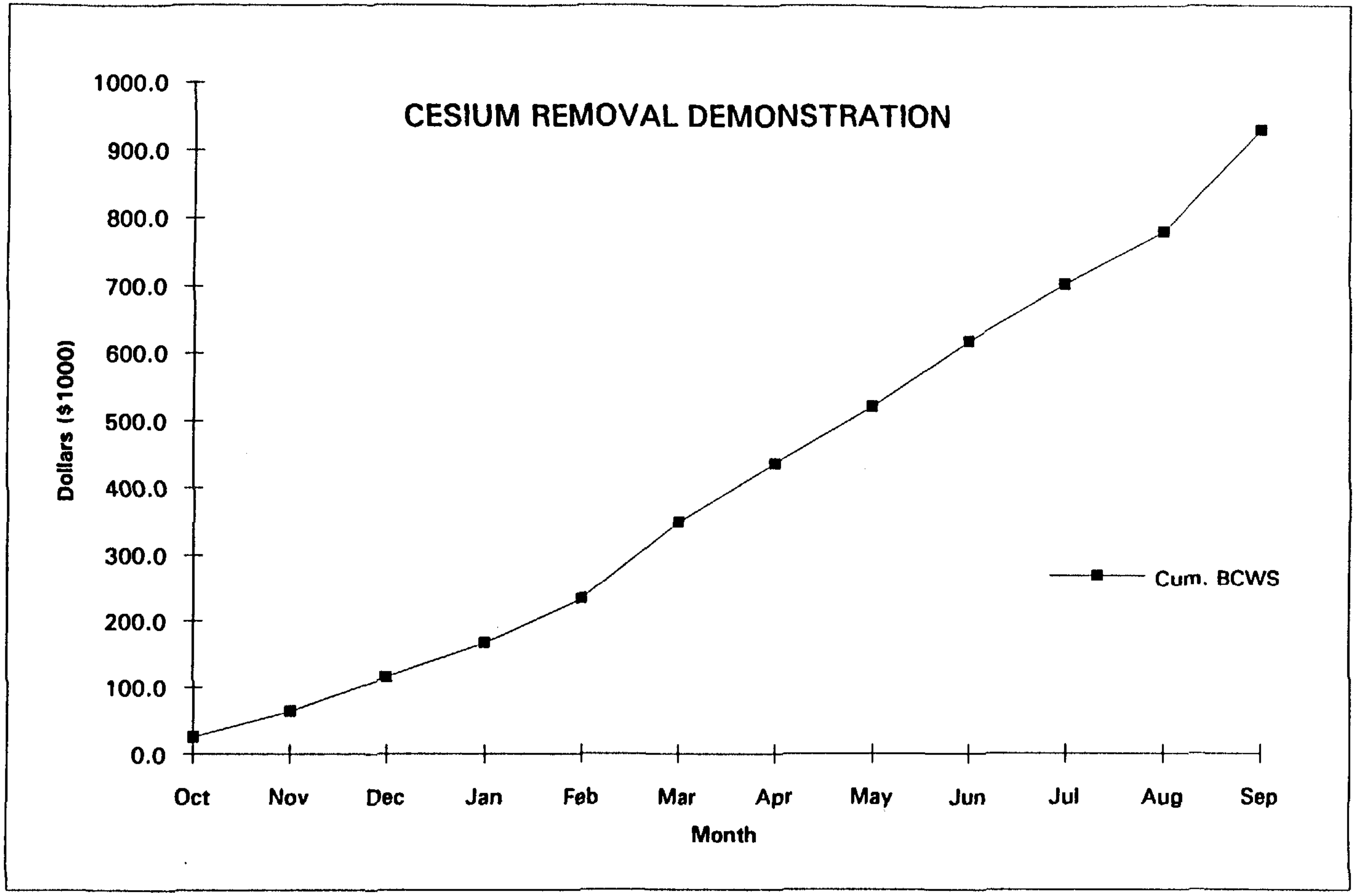
Installation and Preoperational Testing:
- Complete system installation 7/31/96
- Other milestones . . . . TBD

System Operations:
- Begin waste processing 9/1/96
- Other milestones . . . . TBD

Decontamination and Removal:
- Milestones . . . . TBD

2.4.3 Costs

The costs for this project have been broken down by month and are displayed in Fig. 2.6.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BCWS	26.0	38.0	51.0	51.0	67.0	115.0	87.0	85.0	97.0	84.0	77.0	150.0
ACWP												
Cum. BCWS	26.0	64.0	115.0	166.0	233.0	348.0	435.0	520.0	617.0	701.0	778.0	928.0
Cum. ACWP												
Cum. VAR												
EAC												
EVAC												

Fig. 2.6. Cost breakdown by month—Cesium Removal Demonstration. BCWS = budgeted cost of the work scheduled.

2.5 OUT-OF-TANK EVAPORATOR DEMONSTRATION

The Out-of-Tank Evaporator Demonstration project will be coordinated by A. J. Lucero, the project's PI, at ORNL. The total budget for this project is $1100K. A Mid-Year Technical Review of this project will be available on 3/31/95. An End-of-Year Report will be available on 9/30/95. The project is expected to conclude on 11/30/95. A Final Report on this project is expected on 2/24/96. A description of the project, breakdown of costs, and schedule of major milestones are provided in Sects. 2.5.1–2.5.3.

2.5.1 Description

The purpose of this project is to demonstrate the use of a skid-mounted, subatmospheric pressure evaporator for removing excess water from liquid waste retrieved from USTs.

The demonstration will process approximately 25,000 gal of liquid waste. The liquid waste that is processed by the demonstration has a high salt content and is contaminated with cesium, strontium, and technetium. Output is a concentrated waste that will be placed in interim storage for further separation at a later date.

This demonstration will determine processing capabilities and identify potential operating and maintenance problems. It will also identify any problems in decontaminating the evaporator for use at other sites. Equipment and procedures to be used for this demonstration will be provided to the Cesium Removal Demonstration project. This project is a part of a comprehensive demonstration program being implemented at ORNL to provide data for Waste Management Operations at all four DOE UST sites.

Upon completion of the demonstration, WMRAD will assume responsibility for the evaporator system and will modify the unit, as necessary, based on the feedback from this demonstration. WMRAD is planning to use the evaporator system to process the remainder of the liquid waste at ORNL.

2.5.2 Milestones

Project Management:
- Issue Technical Task Plan 11/15/94
- Prepare Quality Assurance (QA) Assessment 11/15/94
- Prepare Operating Plan 1/30/95

Safety QA and National Environmental Policy Act (NEPA) Documentation:
- Obtain approval of NEPA documentation 1/3/95
- Complete Readiness Review Plan 1/21/95
- Prepare Problem Safety Summary 4/4/95
- Obtain approval for ALARA (as low as reasonably achievable) plan 6/1/95
- Prepare Operational Readiness Review 6/1/95

Engineering Design and Support:
- Complete specifications for evaporator system 8/3/94
- Complete Engineering Feasibility Study 9/30/94
- Obtain approval of modifications to Safety Study 6/15/95

Procurement, Construction, and Installation:

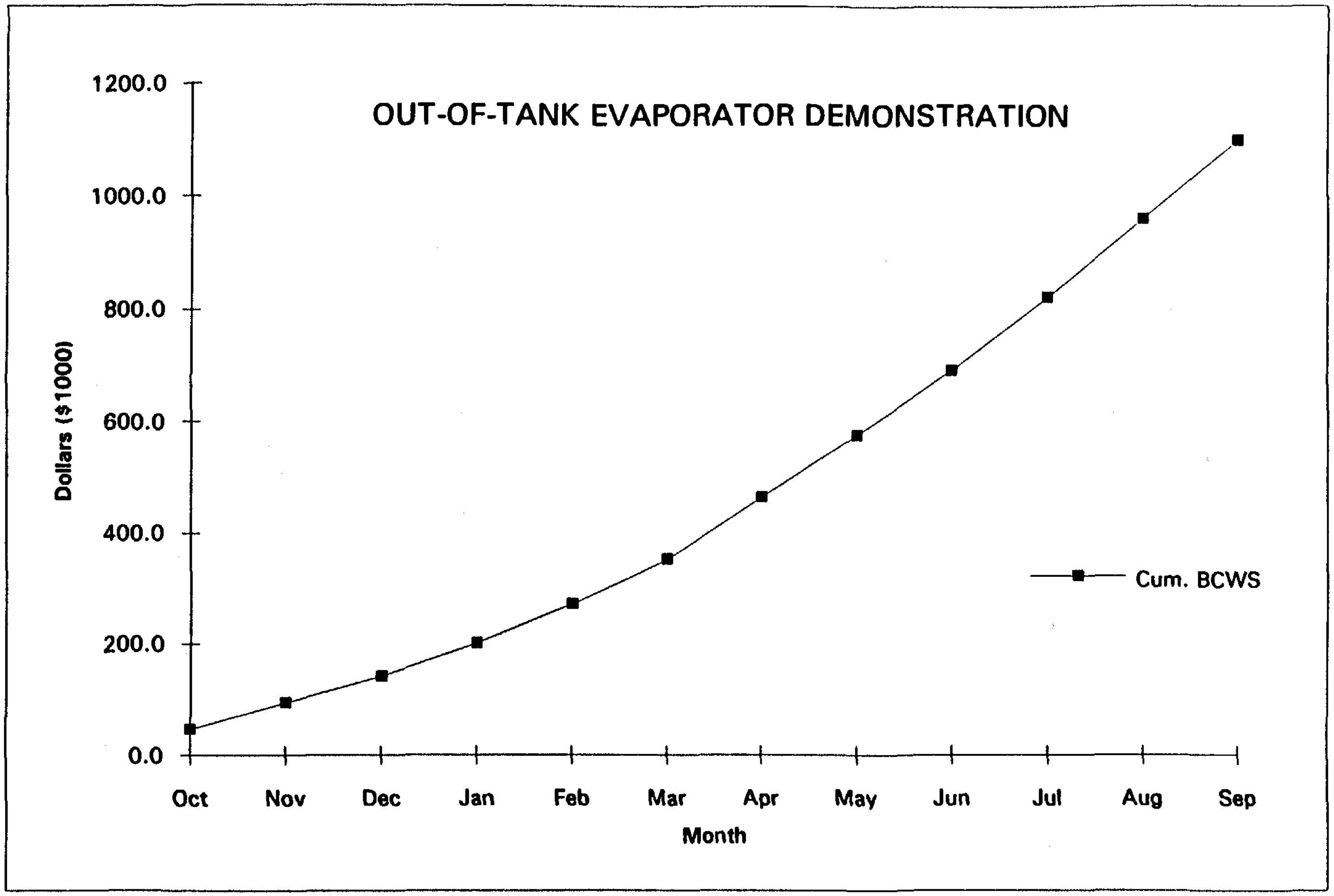
- Award contract for evaporator system 10/5/94
- Issue work order for evaporator installation 12/17/94
- Complete procurement of materials for installation 3/31/95
- Prepare letter/report on project status 4/1/95
- Complete installation of concrete pads 5/18/95
- Complete installation of evaporator system 6/15/95
- Prepare letter/report on status of installation 8/15/95

Start-up Operation and Decontamination:

- Complete surrogate tests 7/28/95
- Prepare letter/report on nonradioactive tests 8/15/95
- Complete processing of MVST supernate 9/30/95
- Complete decontamination of evaporator system 11/30/95
- Prepare letter/report on demonstration and transfer of evaporator 2/24/96

2.5.3 Cost

The costs for this project have been broken down by month and are displayed in Fig. 2.7.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BCWS	47.0	47.0	47.0	60.0	70.0	80.0	112.0	112.0	115.0	130.0	140.0	140.0
ACWP												
Cum. BCWS	47.0	94.0	141.0	201.0	271.0	351.0	463.0	575.0	690.0	820.0	960.0	1100.0
Cum. ACWP												
Cum. VAR												
EAC												
EVAC												

Fig. 2.7. Cost breakdown by month—Out-of-Tank Evaporator Demonstration. BCWS = budgeted cost of the work scheduled.

2.6 CROSSFLOW FILTRATION TEST

The Crossflow Filtration Test project is being coordinated by D. J. McCabe, the project's PI, at Savannah River. The total budget for this project is $300K. A Mid-Year Technical Review will be available on 3/31/95. An End-of-Year Report will be available 9/30/95. The expected conclusion of this project will be determined later in FY 1995. A final report is expected in FY 1997. A description of the project, breakdown of costs, and schedule of major milestones are provided in Sects. 2.6.1–2.6.3.

2.6.1 Description

The purpose of this project is (1) to perform tests of laboratory-scale filters and filtration equipment for the removal of sludge and insoluble solids from samples of UST waste and (2) to evaluate performance of full-scale filters being installed at SRS to treat in-tank precipitation in which small particles of cesium borate are produced.

It is advantageous to filter UST waste before processing through ion-exchange systems because filtering reduces or eliminates bed fouling, improves removal efficiencies, and eliminates premature breakthrough of radioactive waste.

Work in this project will focus on crossflow filtration. Various types of crossflow filters have been the subject of ongoing research at SRTC for over a decade. Other filtration technologies will be considered. However, crossflow filtration is expected to be the most robust pretreatment method.

Filters or separators to be used in this project will most likely be selected from commercially available options. Studies are expected to be conducted with metal or ceramic filters unless a better alternative is identified.

The waste to be used in the laboratory-scale tests will be nonradioactive waste containing sludge and potassium tetraphenylborate. For additional laboratory-scale tests, nonradioactive waste samples to represent Oak Ridge and Hanford UST wastes will be created after consulting appropriate site personnel. For large-scale tests, the waste will be actual radioactive waste retrieved from UST sites.

Testing in this project will be performed by the Interim Waste Technology Section at SRTC. Four staff personnel have been assigned to this project, with a fifth person available upon request. The testing in this project will determine removal efficiencies and filter and waste stream compatibility, as well as the filter and pumping parameters required to improve separation and throughput.

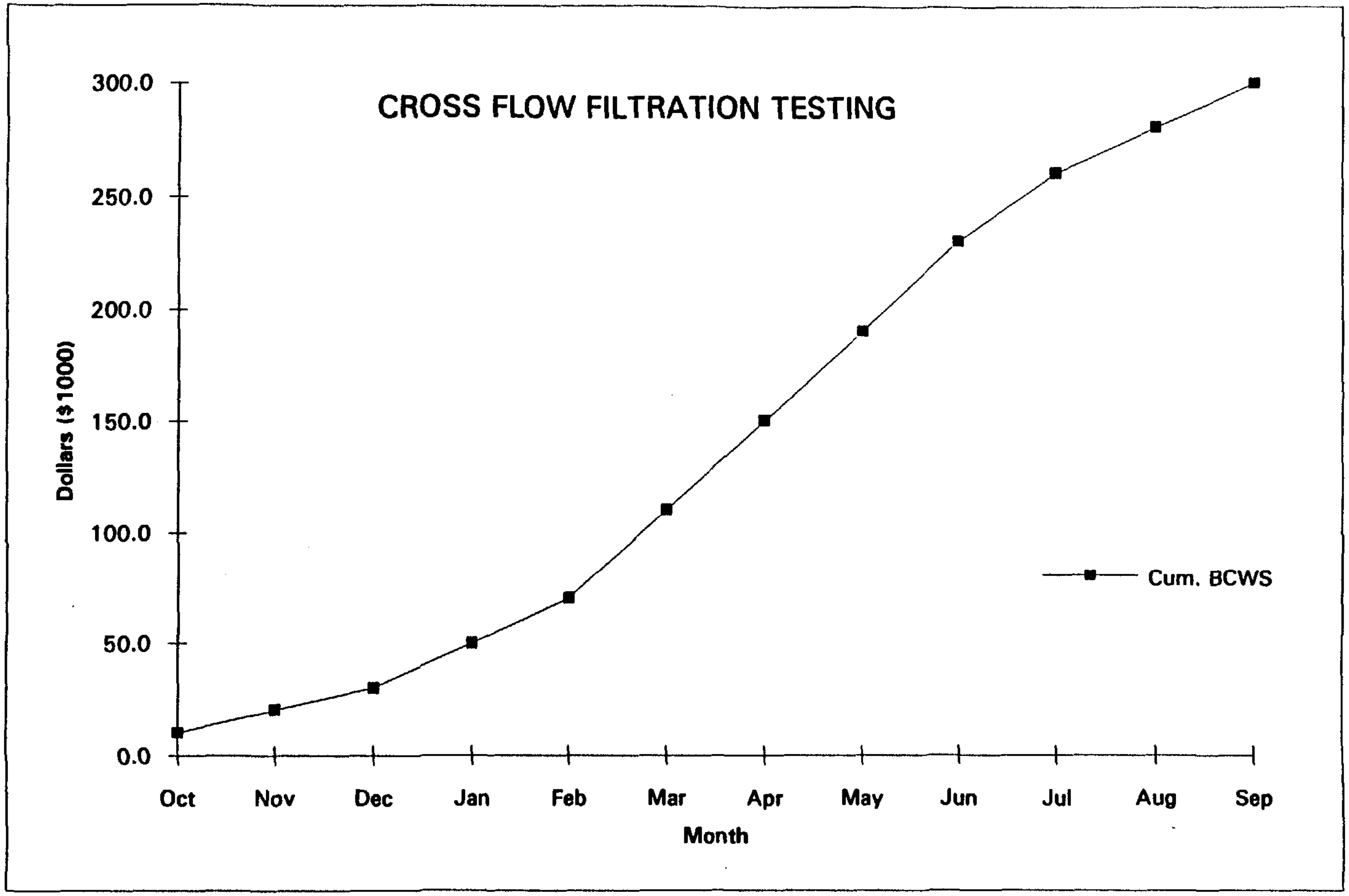
This project will support the full-scale work in the Late Wash project.

2.6.2 Milestones

Issue Technical Task Plan 11/15/94
Prepare OTD Mid-Year Technical Review 3/31/95
Complete evaluation and ranking of filtration needs 4/30/95
Initiate demonstration 4/30/95
Prepare End-of-Year Report 9/30/95

2.6.3 Cost

The costs for this project have been broken down by month and are displayed in Fig. 2.8.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BCWS	10.0	10.0	10.0	20.0	20.0	40.0	40.0	40.0	40.0	30.0	20.0	20.0
ACWP												
Cum. BCWS	10.0	20.0	30.0	50.0	70.0	110.0	150.0	190.0	230.0	260.0	280.0	300.0
Cum. ACWP												
Cum. VAR												
EAC												
EVAC												

Fig. 2.8. Cost breakdown by month—Crossflow Filtration Testing. BCWS = budgeted cost of the work scheduled.

2.7 TECHNICAL INTERCHANGE WITH CEA

The Technical Interchange with CEA project will be coordinated by R. T. Jubin, the project's PI and an ORNL staff member. As a part of this project, Jubin is currently at the Commissariat à l' Energie Atomique (CEA) Fontennay-aux-Roses site in France. The FY 1995 total budget for this project is $330K. A Mid-Year Technical Review of this project will be available on 3/31/95. The End-of-Year Report will be available on 9/30/95. The project is expected to conclude on 8/31/95. The final project report will be available on 11/30/95. A description of the project, breakdown of costs, and schedule of milestones are provided in Sects. 2.7.1–2.7.3.

2.7.1 Description

The purpose of this project is to familiarize DOE with other technologies for reducing and immobilizing radioactive components of liquid waste from USTs. This familiarity will enable DOE to select the best alternative technology for its waste remediation efforts.

As a part of this project, Jubin has been assigned to study the CEA process called DIAMEX. In return, DOE will provide information on its transuranium extraction (TRUEX) process. Both the DIAMEX and TRUEX processes have the same function: to separate transuranics from acidic waste streams.

This interchange was initiated in February 1994 with the assignment of Jubin to the CEA site at Fontenay-aux-Roses. Specifically, Jubin's mission is to evaluate the DIAMEX process against the comparable TRUEX process and determine the potential applicability of the former process to DOE's needs in UST waste processing.

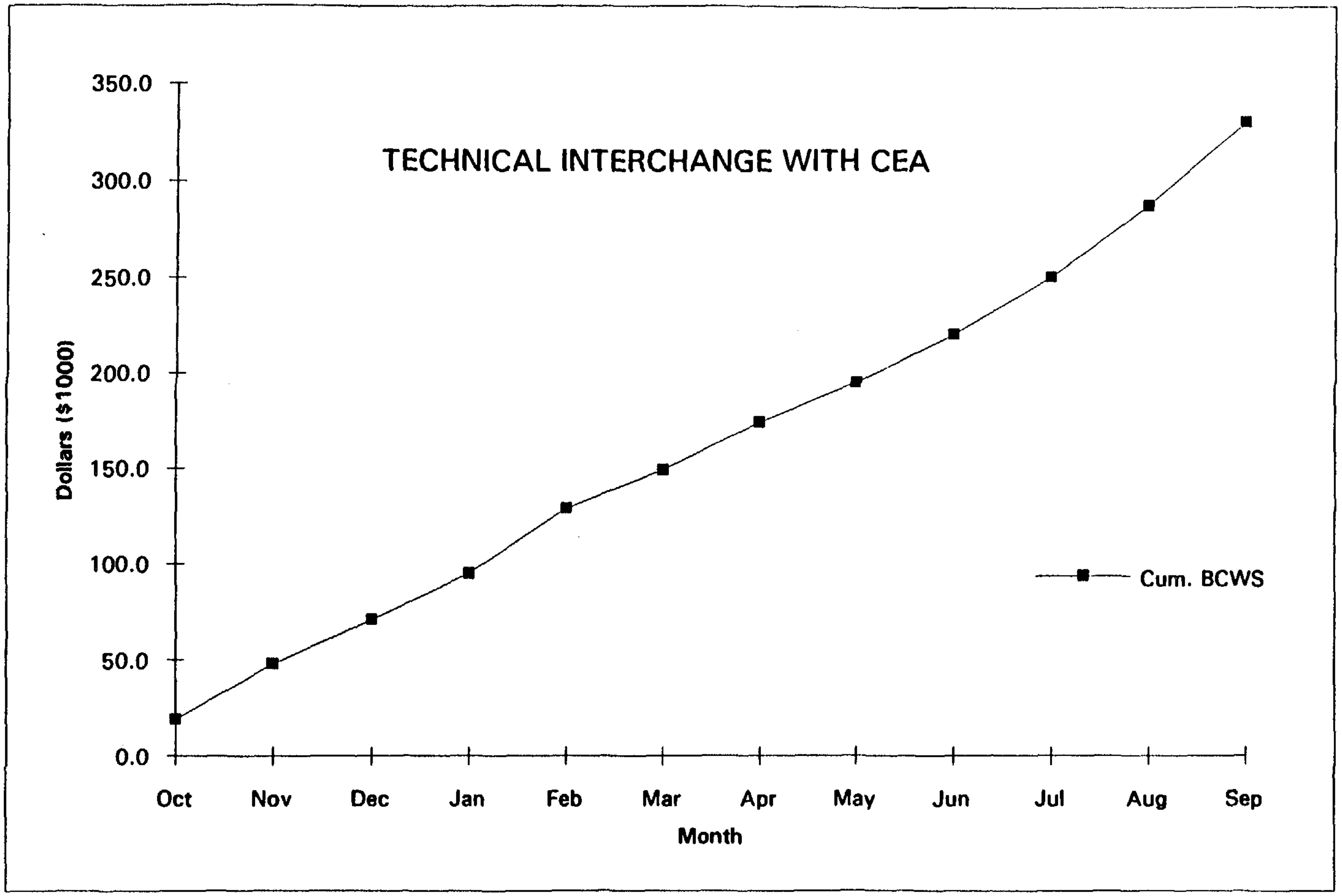
Additionally, Jubin has been tasked to determine other possibilities for technical collaboration. This project represents an excellent first step for continued interchanges of technology between DOE and CEA.

2.7.2 Milestones

Issue Technical Task Plan	11/15/94
Prepare OTD Mid-Year Technical Review	3/31/94
Complete assignment at CEA	8/31/95
Prepare final report	11/30/95

2.7.3 Cost

The costs for this project have been broken down by month and are displayed in Fig. 2.9.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BCWS	19.0	29.0	23.0	24.0	34.0	20.0	25.0	21.0	25.0	30.0	37.0	43.0
ACWP												
Cum. BCWS	19.0	48.0	71.0	95.0	129.0	149.0	174.0	195.0	220.0	250.0	287.0	330.0
Cum. ACWP												
Cum. VAR												
EAC												
EVAC												

Fig. 2.9. Cost breakdown by month—Technical Interchange with CEA. BCWS = budgeted cost of the work scheduled.

2.8 TRUEX APPLICATIONS

The TRUEX Applications project will be coordinated by G. F. Vandergrift, the project's PI, at ANL. The total budget for this project is $50K. A Mid-Year Technical Review of this project will be available on 3/31/95. An End-of-Year Report will be available on 9/30/95. The project is expected to conclude at the end of the fiscal year (9/30/95). For this project, the End-of-Year Report will be the final report. A description of the project, breakdown of costs, and schedule of major milestones are provided in Sects. 2.8.1–2.8.3.

2.8.1 Description

The purpose of this project is to report on TRUEX development efforts throughout the DOE system and to recommend any necessary additional work. (The TRUEX process refers to the extraction of various transuranic elements, such as neptunium, americium, plutonium, and curium.)

Visits will be made to the four DOE sites to determine their plans for use of the TRUEX process. A report will be written that documents (1) the status of the TRUEX process at each site and (2) the plans at each site for further development and implementation.

The TRUEX process is a solvent extraction procedure. It is capable of highly efficient separation of small quantities of transuranic elements from acidic, aqueous nitrate, or chloride solutions. Solutions of these types are typically generated in the reprocessing of spent nuclear fuel and in the plutonium production and purification processes.

The TRUEX process was invented at ANL, and the Center for TRUEX Development has been at ANL for over 10 years.

An important precondition for successful use of the TRUEX process (as well as any other solvent extraction or ion-exchange process) is that the transuranics be in a soluble form. The transuranic ions can be highly complexed and still be extractable by the TRUEX solvent.

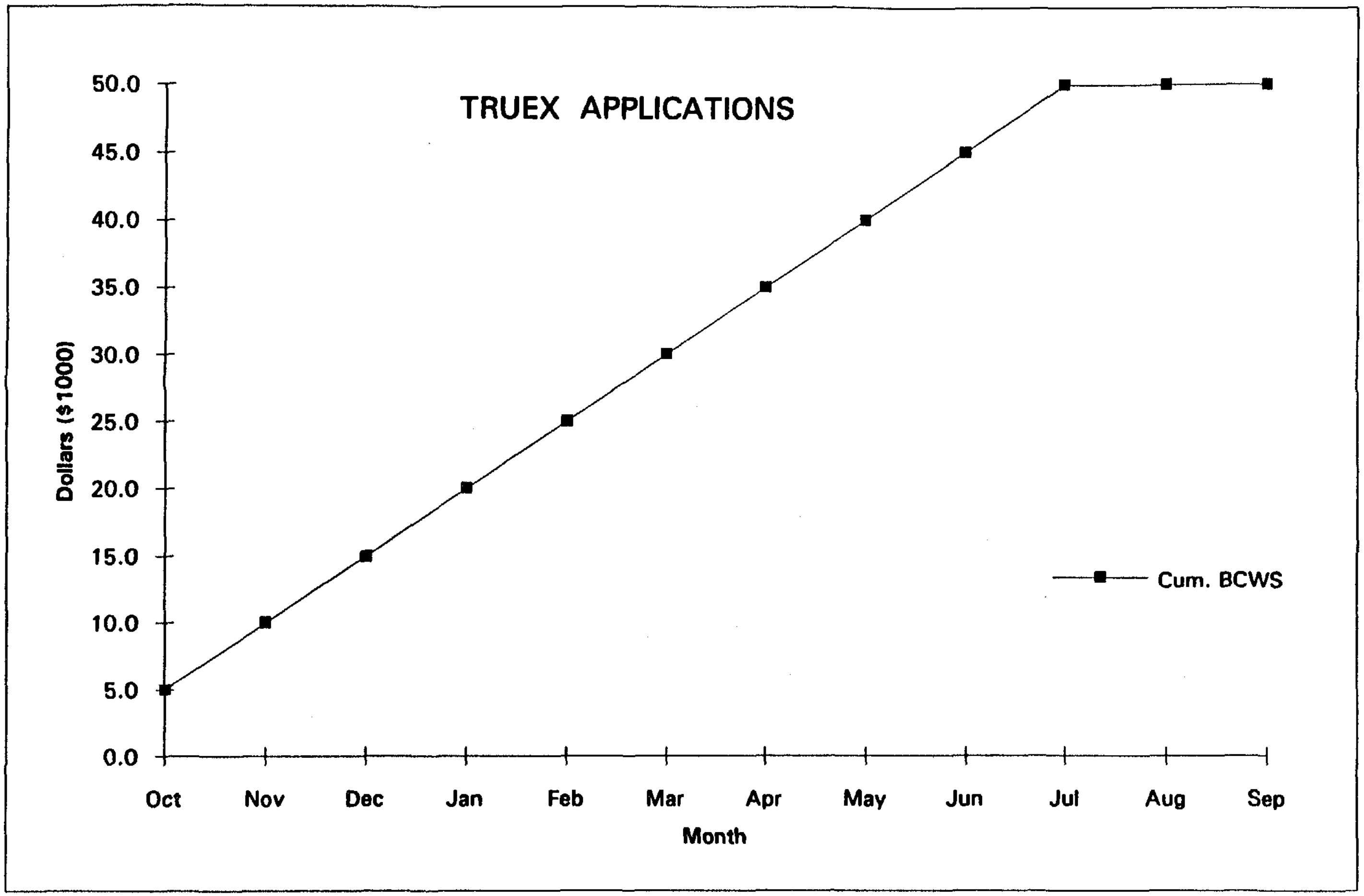
The use of the TRUEX process for treating transuranic waste is under consideration throughout the DOE complex.

2.8.2 Milestones

Issue Technical Task Plan 11/15/94
Prepare Final Report 9/30/95

2.8.3 Cost

The costs for this project have been broken down by month and are displayed in Fig. 2.10.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BCWS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	0.0	0.0
ACWP												
Cum. BCWS	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	50.0	50.0
Cum. ACWP												
Cum. VAR												
EAC												
EVAC												

Fig. 2.10. Cost breakdown by month—TRUEX Applications. BCWS = budgeted cost of the work scheduled.

2.9 NAC/NAG PROCESS STUDIES (CONDUCTED AT ORNL)

The testing in the NAC/NAG Process Studies (ORNL) project will be coordinated by D. D. Lee, the project's PI, at ORNL. Total budgeted cost for this project is $100K. A Mid-Year Technical Review of this project will be available on 3/31/95. The Final Report will be also used as the End-of-Year report; it will be available on 9/30/95. The project is expected to conclude on 9/30/95. A description of this project, breakdown of costs, and schedule of milestones are provided in Sects. 2.9.1–2.9.3.

2.9.1 Description

This project extends the development of the Nitrate to Ammonia and Ceramic/Nitrate to Ammonia and Glass (NAC/NAG) process being performed at FIU. The project work being conducted at FIU is limited to nonradioactive waste samples. ORNL will extend FIU's development work by (1) validating the results of FIU studies on nonradioactive waste and (2) performing experiments that require radioactive waste.

Providing technical direction and oversight to the FIU studies is a major component of the ORNL effort.

The scope of the NAC/NAG Process Studies (ORNL) project covers only the work to be done by ORNL. All work performed by FIU is covered under the NAC/NAG Process and Waste Form Studies (FIU) project.

For the ORNL project, researchers will compare the models of the NAC/NAG reactor for use with radioactive surrogates with the FIU model for use with sodium nitrate. These comparisons will include the fluid and thermal properties of the slurry produced by NAC/NAG process as well as reactor parameters (e.g., size and shape of aluminum particles, nitrate concentration, agitation, temperature, number of phases, and slurry solids concentration).

ORNL will perform bench-scale tests of the NAC/ NAG process with a variety of simulated supernates to (1) determine design parameters for a full-scale NAC/NAG reactor and (2) determine operating parameters for this reactor.

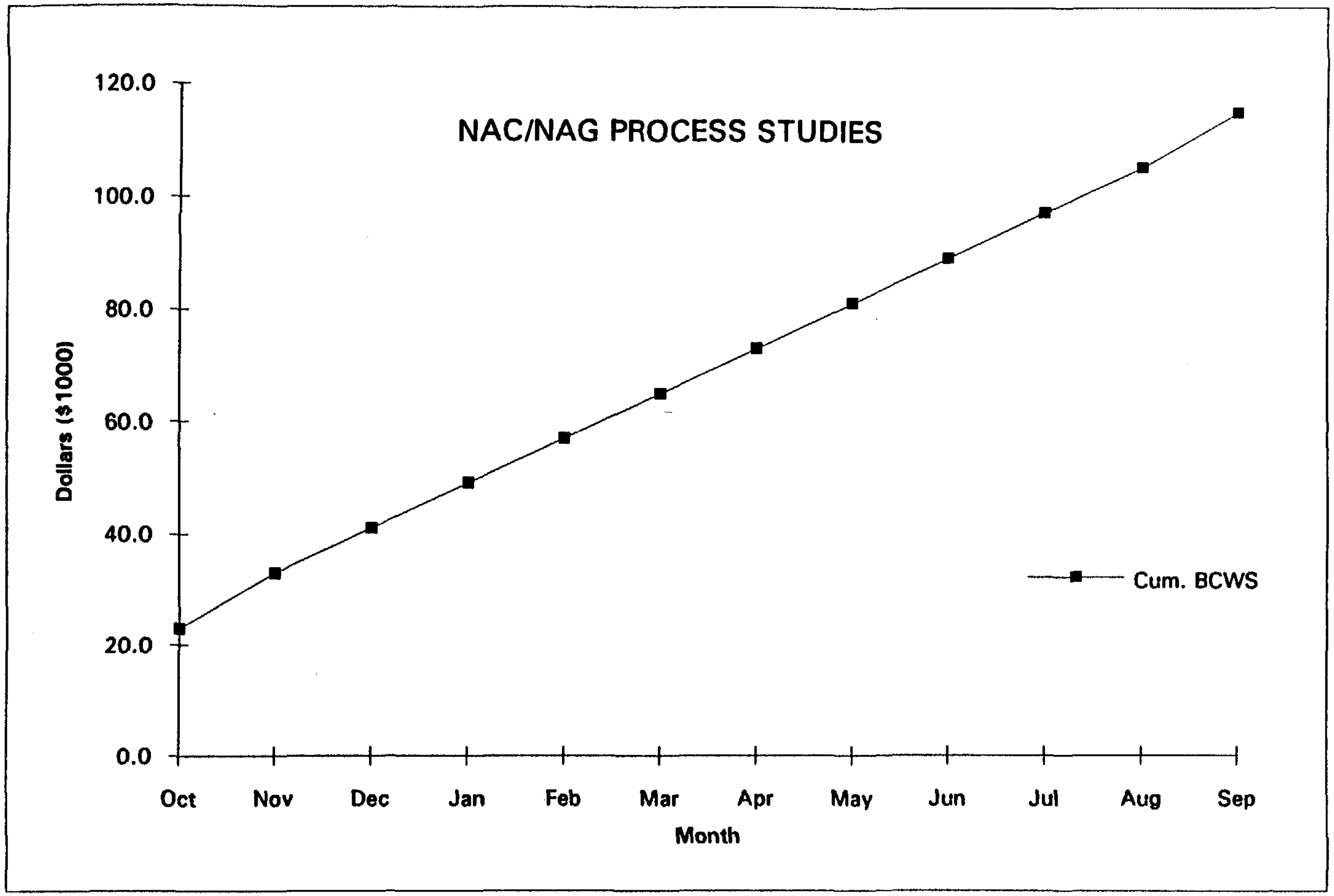
The final products of this project are (1) a set of recommendations for reactor design parameters and (2) a database that details reactor operating parameters. Information developed by this project will be submitted to the DOE Program Manager for dissemination. Results will also be presented to Waste Management personnel at other sites. Technologies developed in this project are expected to apply to the remediation of tank waste supernates and salt cakes at most, if not all, DOE sites.

2.9.2 Milestones

Prepare Technical Task Plan 11/15/94
Prepare Mid-Year Technical Review 3/31/95
Prepare ORNL Reactor Studies Report 5/31/95
Prepare End-of-Year Report 9/30/95

2.9.3 Costs

The costs for this project have been broken down by month and are displayed in Fig. 2.11.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BCWS	8.0	10.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	10.0
ACWP												
Cum. BCWS	23.0	33.0	41.0	49.0	57.0	65.0	73.0	81.0	89.0	97.0	105.0	115.0
Cum. ACWP												
Cum. VAR												
EAC												
EVAC												

Fig. 2.11. Cost breakdown by month—NAC/NAG Process Studies (conducted at ORNL). BCWS = budgeted cost of the work scheduled.

2.10 NAC/NAG PROCESS AND WASTE FORM STUDIES (CONDUCTED AT FIU)

The testing in the NAC/NAG Process and Waste Form Studies (FIU) project will be coordinated by D. D. Lee, the project's PI, at ORNL. Total budgeted cost for this project is $200K. A Mid-Year Technical Review of this project will be available on 3/31/95. The End-of-Year report on this project will be available on 9/30/95. The project is expected to conclude on 8/31/95. A description of this project, breakdown of costs, and schedule of milestones are provided in Sects. 2.10.1–2.10.3.

2.10.1 Description

This FIU project has two major thrusts: (1) further development of the NAC/NAG process and (2) studies of NAC/NAG waste forms.

The NAC/NAG process is important to UST remediation efforts because it enables (1) the decomposition of nitrate to ammonia, (2) the immobilization of strontium and any soluble actinides and lantanides, and (3) the immobilization of the alkali metals (including cesium) in an inert waste that may be suitable for disposal. The NAC/NAG process can convert nitrate to ammonia at low temperatures that will not volatize radionuclides such as cesium and technetium.

The first major thrust (i.e., further development of the NAC/NAG process) will require both studies of reactor chemistry and testing to design reactor equipment. FIU will determine the reaction rate constant as a function of aluminum particle size and shape, nitrate concentration, and temperature using various nonradioactive surrogates.

Wastes from the NAC/NAG process include a liquid low-level waste (LLLW) and a solid high-level waste (HLW). Acceptable technology is available for the further processing of the LLLW from the NAC/NAG process. Conversion of the solid HLW into glass or glassy ceramic is one of the subprocesses under study in the second major thrust of this project (studies of NAC/NAG waste forms).

The second major thrust requires three tasks: (1) drying and sintering the solid HLW to produce a glass or glassy ceramic final waste form, (2) characterizing these two final waste forms, and (3) performing leaching studies.

The first task (drying and sintering the solid HLW to produce a glass or glassy ceramic final waste form) will use conventional furnace equipment. FIU will also conduct a literature survey to determine the feasibility of using other commercially available equipment (such as conventionally heated rotary kilns) to produce ceramic sinters.

The second task (characterizing the two final waste forms) will use the Product Consistency Test (PCT) and Toxicity Characteristic Leaching Procedure (TCLP) test. The PCT and the TCLP leach test will allow comparison of FIU-produced glasses and glassy ceramics with these same forms produced in project work at Hanford. Chemical characterization studies will enable design of a waste forms production system.

The third task (performing leaching studies) is the final task. Immobilization of radioactive waste is an important goal of DOE remediation efforts. A requirement for the NAC/NAG waste forms is that the radioactive content does not leach out.

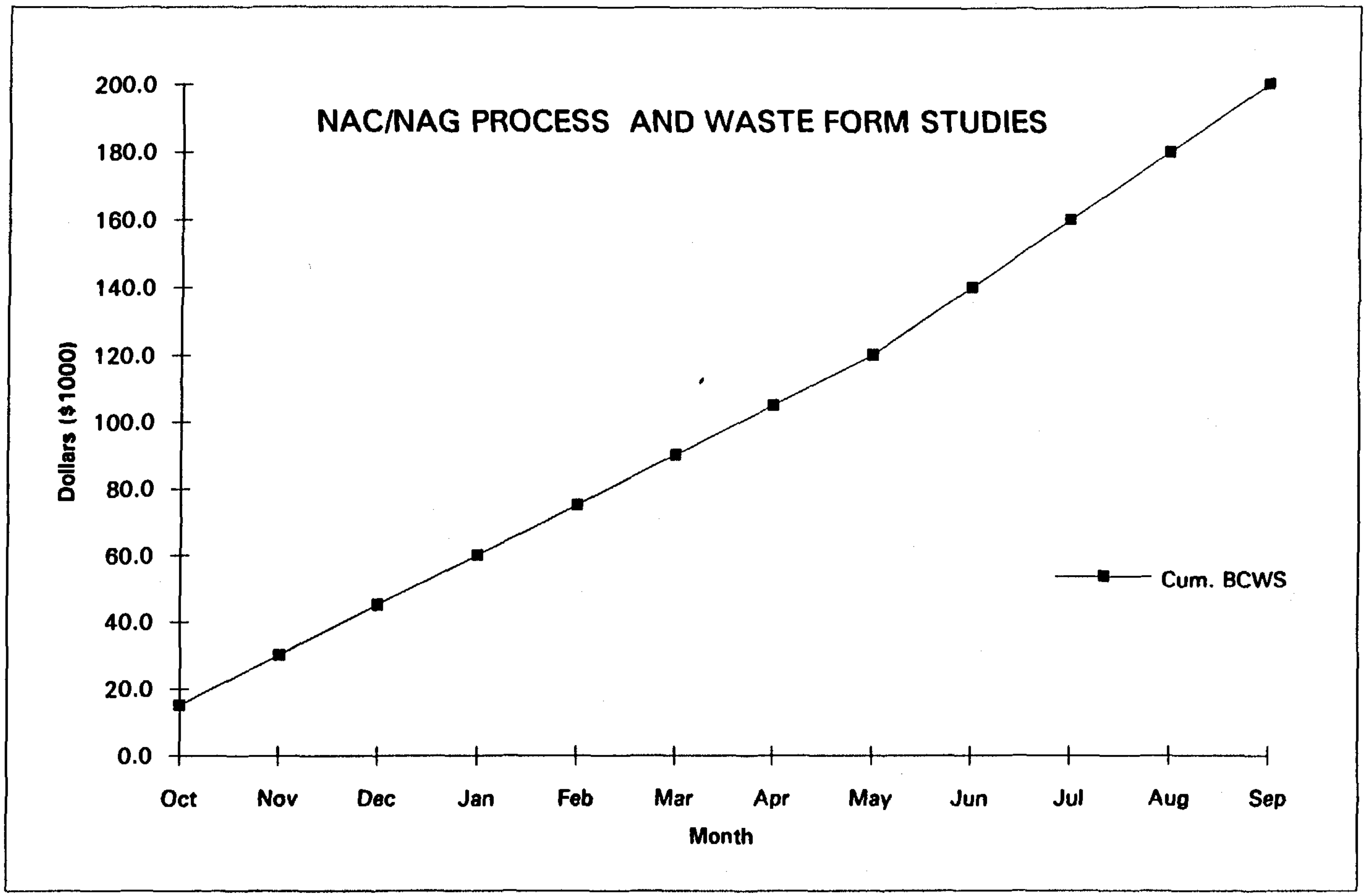
To conclude this project, FIU will assist ORNL and DOE in the conduct of two technology transfer workshops.

2.10.2 Milestones

Prepare Technical Task Plan	11/15/94
Prepare OTD Mid-Year Technical Review	3/31/95
Prepare FIU's Reactor Studies Letter Report	5/31/95
Prepare FIU's Waste Form Letter Report	6/30/95
Conduct Technology Transfer workshop	8/31/95
Prepare End-of-Year Report	9/30/95

2.10.3 Costs

The costs for this project have been broken down by month and are displayed in Fig. 2.12.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BCWS	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	20.0	20.0	20.0	20.0
ACWP												
Cum. BCWS	15.0	30.0	45.0	60.0	75.0	90.0	105.0	120.0	140.0	160.0	180.0	200.0
Cum. ACWP												
Cum. VAR												
EAC												
EVAC												

Fig. 2.12. Cost breakdown by month—NAC/NAG Process and Waste Form Studies (conducted at FIU). BCWS = budgeted cost of the work scheduled.

2.11 PROGRAM MANAGEMENT

The Program Management project is coordinated by C. P. McGinnis, the PP-TIM at ORNL. Total budget for this project in FY 1995 is $250K. A End-of-Year Report on this project is due 9/30/95. This is an ongoing project that will last the duration of the Pretreatment Program. A description of the project, breakdown of costs, and schedule of major milestones are provided in Sects. 2.11.1–2.11.3.

The Pretreatment Program office receives administrative support for technical projects from R. D. Hunt and W. T. Wilkenson. Hunt serves as the system lead for cesium removal projects, and Wilkenson is on assignment to the Pretreatment Program office from the Hazardous Waste Remedial Actions Program. Wilkenson oversees program reporting, contracts, and milestone and budget tracking.

2.11.1 Description

Program Management is responsible for recommending a comprehensive approach for meeting the needs of the four UST sites. This office responds by providing coordination and administrative support to the technical projects.

In FY 1995, the Program Management project will be used to coordinate 11 projects at 3 sites (Oak Ridge, Savannah River, and ANL).

Activities within the Program Management project include evaluation of project proposals, preparation of the PMP, research and response to inquiries from the TFA-Coordinator, research and response to inquiries from DOE-EM at headquarters, and coordination with the EM-30 (Waste Management Operations) function at four major tank sites.

The long- and short-term planning provided in this project ensure that the technical projects within the PP are completed in a timely and cost-effective manner. The coordination provided by this project also eliminates duplication of effort at the various DOE sites.

2.11.2 Milestones

Program Management Plan for the Pretreatment Program:
- Update the Program Management Plan for the Pretreatment Program 12/31/94

Technology Development Activities Chart:
- Update the Technology Development Activities Chart 12/31/94

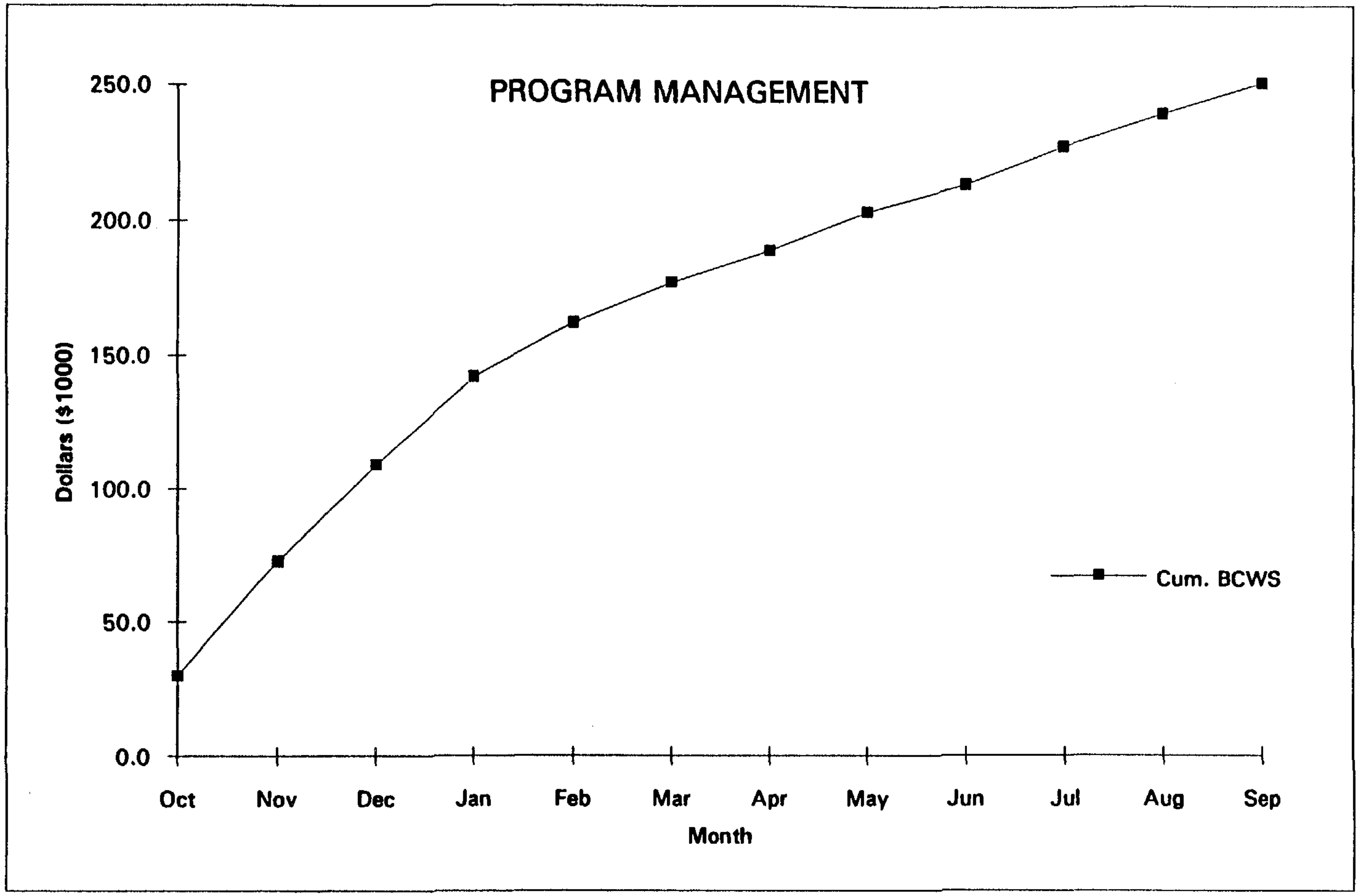
Office of Technology Development Mid-Year Review:
- Perform OTD Mid-Year Technical Review 3/31/95

Interface with EM-30 and EM-50 Programs:
- Determine FY 1996 project requirements 4/30/95

Review and select projects for FY 1996:
- Identify Technical Task Plans that are due 7/31/95

2.11.3 Cost

The costs for this project have been broken down by month and are displayed in Fig. 2.13.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BCWS	30.0	43.0	36.0	33.0	20.0	15.0	12.0	14.0	10.0	14.0	12.0	11.0
ACWP												
Cum. BCWS	30.0	73.0	109.0	142.0	162.0	177.0	189.0	203.0	213.0	227.0	239.0	250.0
Cum. ACWP												
Cum. VAR												
EAC												
EVAC												

Fig. 2.13. Cost breakdown by month—Program Management. BCWS = budgeted cost of the work scheduled.

3. MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

The Pretreatment Program is an organizational unit performing work within the TFA. The TFA was established by the Deputy Assistant Secretary for Technology Development (EM-50). The Deputy Assistant Secretary (EM-50) manages OTD and reports to the Assistant Secretary for Environmental Restoration and Waste Management (EM-1).

The Deputy Assistant Secretary for Technology Development assigned responsibility for the TFA to the TFA Management Team. The TFA Management Team is chaired by a DOE Program Manager (EM-55).

The TFA Management Team (which serves more in the capacity of a steering committee) assigned lead responsibility for the TFA to the Technical Program Officer (TPO) at DOE-Richland. For day-to-day management of the TFA, a manager at PNL was assigned the role of TFA-Coordinator.

The TFA-Coordinator has given the Pretreatment Program—TIM the responsibility for performing the projects defined in this PMP. To support the Pretreatment Program—TIM, research and support personnel have been assigned to perform the individual tasks comprising the projects. Quality assurance (QA) personnel at all sites will support the Pretreatment Program by providing QA advice and assistance as needed.

The Pretreatment Program—TIM has program responsibility to the Technical Program Manager (TPM) at Martin Energy Systems, Inc. The TPM reports to the Vice President of Environmental Management and Enrichment Facilities (formerly Environmental Restoration and Waste Management and Uranium Enrichment Support) for Energy Systems. The TPM also has program responsibility to the TPO at DOE's Oak Ridge Operations Office (DOE-ORO). The TPO at DOE-ORO is the official liaison between DOE-ORO and the TFA Management Team.

A management organization chart for the Pretreatment Program is shown in Fig. 3.1.

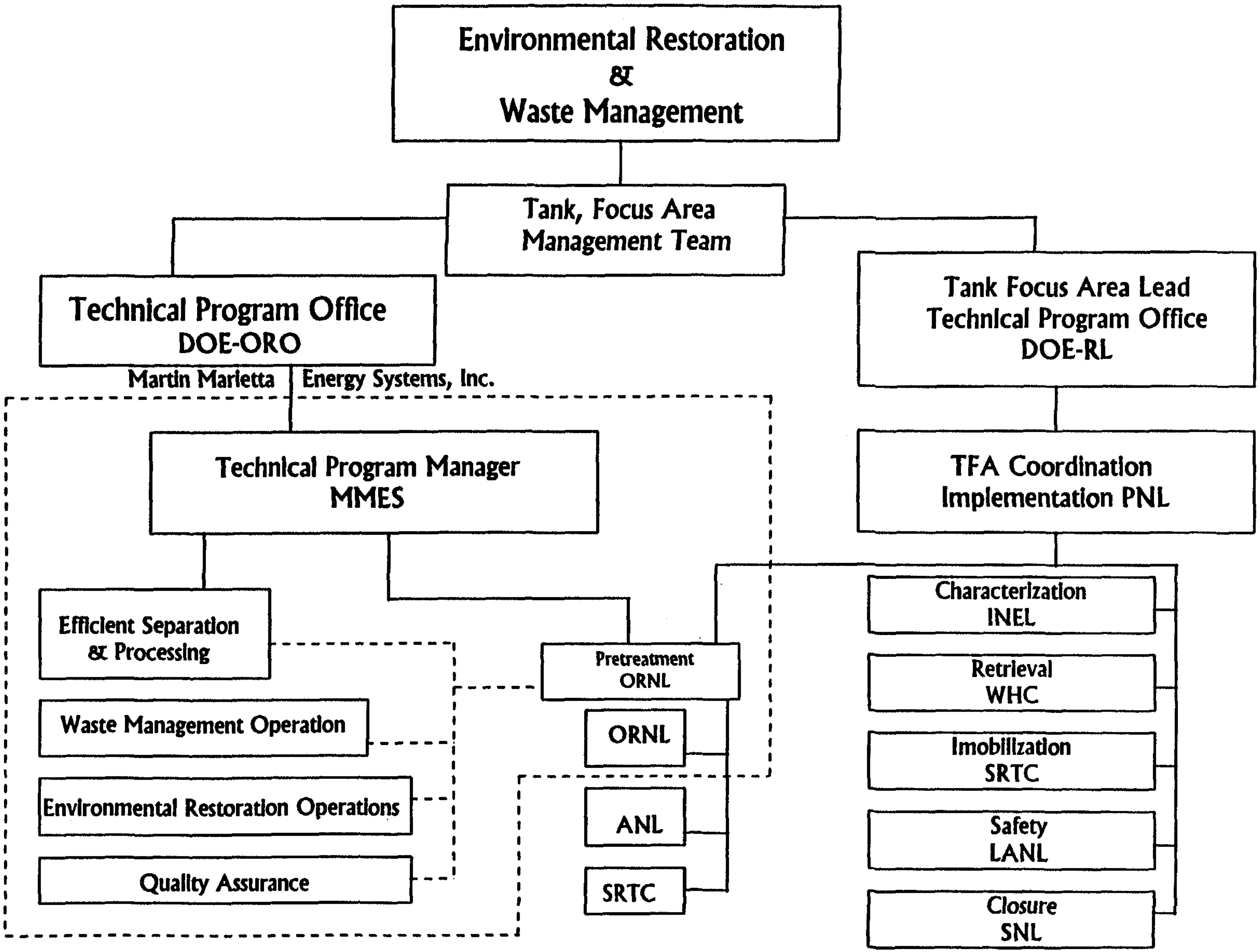


Fig. 3.1. Management organization chart for the Pretreatment Program.

4. PROJECT MANAGEMENT SYSTEM

The project management system used by the Pretreatment Program provides for work definition, budget formulation, work authorization, performance measurement, progress reports, project reviews, and status meetings. This project management system meets the requirements of DOE Order 4700.1, *Project Management System.*

4.1 WORK DEFINITION

Both a project description and a schedule of milestones for each project in the Pretreatment Program are shown in Sect. 2 of this PMP.

4.2 BUDGET FORMULATION

The Technical Task Plan (TTP) is the basic control document used for budgeting projects within the Pretreatment Program. TTPs contain information at the level of detail necessary to document the cost, schedules, and technical baselines and are prepared in response to the field budget call that is made during January each year.

The Pretreatment Program—TIM responds to the field budget call by tasking the program's PIs to develop TTPs for their projects. The Pretreatment Program—TIM is then responsible for collecting and reviewing the TTPs to ensure that the TTPs from his organization adequately address the needs of the project and that resource requirements shown in the TTP are properly supported in the narrative.

The Pretreatment Program—TIM then compiles the TTPs into a PMP and submits the PMP to the Technical Program Manager, Martin Marietta Energy Systems, Inc., who submits it to OTD.

4.3 PERFORMANCE MEASUREMENT

The OTD specifies control techniques to ensure that funds obligations do not exceed funds availability and that obligations are stated correctly. Financial information is collected monthly by prime contract and used to make comparisons of the budgeted and actual rates of funds expenditures.

All project managers are responsible for compiling and analyzing obligation and expenditure data for their projects. Periodically, the project managers will report the financial status to the Pretreatment Program—TIM, who then reports the financial status of the Pretreatment Program and the individual projects to the Energy Systems TPM and the TFA-Coordinator.

4.4 PROGRESS REPORTS

Progress on each project covered by this PMP is reported monthly to the OTD through the Project Tracking System (PTS), a required reporting system. Elements of the PTS reporting include costs, milestones, technical progress, and issues. The Pretreatment Program—TIM is responsible for ensuring that these PTS reports are prepared and submitted as scheduled.

Each site participating in the Pretreatment Program will provide the Pretreatment Program—TIM with a copy of its monthly PTS report. Using the PTS reports, the Pretreatment Program office will prepare an executive summary for the TFA-Coordinator's monthly progress report.

4.5 PROJECT REVIEW MEETINGS

To facilitate the exchange of information between project participants, the individual project managers will schedule periodic review meetings to exchange general information, identify action items, report project statuses, and exchange technical information. Additional project review meetings, as well as technical review meetings, will be scheduled as needed.

5. DOCUMENT CONTROL

The Pretreatment Program—TIM shall be responsible for overseeing the overall program's document control. Control of individual project documentation shall be the responsibility of the project's PI, who will use the document control plan in effect for the appropriate organization and site.

For example, the PIs for Oak Ridge projects will follow guidelines specified in ORNL's Chemical Technology Division documentation control plan. PIs will maintain all project documentation in the office of the Pretreatment Program—TIM, and access to the documentation will be controlled by Pretreatment Program—TIM and the PIs. Projects performed at other sites will be governed by the document control plan for these sites and organizations.

For each assigned project, the PI shall ensure that documentation is complete and that it is filed according to documentation procedures for the site or organization. For projects conducted at other sites, the PI shall ensure that equivalent documentation controls are implemented.

6. QUALITY ASSURANCE

Each site in the DOE complex has established a QA program to ensure that projects requirements are met. Each Pretreatment Program project shall comply with the QA program established for the site and organization conducting the project. The Pretreatment Program—TIM has oversight authority to ensure that Pretreatment Program projects are conducted according to the applicable QA plan.

The QA programs for Pretreatment Program projects shall be approved for research and development activities. These QA programs shall encompass the principal requirements in DOE Order 4700.1, *Project Management System;* DOE Order 5700.6C, *Quality Assurance*; DOE Order 5820.2A, *Radioactive Waste Management;* and ASME NQA-1, *Quality Assurance Program Requirements for Nuclear Facilities.*

Each site's QA organization shall provide advice to the project managers on QA matters as needed and shall provide assistance in performing QA activities. Technical reviews, peer reviews, inspections, surveillances, and audits shall be conducted as appropriate. All work shall be performed by individuals who are familiar with the governing QA plan.

All projects involving more than one organization or site will be coordinated with the appropriate QA personnel.

INTERNAL DISTRIBUTION

1. A. G. Croff
2. N. H. Cutshall
3. B. Z. Egan
4. R. D. Hunt
5. R. T. Jubin
6. T. E. Kent
7. D. D. Lee
8. A. J. Lucero
9. W. Kot
10. A. P. Malinauskas
11. C. P. McGinnis
12. M. Morrison
13. S. M. Robinson
14. J. F. Walker
15. J. S. Watson

16–20. W. J. Wilkenson

21. Central Research Library
22. Y-12 Technical Library
    Document Reference Center
23. ORNL Patent Section

24–25. ORNL Laboratory Records

26. Laboratory Records, RC

EXTERNAL DISTRIBUTION

27. D. Biancosino, Department of Energy, Trevion II, 12800 Middlebrook Rd., Germantown, MD 20874
28. J. Bibler, Westinghouse Savannah River Company/SRTC, 773-A, B-132, Aiken, SC 29808
29. D. Brown, US DOE Richland Operations Office, 825 Jadwin Avenue, P.O. Box 550, Richland, WA 99352
30. F. DesChamps, Department of Energy, Trevion II, 12800 Middlebrook Rd., Germantown, MD 20874
31. R. Eschenbaum, Westinghouse Hanford Company, P.O. Box 1970; MS: R2-31, Richland, WA 99352
32. S. Fink, P.O. Box 616, Bldg. 773-43A, Aiken, SC 29802
33. T. Fryberger, Department of Energy, Trevion II, 12800 Middlebrook Rd., Germantown, MD 20874
34. D. W. Geiser, Department of Energy, Trevion II, 12800 Middlebrook Rd., Germantown, MD 20874
35. S. M. Gibson, Department of Energy, Trevion II, 12800 Middlebrook Rd., Germantown, MD 20874
36. R. Gilchrist, Westinghouse Hanford Company, P.O. Box 1970; MS: L5-63, Richland, WA 99352
37. R. D. Korynta, DOE-ORO, Waste Management Building, EW-92, Oak Ridge, TN 37831
38. J. Lee, Sandia National Laboratory, PNL/TDPO, 723 Parkway, Richland, WA 99352
39. P. Lurk, Department of Energy, Trevion II, 12800 Middlebrook Rd., Germantown, MD 20874
40. M. Malone, Department of Energy, Trevion II, 12800 Middlebrook Rd., Germantown, MD 20874
41. B. Maas, US DOE Richland Operations Office, 825 Jadwin Avenue, P.O. Box 550, Richland, WA 99352
42. D. McCabe, P.O. Box 616, Bldg. 773-43A, Aiken, SC 29802
43. C. S. Mims, DOE-ORO, IRC Building, EW-911, Oak Ridge, TN 37831
44. J. O. Moore, DOE-ORO, Waste Management Building, EW-92, Oak Ridge, TN 37831
45. L. Nenninger, 555 Quince Orchard Road, Suite 500, Gaithersburg, MD 20878

46. J. R. Noble-Dial, DOE-ORO, Waste Management Building, EW-92, Oak Ridge, TN 37831
47. J. Plodinec, Westinghouse Savannah River Company, P.O. Box 616, Aiken, SC 29802
48. M. J. Quadrel, Battelle, Pacific Northwest Laboratory, Battelle Blvd., 3200 Q Ave. P.O. Box 999, Richland, WA 99352
49. R. K. Quinn, Battelle, Pacific Northwest Laboratory, Battelle Blvd., 3200 Q Ave. P.O. Box 999, Richland, WA 99352
50. L. C. Roddye, DOE-ORO, Waste Management Building, EW-92, Oak Ridge, TN 37831
51. S. Rozzi, 555 Quince Orchard Road, Suite 500, Gaithersburg, MD 20878
52. J. T. Slankas, Westinghouse Hanford Company, P.O. Box 1970; MS: R2-31, Richland, WA 99352
53. T. Stewart, Battelle, Pacific Northwest Laboratory, Battelle Blvd., 3200 Q Ave. P.O. Box 999, Richland, WA 99352
54. H. Sullivan, Los Alamos National Laboratory, SM30 Warehouse, Bikini Road, P.O. Box 1663, Los Alamos, NM 87545
55. T. Thomas,Westinghouse Idaho Nuclear Company Inc., 1955 Fremont Ave., P. O. Box 4000, Idaho Falls, ID 83415
56. W. Tomositas, P.O. Box 616, Bldg., Aiken, SC 29802
57. G. Vandegrift, Argonne National Laboratory, 9700S Cass Ave., Building 205, Argonne, IL 60439
58. M. Winokur, Waste Policy Institute, Quince Diamond Executive Center, 555 Qunice Orchard Road, Suite 600, Gaithersburg, MD 20878-1437
59. Office of Assistant Manager, Energy Research and Development, DOE-ORO, P.O. 2008, Oak Ridge, TN 37831-6269

60–61. Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831