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**MARTIN MARIETTA**

**ENVIRONMENTAL  
RESTORATION  
PROGRAM**

**Project Management Plan  
for the Gunitite and Associated Tanks  
Treatability Studies Project  
at Oak Ridge National Laboratory,  
Oak Ridge, Tennessee**

**MASTER**

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FOR THE UNITED STATES  
DEPARTMENT OF ENERGY

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Energy Systems Environmental Restoration Program

**Project Management Plan  
for the Gunite and Associated Tanks  
Treatability Studies Project  
at Oak Ridge National Laboratory,  
Oak Ridge, Tennessee**

Date Issued—December 1995

Prepared by  
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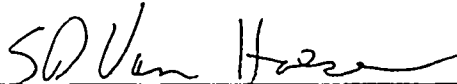
Prepared for the  
U.S. Department of Energy  
Office of Environmental Management  
under budget and reporting code EW 20

Environmental Management Activities at  
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Oak Ridge, Tennessee 37831-6285  
managed by  
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U.S. DEPARTMENT OF ENERGY  
under contract DE-AC05-84OR21400


Project Management Plan for the Gunitite and Associated Tanks  
Treatability Studies Project at Oak Ridge National Laboratory,  
Oak Ridge, Tennessee

ORNL/ER-254

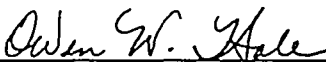
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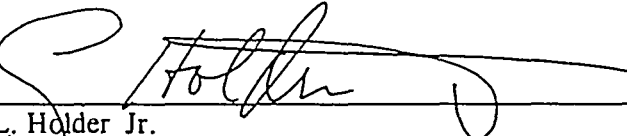
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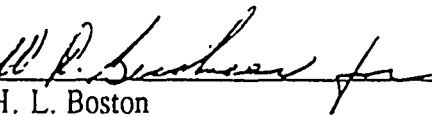
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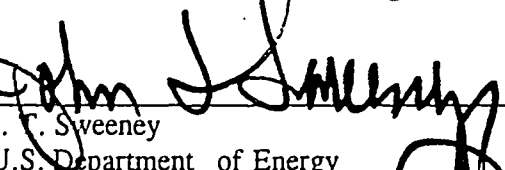
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## PREFACE

This Project Management Plan for the Gunitite and Associated Tanks Treatability Study at Oak Ridge National Laboratory (ORNL/ER-254) establishes how the project conducts operations. The project itself is conducted in accordance with the Treatability Study Work Plan (DOE/OR/02-1300&D2), which is a Federal Facility Agreement Milestone. The purpose of this project is a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) required waste characterization and remediation study to be conducted at Oak Ridge National Laboratory from FY 1994 to FY 1997. This work is being performed under Work Breakdown Structure 6.1.01.41.12.04 (Activity Data Sheet 3301 "ORNL WAG 1 Treatability Studies for Gunitite and Associated Tanks Operable Unit").

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## ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CET	Center for Environmental Technology
DOE	U.S. Department of Energy
Energy Systems	Lockheed Martin Energy Systems, Inc.
EPA	Environmental Protection Agency—Region IV
ER	Environmental Restoration
FFA	Federal Facility Agreement
GAAT	Gunite and Associated Tanks
JEG	Jacobs Engineering Group Inc.
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
OTD	Office of Technology Development
RI/FS	Remedial Investigation/Feasibility Study
TDEC	Tennessee Department of Environment and Conservation
WAG	Waste Area Grouping



## EXECUTIVE SUMMARY

This project management plan describes the scope and objectives for the Gunitite and Associated Tanks (GAAT) Treatability Studies Project of the Oak Ridge National Laboratory (ORNL) Environmental Restoration (ER) Program. This plan will serve as the project-specific management plan as called for in ORNL ER *Program Management Plan* ORNL/ER-167 (Energy Systems 1994).

This document is intended to explain how the GAAT Treatability Studies Project does business. The management structure of the project is described in detail in this plan. The various personnel matrixed to the project for the completion of specific assignments are identified. This plan also identifies the interactions between the GAAT Treatability Studies Project and ER Program personnel.

Separate sections of the report describe performance criteria and work plans, project organization, project summary work breakdown structure, schedule, milestones, and summary cost estimate.

# 1. INTRODUCTION

## 1.1 PURPOSE

This plan for the Gunitite and Associated Tanks (GAAT) Treatability Studies Project satisfies the requirements of the program management plan for the Oak Ridge National Laboratory (ORNL) Environmental Restoration (ER) Program as established in the *Program Management Plan for the Martin Marietta Energy Systems, Inc., Oak Ridge National Laboratory Site Environmental Restoration Program*. ORNL/ER-167 (Energy Systems 1994). This plan is a subtier of several other ER documents designed to satisfy the U.S. Department of Energy (DOE) Order 4700.1 requirement for major systems acquisitions.

This project management plan identifies the major activities of the GAAT Treatability Studies Project; establishes performance criteria; discusses the roles and responsibilities of the organizations that will perform the work; and summarizes the work breakdown structure, schedule, milestones, and cost estimate for the project.

## 1.2 BACKGROUND

In 1943, the Clinton Laboratories were built in Oak Ridge, Tennessee, to serve as a pilot facility for production operations at Hanford, Washington. The work included construction of six large underground concrete (Gunitite) tanks (designated W-5 through W-10) for storage of wastes that might be generated at the Laboratories. Construction was started in April 1943, and the tanks were in operational use in November 1943. These tanks have an inside diameter of 50 ft, a sidewall height of 12 ft, and a capacity of 643,000 L (170,000 gal). A schematic illustration of the tanks is provided in Fig. 1. Six smaller Gunitite tanks and four stainless steel tanks constitute the rest of the GAAT. The name of the Clinton Laboratories was changed to the Oak Ridge National Laboratory (ORNL), and the waste storage tanks became an integral part of the ORNL waste system. The initial six tanks became part of what is historically called the South Tank Farm, and the four steel tanks and four of the smaller Gunitite tanks became part of what has been historically called the North Tank Farm. The remaining two smaller Gunitite tanks (W-11 and TH-4) are located a short distance from the South Tank Farm. A site overview showing the tank locations is provided in Fig. 2.

The radioactive, hazardous, and other chemical wastes handled by these tanks have been routinely treated with caustic to a pH of 10 or greater; substances that are insoluble in high pH solutions precipitated and settled in the waste storage tanks. In 1980, when the ORNL waste system was revised and these tanks were taken out of service, about 1.5 million liters (400,000 gal) of sludge containing between 0.5 and 1 million curies had accumulated in the tanks. Subsequent characterization of the tanks indicated transuranic and Resource Conservation and Recovery Act materials were also present in the tanks.

A program to empty the original six tanks and dispose of the accumulated sludge began in 1977. Process development, system design, and facility construction were completed by June 1982. In approximately 18 months of operation, sludge in five of the six 170,000-gal tanks was removed by sluicing (see Fig. 3 for the sluicing system layout). Through the use of this technique, the sludge was resuspended in a water-2.5% bentonite mixture. Bentonite was used to suspend the sludge and

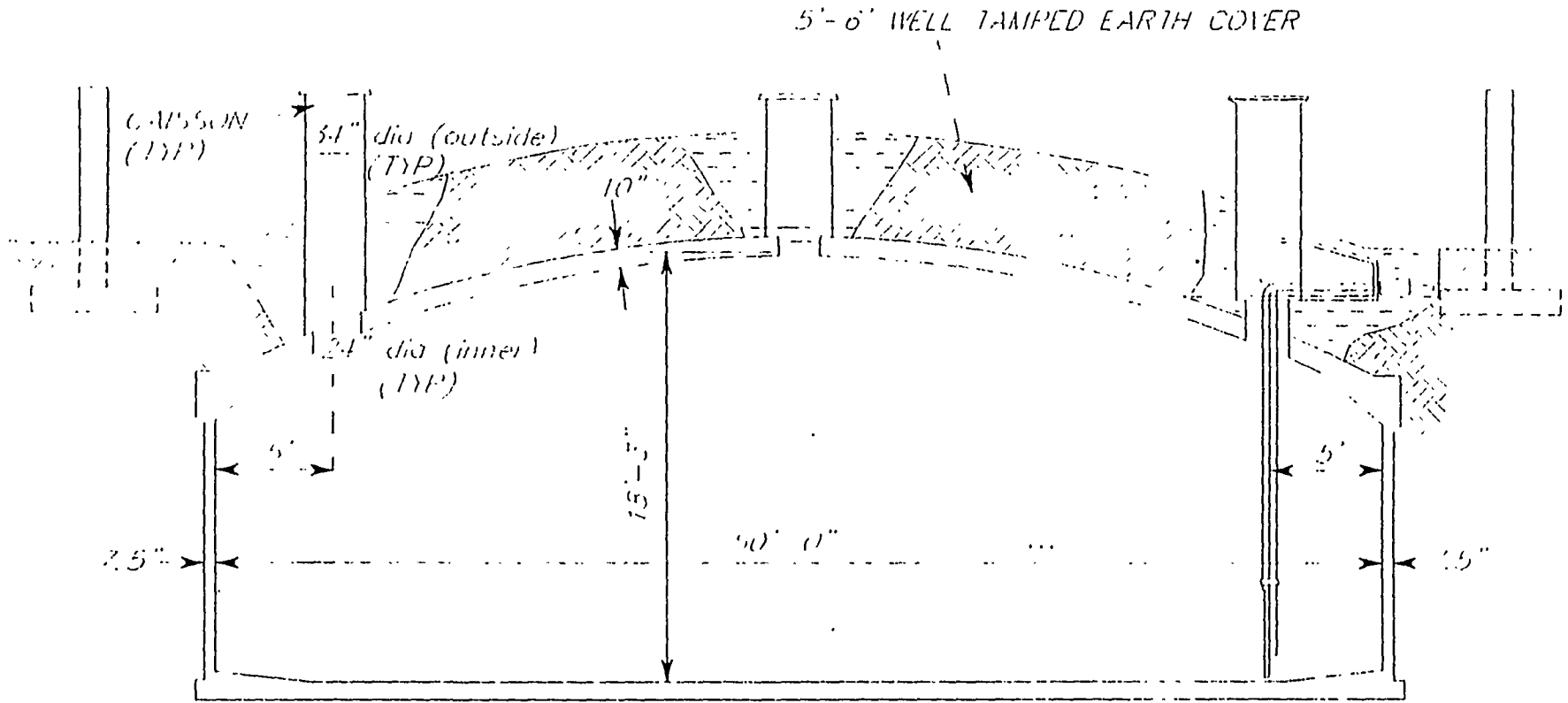
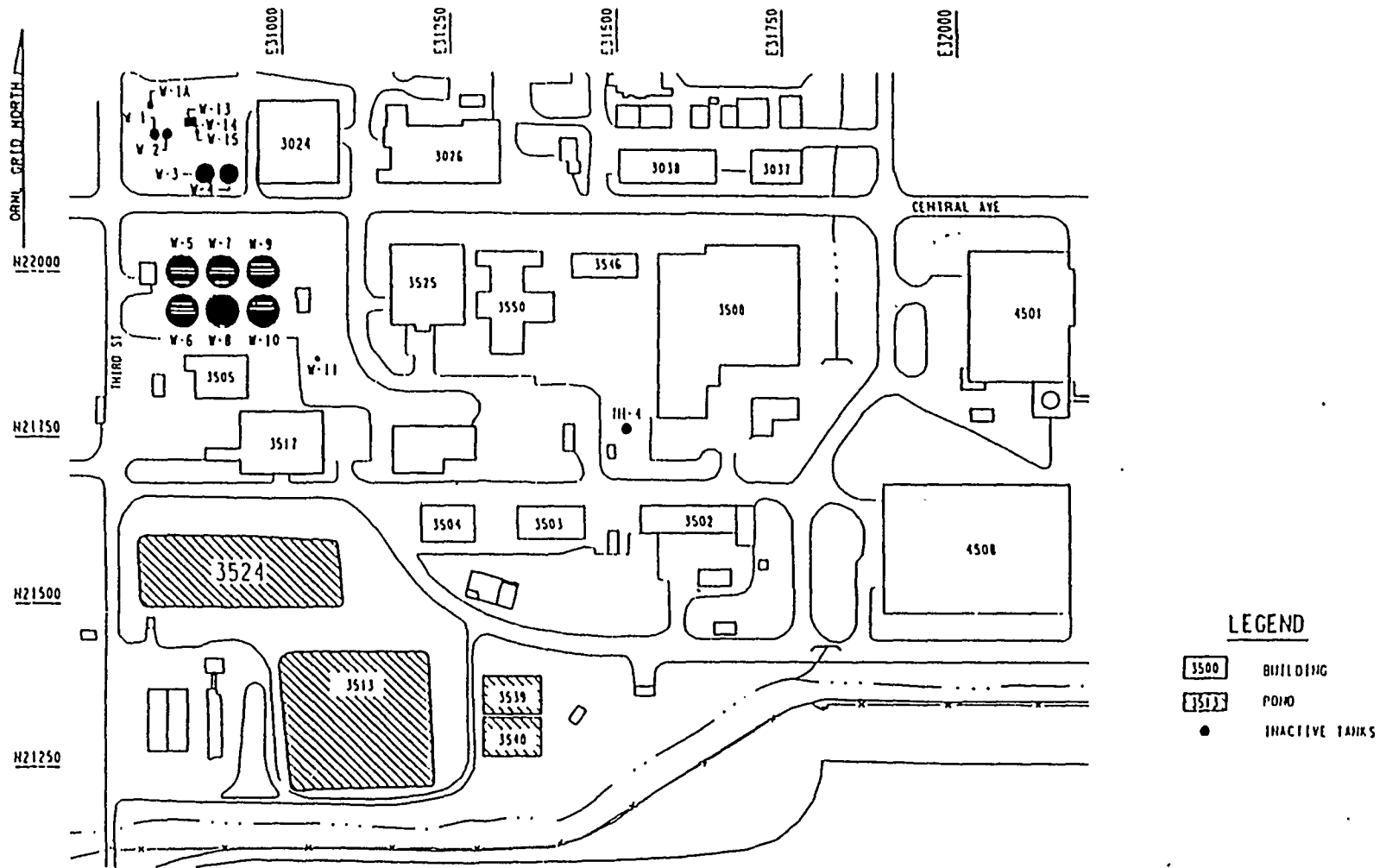


Fig. 1. Typical Gunite tank cross section.





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Fig. 2. Location of inactive waste storage tanks at the ORNL main plant site.

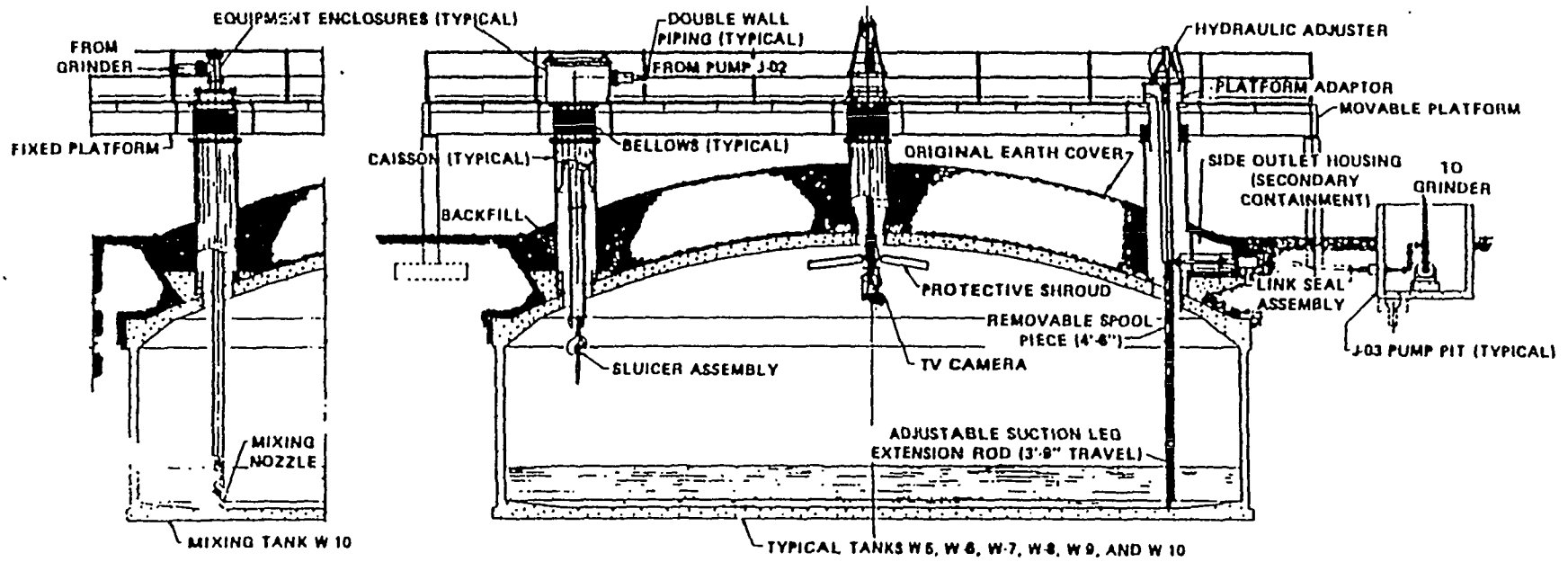


Fig. 3. Cross section of Gunite tank during operations in 1984.

extend the time before the sludge settled. Approximately 90% of the sludge was resuspended, pumped to the Melton Valley storage tanks, then transferred to the hydrofracture site for temporary storage, and subsequently, permanent disposal. Following this operation, the amount of sludge remaining in these tanks was estimated at about 216,000 L (57,000 gal), approximately 80% of which resides in tanks W-6 and W-10.

In 1989, the Oak Ridge Reservation (ORR) was placed on the National Priorities List and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) remediation process was initiated. The tanks described previously were combined into the GAAT operable unit located within Waste Area Grouping (WAG) 1. In January 1992, the Federal Facility Agreement (FFA) was adopted by DOE, Environmental Protection Agency--Region IV (EPA), and Tennessee Department of Environment and Conservation (TDEC). Under the FFA, the Remedial Investigation/Feasibility Study (RI/FS) for the GAAT was to be issued to EPA and TDEC for comment by May 2, 1994. The RI/FS—prepared by DOE, Lockheed Martin Energy Systems, Inc. (Energy Systems), Bechtel National, Inc., CDM Federal Programs, Radian, and Jacobs Engineering Group Inc. (JEG)—contained information on the nature and extent of contamination in tanks and surrounding media, and evaluated seven remediation alternatives (Table 1) which reflected a range of removal, treatment, and disposal options, including “no action.”

**Table 1. Gunite and associated tanks RI/FS remediation alternatives**

Alternative	Descriptions
1	No action, institutional controls only
2	Tank stabilization, no sludge treatment
3	In situ sludge fixation in each tank
4	Remove sludge, in situ fixation/consolidation
5	Remove sludge, treatment/storage at ORR
6	Remove sludge, treatment/disposal via DOE transuranic waste program
7	Remove sludge, tanks, soils for treatment and storage/disposal at ORR

During reviews of the RI/FS, DOE, Energy Systems, and JEG determined that significant technical and cost uncertainties existed that needed to be resolved in order to provide the basis for the decisions to be made in the Record of Decision. After discussion with EPA and TDEC, it was agreed that a series of treatability studies would be performed to reduce these uncertainties. The treatability studies are to be completed to support issue of the draft Feasibility Study by March 30, 1999, to be followed by the Proposed Plan and Record of Decision.

The Remedial Investigation/Baseline Risk Assessment (DOE/OR/02-1275-R1) was submitted to DOE in May 1994.

A legally enforceable FFA milestone has been established which requires that detailed Treatability Study Plans, as called for in CERCLA, be prepared and submitted to the regulatory agencies by September 30, 1994. Based on the investigations conducted as part of the RI/FS, it is anticipated that treatability studies will be conducted in the areas of waste and residual characterization, unconfined and confined sluicing, deployment systems (remotely operated vehicle and arm), treatment systems, stabilization, and sludge transfer.

### 1.3 THE CERCLA TREATABILITY STUDY PROCESS

The GAAT Treatability Studies Project will be conducted in accordance with the guidance provided in *Guide for Conducting Treatability Studies Under CERCLA*, (EPA/540/2-89/058). As discussed in this document, the CERCLA process provides encouragement to conduct treatability studies to provide site-specific data necessary to aid in the selection and implementation of a remedy. The guide describes a three-tiered approach for conducting treatability studies, consisting of (1) laboratory screening, (2) bench-scale testing, and (3) pilot-scale testing. Depending on the information gathered during site characterization and technology screening and the data gaps that exist, treatability studies may begin with any tier and may skip tiers that are not needed. The guide also presents a stepwise approach or protocol for conducting treatability studies for determination of the effectiveness of a technology (or combination of technologies) in remediating a CERCLA site.

The results of the treatability studies to be conducted in this project are intended to be used to support preparation of the Feasibility Study for the remediation of the GAAT. It is intended that this Feasibility Study will support the preparation of a Proposed Plan and a Record of Decision for the GAAT remediation.

### 1.4 SCOPE

This project management plan identifies all activities necessary to implement the GAAT Treatability Studies Project. These activities include establishing data quality objectives; issuing the work assignments; preparing the work plans; preparing the sampling and analysis plans; preparing required project plans (e.g., health, safety, and waste management plans); preparing design and procurement packages; complying with regulatory requirements; executing the treatability studies; analyzing and interpreting the data; reporting the results; and conducting community relations activities. The methods of accomplishment will be determined during the Phase II, following final selection of subcontractors to support this project. This plan will be revised or appended at that time to include the methods of accomplishment.

### 1.5 PRIMARY PARTICIPANTS

The GAAT Treatability Studies Project will be a joint venture conducted primarily by Energy Systems in its role as the Integrating Contractor and facility manager, and by JEG in its role as Technical Support Contractor. These organizations and their subcontractors will perform the planning, engineering, and procurement activities required for the treatability studies. Since the treatability studies are research

and development activities and require close coordination with ongoing ORNL operations (e.g., waste management and security) and facility management activities, Energy Systems forces and/or service subcontractors will perform operations activities required to conduct the treatability activities. Any activities determined to be "construction" (e.g., new facility construction) will be performed by MK-Ferguson Company of Oak Ridge in its role as the Construction Manager.

## 2. PERFORMANCE CRITERIA AND WORK PLANS

### 2.1 PERFORMANCE CRITERIA

The following performance criteria will be met during the conduct of the GAAT Treatability Studies Project:

- The health and safety of workers involved in the treatability studies will be maintained as the top priority in planning and conducting actions.
- All activities will be conducted in full conformance with all applicable laws and regulations.
- A graded approach will be utilized in application of DOE Orders and guidance, and in application of Energy Systems procedures and guidance consistent with ensuring that personnel, the environment, and facilities are protected and government funds are efficiently utilized.
- The project will be conducted in accordance with the *Life Cycle Baseline Summary for the Environmental Restoration Program* for WAG 1.
- Treatability studies will be conducted in conformance with the Federal Facility Act (FFA) and the guidance provided in EPA/540/2-89/058.
- Activities will be coordinated and integrated with ORNL site, Waste Management Operations, and ORNL Decontamination and Decommissioning Program activities.
- Activities will be conducted to maximize utilization of technologies being developed by the Office of Technology Development (OTD), and the experience and information gained during the project will be transferred back to OTD.
- The project will be conducted to provide the information needed to support issue of the draft Feasibility Study by March 30, 1999.

### 2.2 WORK PLANS

The general work plan for the project described in the following sections reflects the project summary work breakdown structure contained in Sect. 4. Each of the work activities is described in the following sections.

#### 2.2.1 Project Management

These activities include project management, project tracking and reporting, facility management, community relations, waste management interface, health and safety support, quality assurance support, training coordination, and compliance support. The following project-level documents are planned to be prepared as part of this effort: project management plan, quality assurance project plan, training needs assessment, fiscal year work plans, baseline document, baseline change proposals, monthly status reports, and project tracking system inputs. Although attempts will be made to avoid duplication and

utilize higher level documents wherever possible, it is expected that the following subproject-level documents will be required for each individual project work activity: work plan and procedures, safety review, waste management plan, health and safety hazard addendum, and best management practices plan.

### **2.2.2 Studies and Assessments**

These activities include cost and scheduling support, information management support, and the conduct of a number of studies and assessments required to support project planning and implementation. Reports currently expected to be prepared include treatability study plan(s), risk model, as-built drawings, information management plan, tank enclosures study, tank structural evaluation and model, safety analysis report, technology review, tank characterization summary, sludge solubility study, categorical exclusion, and existing piping condition review. It is expected that additional documents will need to be prepared as project planning and implementation proceeds.

In addition, this activity is aimed at providing sampling and analytical support required to characterize the sludges, liquids, residues, and tank shell materials. It is expected that sampling and analytical activities will be conducted throughout the life of the project to support planning efforts and to provide information to determine the effectiveness of technologies utilized in the treatability studies. Some of the analytical data will be shared with the National Transuranic Program Office in support of waste characterization for the Waste Isolation Pilot Project. Initial efforts will focus on (1) establishing a task release with Bechtel National, Inc., to perform manual sampling; (2) developing plans with Energy Systems Analytical Chemistry Division to perform analysis; and (3) coordinating the sampling and characterization activities. Existing documents and procedures will be used to the maximum extent possible, although a sampling plan and updates to some existing documents are expected to be required. In addition, new equipment will need to be procured to obtain core samples from the tank walls and floor and to map the location of sludges in the tanks.

### **2.2.3 Support Facilities**

This activity is directed at performing the facility modifications and new construction needed to support conduct of the treatability studies. Utility extensions and upgrades, support platform modifications, staging areas and support trailers, piping, instrumentation, cold test facilities, etc., will be required. These requirements will be identified in functional requirements documents, which will be prepared as required.

### **2.2.4 Treatability Studies**

This activity is directed at the performance of the treatability studies, and will be supported by conducting planning, procurement, and operations activities. It is anticipated that treatability studies will be conducted in the areas of waste and residual characterization, unconfined and confined sluicing, deployment systems (remotely operated vehicle and arm), treatment systems, tank stabilization, and sludge transfer. The need for the treatability studies will be determined through the CERCLA process referenced previously, and the individual treatability study plans will be developed as discussed in Sect. 2.2.2. Equipment, subcontractors, and facility support required to conduct the treatability studies will be provided through this activity.

### 3. PROJECT ORGANIZATION

#### 3.1 PROGRAM INTERFACE

Because of its importance and visibility, the GAAT Treatability Studies Project will report directly to the ORNL ER Remediation Manager as indicated in Fig. 4. Since GAAT is part of WAG 1, the GAAT Treatability Studies Project Manager will be responsible for coordinating and integrating activities with the WAG 1 Project Manager. All financial, schedule, and other related documents will be consistent with and incorporable into the WAG 1 level as required. The Project Manager will be responsible for project-level approval of all project activities including financial documents, reports, etc. Program-level approvals will be provided by the Remediation Manager, Deputy Program Manager, and/or Program Manager as appropriate.

#### 3.2 DETAILS OF PROJECT ORGANIZATION

The organization of the project is shown in Fig. 5. The project participants and responsibilities are as outlined in the ORNL ER Program Management Plan (ORNL/ER-167) with the following exceptions.

The GAAT Treatability Studies Project Manager position has been established and will report to the Remediation Manager. The Project Manager will perform the same roles and responsibilities for the project as those of a WAG Project Manager, as defined in Sect. 4.2 of the ORNL ER Program Management Plan. The Project Manager will be responsible for integrating and coordinating the GAAT treatability studies activities with the WAG 1 Project Manager. For financial and schedule reporting activities, the GAAT Treatability Studies Project will continue to be an operable unit that "rolls up" to WAG 1.

To ensure close cooperation and integration and to further support the teaming arrangement between Energy Systems and JEG, a Deputy Project Manager position, to be filled by a JEG team member, has been established. The Deputy Project Manager will perform the functions of the Technical Support Contract Manager as described in Sect. 4.4 of the ORNL ER Program management plan and will assist and represent the Project Manager as needed. The Deputy Project Manager will be responsible for managing the activities of the Data Project Manager, Project Risk Assessment Coordinator, Project Estimator, and Project Scheduler. The Deputy Project Manager will also be responsible for project documentation preparation.

To maximize technology transfer between the GAAT Treatability Studies Project and other programs supporting technology development such as OTD and the Center for Environmental Technology (CET), Technology Development Coordinator positions have been established. The Technology Development Coordinators will provide coordination of project activities with OTD organizations supporting the GAAT treatability studies, including the Underground Storage Tank Integrated Demonstration Program; the Robotics Technology Development Program; the Characterization, Monitoring, and Sensor Technology Program; the Decontamination and Decommissioning Integrated Demonstration Program; and the Morgantown Energy Technology Center. In addition, the Technology Development Coordinators will coordinate project activities with CET.



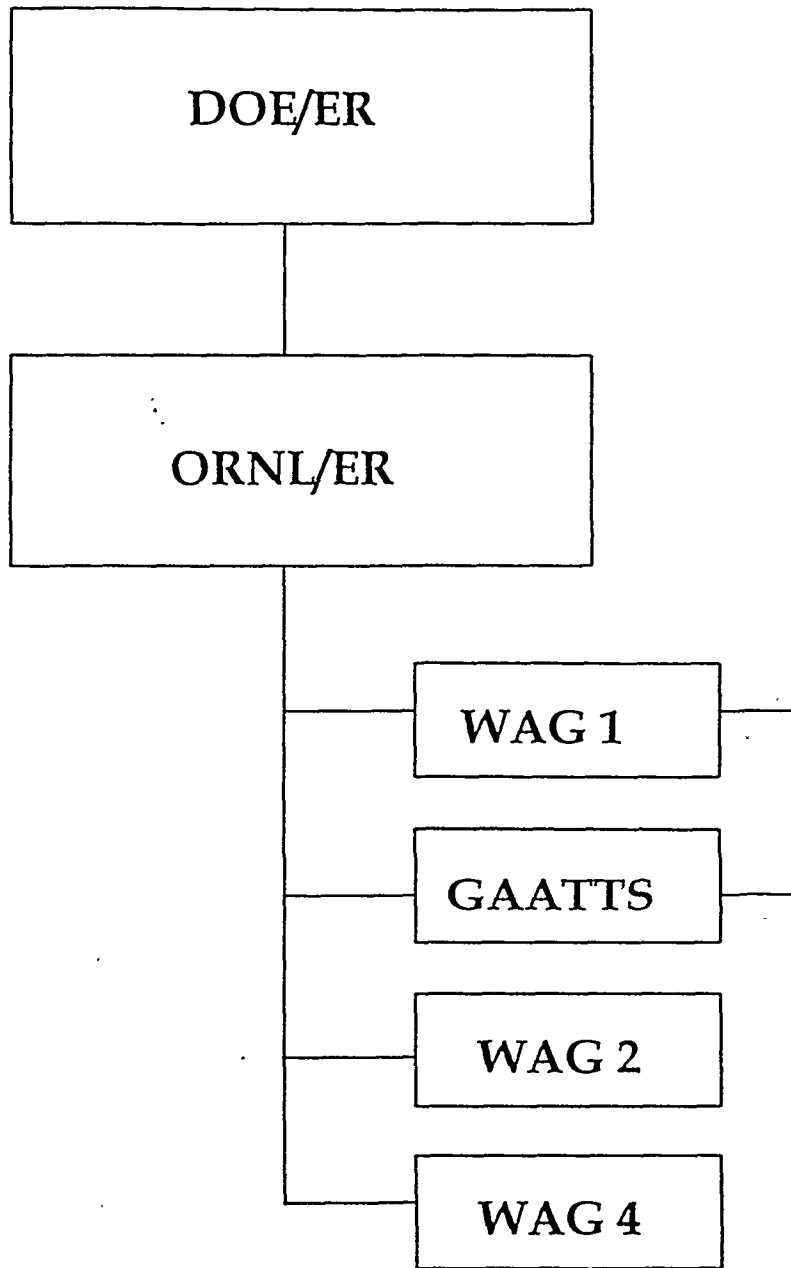


Fig. 4. ORNL ER Program organization chart.

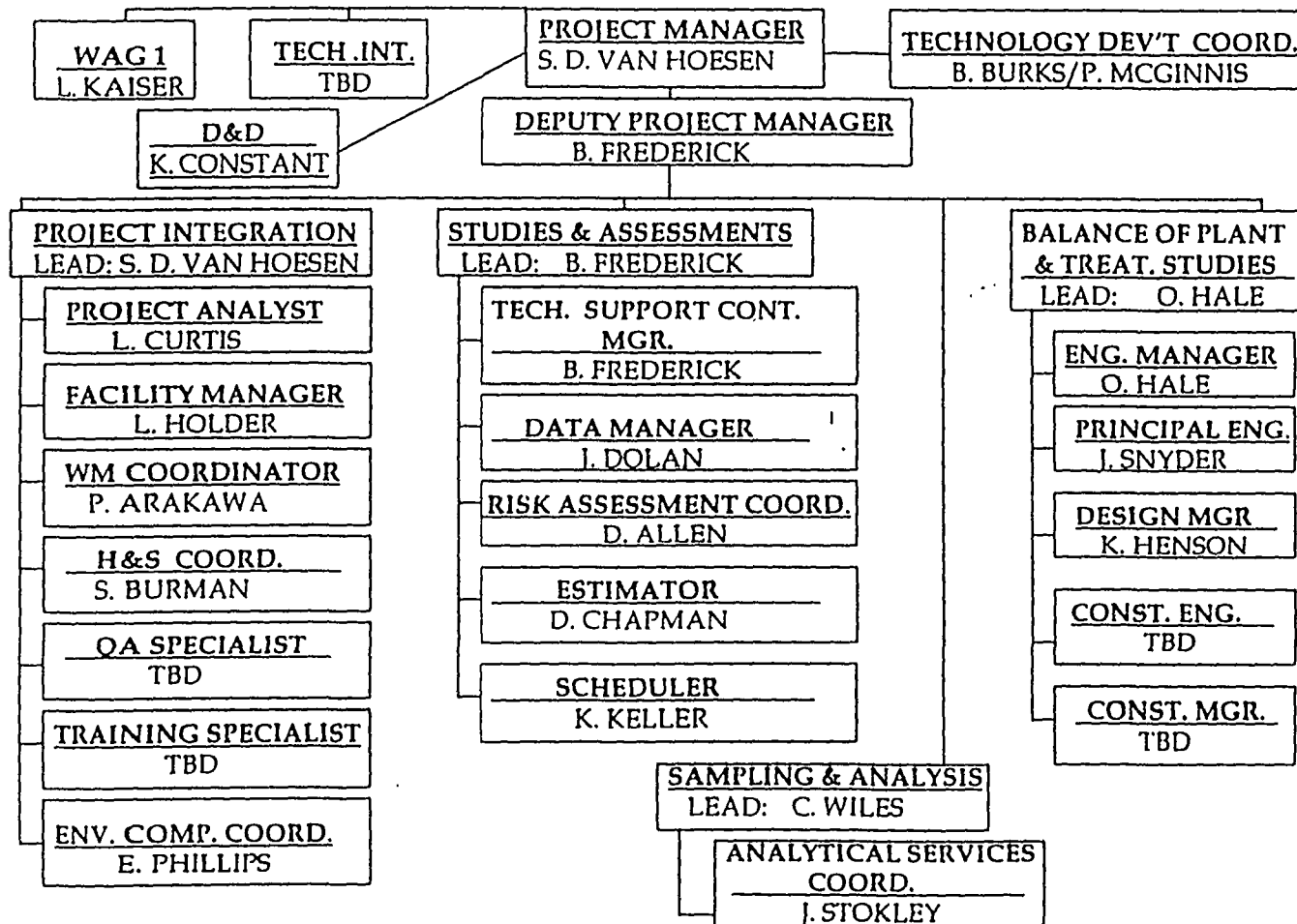


Fig. 5. GAAT Treatability Studies Project organization chart.

## 4. SUMMARY LEVEL WORK BREAKDOWN STRUCTURE

The summary level work breakdown structure for the GAAT Treatability Studies Project is given here.

### 6.1.01.41.03.12 GAAT Treatability Studies

- .12 .01 Treatability Studies Project Management
  - Project Manager
  - Project Analyst
  - Support (G/C)
  - Facility Manager
  - Public Involvement
  - Waste Management Coordination
  - Health and Safety
  - Environmental Compliance
  - Technology Development Coordination
  - Quality Assurance
  - Deputy Project Manager
  
- .12 .02 Studies and Assessments
  - .01 Treatability Plans and Reports
  - .02 Risk Modeling
  - .03 As-configured Drawings
  - .04 Information Management
  - .05 Schedules
  - .06 Cost Estimate
  - .07 Enclosure Study
  - .08 Structural Evaluation
  - .09 Safety Review
  - .10 Technology Review
  - .11 Sampling Plan
  - .12 Field Sampling and Analysis
  - .13 Solubility Study
  - .14 NEPA Support
  - .15 Piping Integrity Study
  - .16 Logistics Study
  - .17 VE Study
  
- .12 .03 Support Facilities
  - .01 Planning/Reporting
  - .02 Engineering
  - .03 Procurement/Construction
  
- .12 .04 Treatability Studies
  - .01 Planning
    - .01 Planning
    - .02 Engineering
    - .03 Procurement/Construction
    - .04 Operations

- .02 Unconfined Sluicing
  - .01 Planning
  - .02 Engineering
  - .03 Procurement/Construction
  - .04 Operations
- .03 End Effectors
  - .01 Planning
  - .02 Engineering
  - .03 Procurement/Construction
  - .04 Operations
- .04 MLDUA Systems Deployment
  - .01 Planning
  - .02 Engineering
  - .03 Procurement/Construction
  - .04 Operations
- .05 Vehicle Systems Deployment
  - .01 Planning
  - .02 Engineering
  - .03 Procurement/Construction
  - .04 Operations
- .06 Treatment
  - .01 Planning
  - .02 Engineering
  - .03 Procurement/Construction
  - .04 Operations
- .07 Stabilization
  - .01 Planning
  - .02 Engineering
  - .03 Procurement/Construction
  - .04 Operations
- .08 Final Reports
  - .01 Planning
  - .02 Engineering
  - .03 Procurement/Construction
  - .04 Operations
- .09 Sludge Transfer
  - .01 Treatability Studies
  - .02 Technology Demonstrations
- .10 Debris Removal
  - .01 Planning
  - .02 Engineering
  - .03 Procurement/Construction
  - .04 Operations
- .11 Melton Valley Storage Tanks
  - .01 Planning
  - .02 Engineering
  - .03 Procurement/Construction
  - .04 Operations

## 5. SCHEDULE

Figure 6 is the summary project schedule for the GAAT Treatability Study and the GAAT CERCLA activities. This schedule provides information concerning the dates for completion of the phases for the GAAT Treatability Study for FY 1994 to FY 1997. In addition, the schedule also provides the information as to the completion of the CERCLA required activities for FY 1998 to FY 2000.

Fiscal Year	1994				1995				1996				1997				1998				1999				2000			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>GAAT Treatability Study Activities</b>																												
Phase I - Treatability Study Work Plan																												
Phase II - Baseline Report																												
Phase II - Stakeholder Input																												
Phase III - Detailed Engineering																												
Phase III - Stakeholder Input																												
Phase IV - Procurement and Construction																												
Phase V - Cold Testing																												
Phase VI - Hot Testing																												
New MVST Operational																												
Characterization																												
Treatability Study Report																												
<b>GAAT CERCLA Activities</b>																												
Feasibility Study Report																												
Proposed Plan																												
Record of Decision																												

GAAT - Gunite™ and Associated Tanks  
 CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act of 1980  
 MVST - Melton Valley storage tanks

<b>JE</b>	Fig. 3.2
<b>Treatability study and CERCLA activities project schedule</b> DOE - ORNL, WAG I GAAT - Oak Ridge, Tennessee	
DOCUMENT ID: 35-1039 1992-09 / TETUDY	DRAWING ID: 94-10064 WKA
ISSUING DATE: SEPTEMBER 19, 1994 R4	

Fig. 6. Preliminary GAAT schedule.

## 6. MILESTONES

Key project milestones are listed here.

Initiate tank sampling	08/15/94
Submit treatability studies work plan Phase I - D1 to DOE	09/30/94
Submit final project management plan to DOE	12/30/94
Issue draft treatability studies baseline and work plan Phase II - D1	06/30/95
Initiate support facility construction	08/31/95
Initiate cold tests	01/02/96
Initiate hot tests	09/30/96
Submit draft feasibility study to regulators	03/30/99

## 7. COST ESTIMATE

The cost estimate summary for the GAAT Treatability Studies Project is captured in a project life cycle baseline document. The baseline document tracks changes to the cost estimate and is revised annually; therefore, the cost estimate summary will not be included in this project management plan. The baseline document is an internal document and has not been cleared for public release. If information is required on the cost estimate summary, contact the GAAT Treatability Studies Project Manager shown in Fig. 5.



**REFERENCES**

Energy Systems. July 1994. *Program Management Plan for the Martin Marietta Energy Systems, Inc. Oak Ridge National Laboratory Site Environmental Restoration Program.* ORNL/ER-167.

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