

LOCKHEED MARTIN



ORNL/ER-389

**ENVIRONMENTAL
RESTORATION
PROGRAM**

**Completion Report for the Isolation
and Remediation of Inactive Liquid
Low-Level Radioactive Waste Tanks
7562, H-209, and T-30
at Oak Ridge National Laboratory,
Oak Ridge, Tennessee**

RECEIVED

JAN 28 1997

OSTI

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

ph

MASTER

This document has been approved by the
ORNL Technical Information Office
for release to the public. Date: 12/27/96

ENERGY SYSTEMS

ER
▶▶▶▶▶

MANAGED BY
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

DISCLAIMER

**Portions of this document may be illegible
in electronic image products. Images are
produced from the best available original
document.**

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Energy Systems Environmental Restoration Program

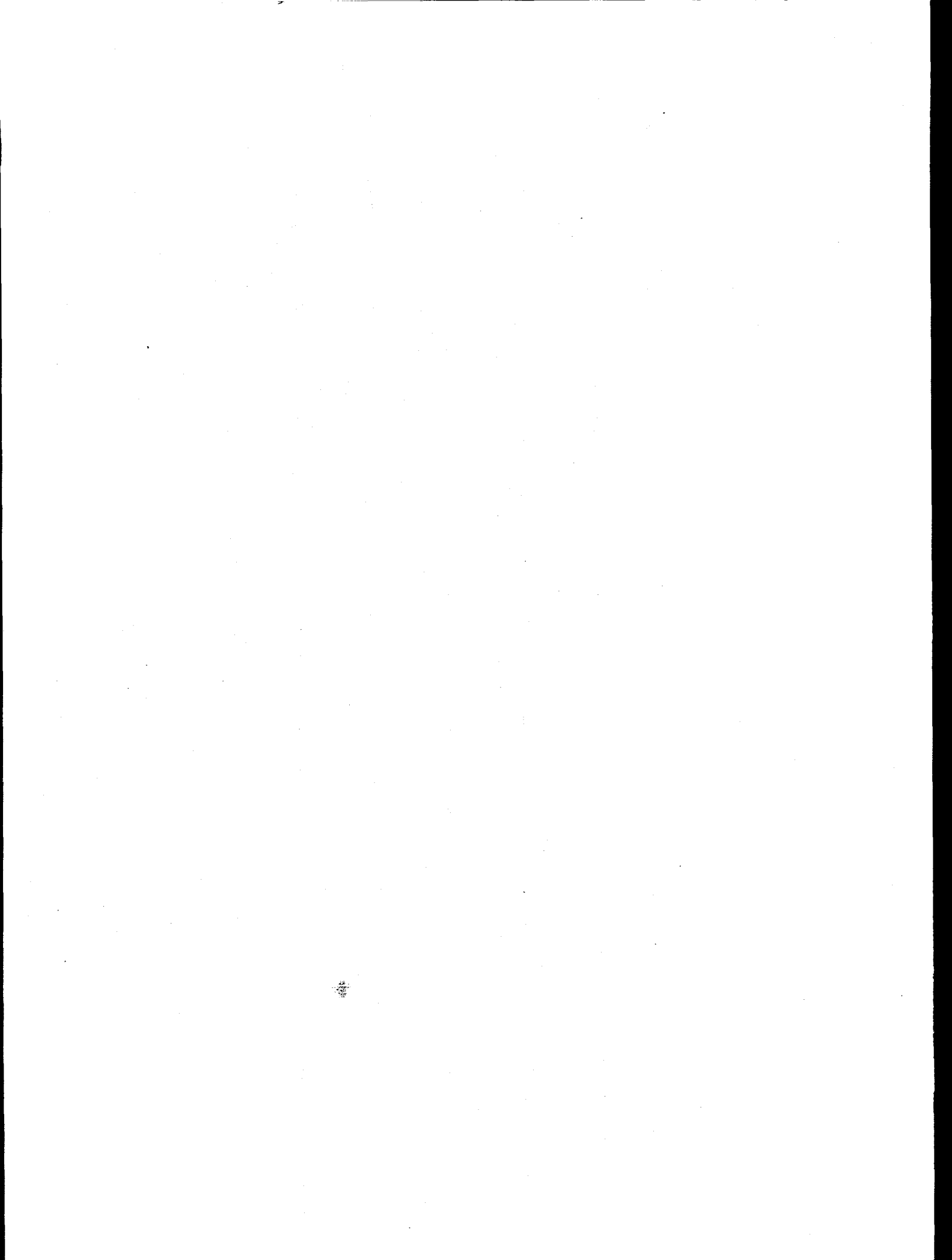
**Completion Report for the Isolation
and Remediation of Inactive Liquid
Low-Level Radioactive Waste Tanks
7562, H-209, and T-30
at Oak Ridge National Laboratory,
Oak Ridge, Tennessee**

Date Issued—December 1996

Prepared by
Advanced Sciences, Inc.
under subcontract 96B-99311C

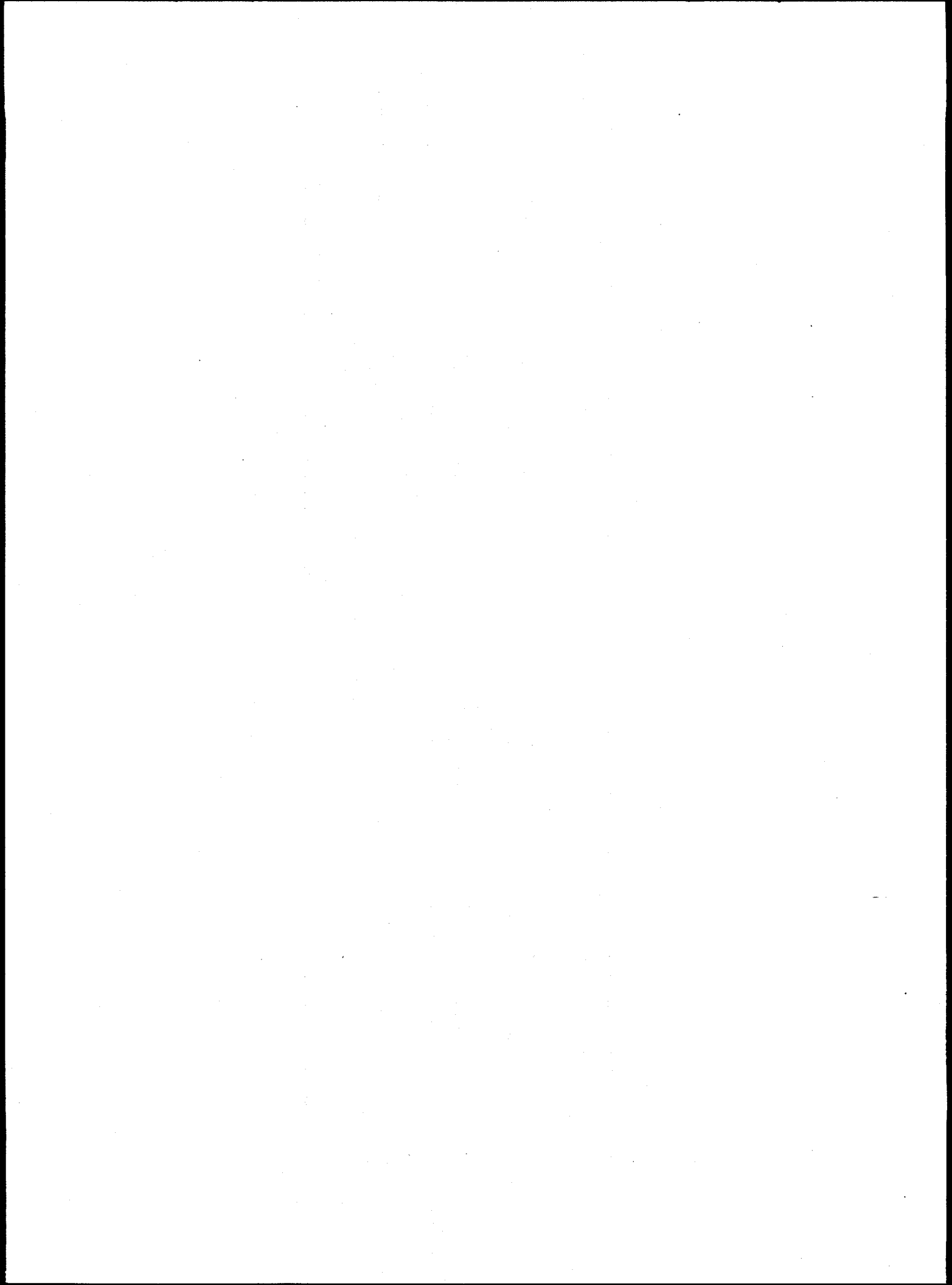
Prepared for
the U.S. Department of Energy
Office of Environmental Management
under budget and reporting code EW 20

Environmental Management Activities at the
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400



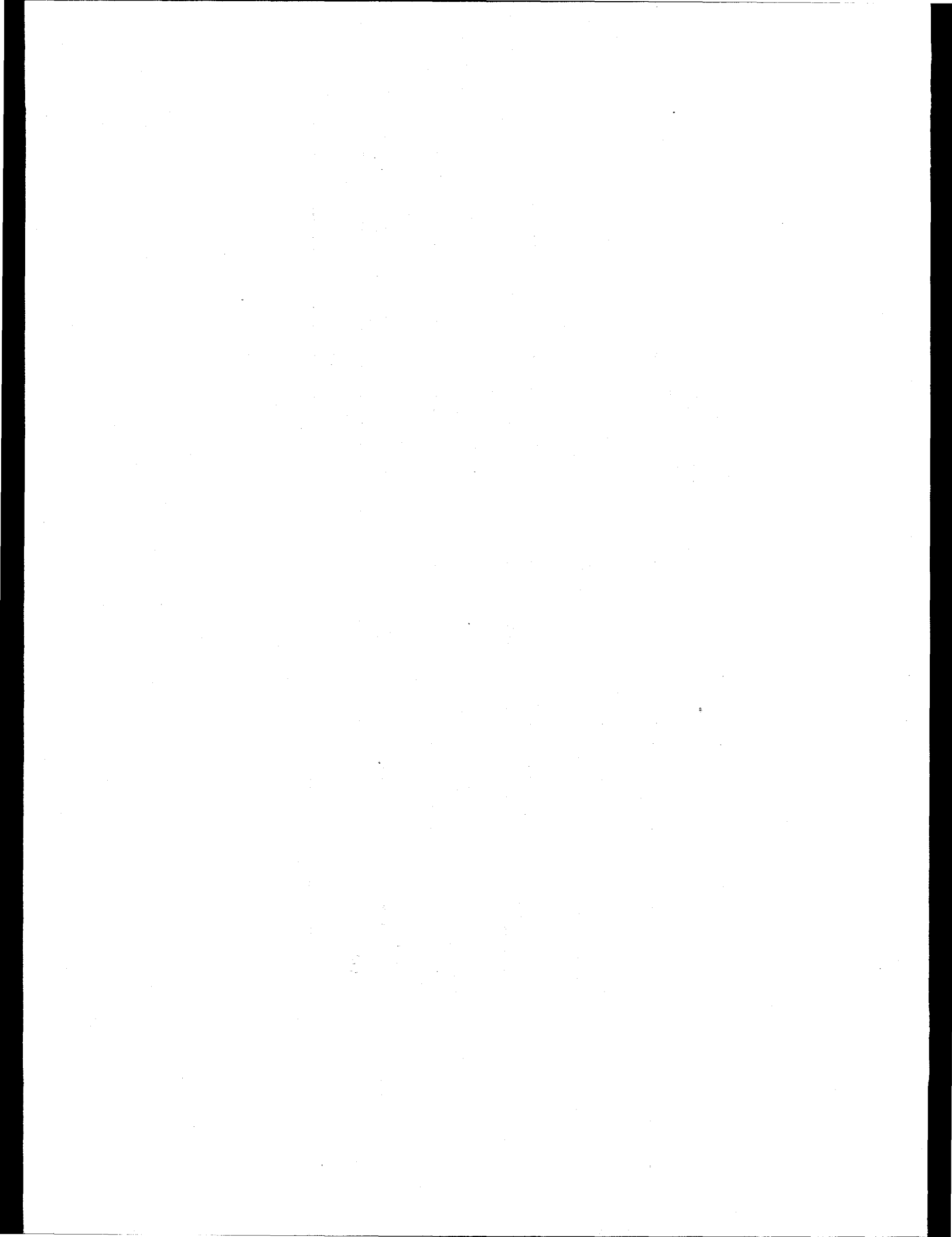
PREFACE

This report provides documentation of the maintenance action completion for remediation of tanks 7562, H-209, and T-30 at Oak Ridge National Laboratory. This report will serve as the remediation completion documentation for the request to remove these tanks from the Federal Facility Agreement Appendix F listing.. This work was performed under Work Breakdown Structure 1.4.12.6.1.01.21, Activity Data Sheet 3301, "ORNL WAG 1 ER."



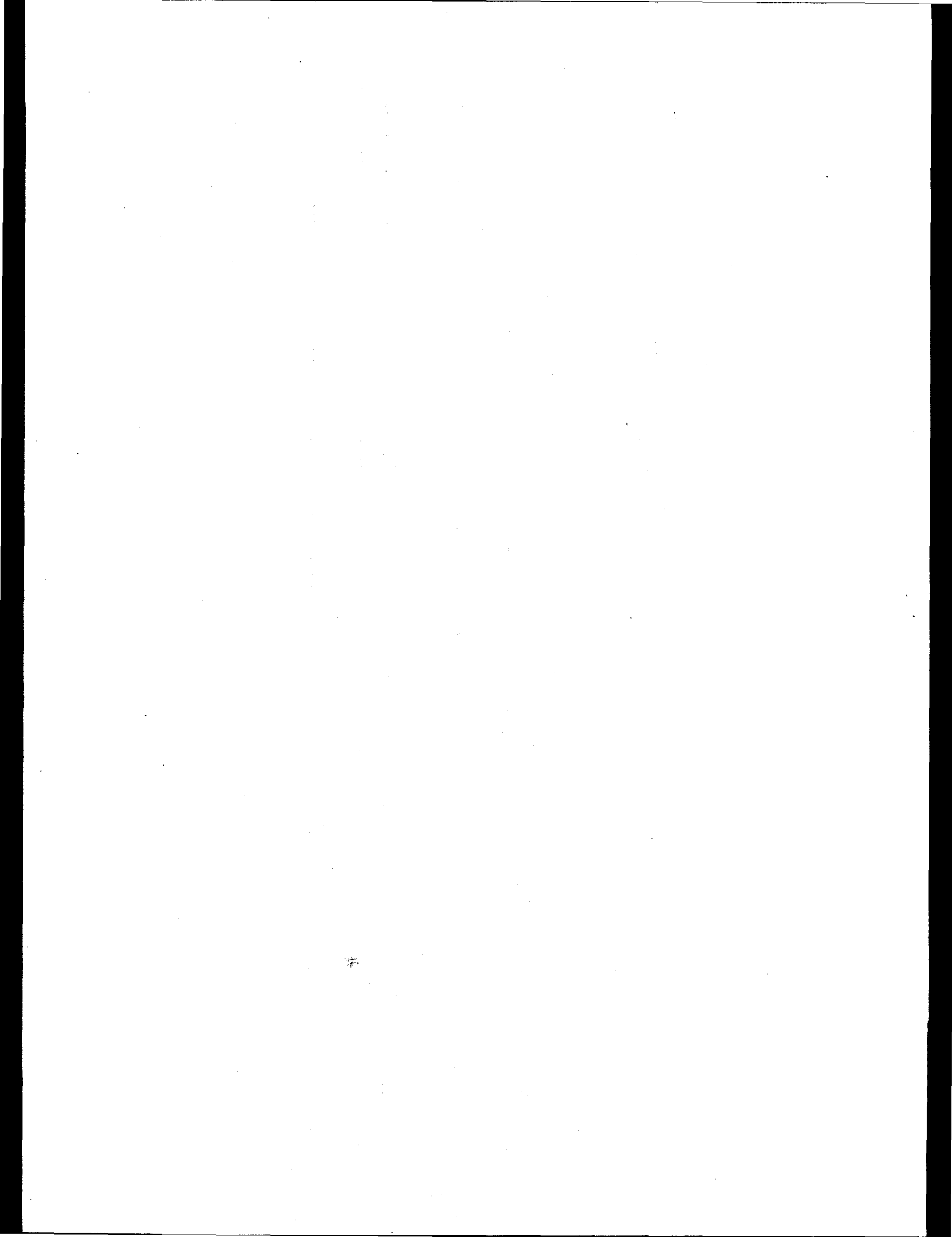
CONTENTS

PREFACE	iii
EXECUTIVE SUMMARY	ix
1. INTRODUCTION AND SITE DESCRIPTION	1
1.1 BACKGROUND	1
1.2 SITE DESCRIPTION	1
1.2.1 Tank 7562	1
1.2.2 Tank H-209	2
1.2.3 Tank T-30	2
2. MAINTENANCE ACTION OBJECTIVES	2
3. INITIAL ASSUMPTIONS	3
4. MAINTENANCE ACTION METHOD OF ACCOMPLISHMENT	3
5. MAINTENANCE ACTION FIELD ACTIVITIES	4
6. REMOVAL FROM FEDERAL FACILITY AGREEMENT LIST	4
7. RETENTION OF MAINTENANCE ACTION RECORDS	4
8. REFERENCES	4



TABLES

1	Chronology of Events for Tank 7562	5
2	Chronology of Events for Tank H-209	5
3	Chronology of Events for Tank T-30	6
4	As-built drawings	6



EXECUTIVE SUMMARY

The Federal Facility Agreement (FFA) among the U.S. Environmental Protection Agency (EPA), the Tennessee Department of Environment and Conservation (TDEC), and the U.S. Department of Energy (DOE) requires that all liquid low-level waste (LLLW) tanks at Oak Ridge National Laboratory (ORNL) that have been removed from service, designated in the FFA as Category D, to be remediated in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements.

A human health risk analysis was conducted on inactive tanks 7562, H-209 and T-30 to determine the method for remediating the tanks. Risk analysis results indicated that the health risk associated with these tanks were within or below the EPA range of concern of 1×10^{-4} to 1×10^{-6} . On the basis of these results, and with regulator approval, it was determined that either no action or in-place stabilization of the tanks would satisfy risk-based remediation goals. Therefore, a decision was made and approved by DOE to remediate these tanks in-place as a maintenance action. Letters documenting these decisions were subsequently submitted to TDEC and EPA.

Tanks H-209 and T-30 were isolated from associated piping, electrical systems, and instrumentation and grouted in-place. Due to regulatory concerns over the location of tank 7562 relative to an area of subsurface soil contamination, tank 7562 was isolated from associated piping and instrumentation and left in-place empty.

Completion of these maintenance actions has met the intent of the FFA for remediation of inactive tanks H-209 and T-30. EPA and TDEC will be requested to approve a change to the FFA removing tanks H-209 and T-30 from the Appendix F list of inactive tanks. The request for removal of tank 7562 from Appendix F will be submitted pending final disposition of the tank. Since the associated tank piping systems remain in-place, it will further be requested that these systems be included as individual sites in Appendix C of the FFA for future remedial consideration.

1. INTRODUCTION AND SITE DESCRIPTION

1.1 BACKGROUND

The Federal Facility Agreement (FFA) among the U.S. Environmental Protection Agency (EPA), the Tennessee Department of Environment and Conservation (TDEC), and the U.S. Department of Energy (DOE) requires that all liquid low-level waste (LLLW) tanks at Oak Ridge National Laboratory (ORNL) that have been removed from service, designated in the FFA as Category D, to be remediated in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements.

A human health risk analysis was performed on inactive tanks 7562, H-209, and T-30 using available characterization data associated with each tank. In each case, the results indicated risks associated with these tanks were within or below the EPA range of concern of 1×10^{-4} to 1×10^{-6} . Based on these results, and with regulators approval, it was determined that either no action or in-place stabilization of the tanks would satisfy risk-based remediation goals. Therefore, a decision was made and approved by DOE to remediate these tanks in-place as a maintenance action rather than an action under the CERCLA process. Letters documenting these decisions were approved by DOE and subsequently submitted to TDEC and EPA (Lingle, 1996).

1.2 SITE DESCRIPTION

The following subsections describe the tank sites as they were prior to maintenance action activities.

1.2.1 Tank 7562

Tank 7562 is a 12,000-gal stainless steel (SS) out-of-service tank located southeast of Building 7500 in Melton Valley. The tank was direct buried in 1957 under 4 to 6 feet of soil, and served as a LLLW storage tank for the Homogeneous Reactor Experiment (HRE). The tank also collected liquid from a decontamination pad located just west of the tank. Prior to remediation activities, the tank had a liquid inventory of 2,300 gal which was monitored daily to ensure there were no inputs to or leaks from the tank.

Existing piping to the tank consists of a 2-in. diameter SS jet discharge line, 2-in. diameter SS spare line, and piping from the decontamination pad. Existing piping from the tank consists of a 1-in. diameter SS jet suction line and a 1.5-in. diameter SS overflow line routed to an inactive retention pond located south of the tank. A vertical 2-in. diameter SS pipe connected to the top of the tank is currently capped above grade. Two SS instrumentation lines are currently routed through one of the tank openings for high and low liquid level detection. Three SS sampling lines from Building 7502 are currently routed through another tank opening. A drywell is located near the east corner of the tank and is sampled monthly.

1.2.2 Tank H-209

Tank H-209 is a 2,500-gal carbon steel tank located southwest of Building 3517, adjacent to White Oak Avenue, in the main ORNL area. The tank was installed in 1961 and held condensate and floor drainage from Building 3517. A 54-in. diameter corrugated metal pipe (CMP) manhole exists and houses equipment and instrumentation associated with the tank. Tank H-209 was emptied during September 1993 and showed no sign of inleakage. The tank liquid level was manually checked semiannually and remained empty prior to remediation activities.

Piping to the tank consists of a 3-in. diameter black steel (BS) line from the process sewer system. Radioactive-contaminated steam condensate was diverted from the process sewer system to tank H-209 based on in-line monitoring near manhole 209. Based on analytical results of samples collected from tank H-209, the liquid waste was either routed through a 2-in. diameter BS line back to the process sewer system through manhole 209 or routed through a 2-in. diameter BS line through cell #15 to tank S523. A 2-in. diameter BS off-gas vent line from tank H-209 to cell #15 maintained a negative pressure at the tank to eliminate potential release of airborne contamination. Prior to remediation activities, there was a negative pressure maintained in the pipe of approximately 6-in. H₂O.

Two SS instrumentation lines associated with a liquid level detection system mounted on the inside of the manhole are routed through two vertical SS pipes attached to the top of the tank. Two additional vertical SS pipes are also attached to the top of the tank on the opposite side of the main tank opening and house SS tubing.

1.2.3 Tank T-30

Tank T-30 is an 825-gal SS tank located at the south of Building 4507. The tank was installed in 1961 in an in-ground vault, and was removed from service in approximately 1980. The tank stored radioactive materials for the Curium Recovery Facility in Building 4507. System piping consists of a 1-inch SS drain line from Building 4507; a 2-inch SS overflow line; and a 0.5-inch SS steam-jet-discharge line. A hole was cut into the tank for sampling in 1989, and a rubber stopper was subsequently placed into the hole. The tank was connected to the process off-gas system, and pit was kept at negative pressure by the cell ventilation system.

2. MAINTENANCE ACTION OBJECTIVES

The main objective of the maintenance actions were to safely and permanently remove tanks 7562, H-209, and T-30 from service to eliminate the need for continued surveillance and maintenance (S&M) of the tank systems. Meeting this objective involved isolation of each tank to prevent future inleakage or introduction of programmatic wastes, and securing each tank in-place by filling the tank with a controlled low-strength grout material. The grout consisted of a mixture of Type II cement, sand, F-Type fly ash, and water with a compressive strength of approximately 300 psi and a permeability of 2×10^{-5} cm/s. Closing the tanks in this way will prevent inadvertent accumulation of any free liquids in the tanks. The low compressive strength of the grout will pose a minimal hindrance to future remediation in the area, and the low permeability will effectively prevent the movement of free liquids into the tank.

3. INITIAL ASSUMPTIONS

Early in the planning phases for these maintenance actions, initial assumptions were made concerning the status and configuration of each tank system. These assumptions were based on available system configuration information, sampling data, and engineering judgement.

Available sample data of tank contents was assumed to be adequate for the human health risk analysis and characterization of contents for removal and proper disposal. Based on this characterization data, it was determined that health risks associated with the tanks were within or below the EPA range of concern of 1×10^{-4} to 1×10^{-6} .

The volume of fluid in the tanks was assumed based on available level measurement data from S&M activities which indicated that tank 7562 had a volume of approximately 2,300 gal and that H-209 and T-30 were empty. The liquid in tank 7562 was removed as a S&M activity prior to isolation the tank was rinsed several times, and liquids disposed of in the active LLLW system.

Available engineering drawings were assumed to accurately reflect tank and piping configurations that could not be visually verified before or during remediation activities. The engineering drawings listed in Section 7 of this report will be revised to reflect "as-built" conditions as a result of the maintenance actions.

4. MAINTENANCE ACTION METHOD OF ACCOMPLISHMENT

The maintenance action fieldwork for tanks 7562 and H-209 was performed in-house by the LMES Plant and Equipment Division. M-K Ferguson direct hire forces performed the maintenance activities for tank T-30. Waste Operations were utilized for pumping, rinsing, and disposal of the contents of tank 7562. All work was conducted in accordance with the applicable Maintenance Action Work Plan (MAWP) and related Addendums (LMES, 1996), Waste Management Plan (WMP) (LMES, 1996), and Health and Safety Plan (LMES, 1996) prepared by LMES for remediation of tanks 7562, H-209 and T-30 except as follows:

- Because of regulatory concerns associated with the location of the tank 7562 in relation to potential contamination in the area, a decision was made by DOE and regulators not to fill the tank with grout during this maintenance action as specified in the MAWP. The tank was isolated from the system and left in-place empty.
- Because of the decision not to grout tank 7562, the excavated area above the tank remains open and was not backfilled as specified in the MAWP.
- Instrumentation lines associated with tank 7562 were cut and capped rather than crimped as specified in the MAWP.
- Tank H-209 and the associated manhole was grouted to approximately 6 to 12 inches below grade. Rather than grouting to the surface, as specified in the MAWP, the remainder of the manhole was filled with concrete to form a surface cap.

5. MAINTENANCE ACTION FIELD ACTIVITIES

Tables 1, 2, and 3 provide a chronology of maintenance action field activities related to remediating tanks 7562, H-209, and T-30. All maintenance activities were conducted in accordance with the MAWP except as indicated in Section 4 of this report.

As a result of these maintenance actions, tank 7562 is empty and isolated from associated piping and electrical systems. The soil area above tank 7562 remains excavated and open. Tanks H-209 and T-30 (including the vault) are isolated from associated piping, electrical systems, and instrumentation and filled with grout.

6. REMOVAL FROM FEDERAL FACILITY AGREEMENT LIST

Completion of this maintenance action has met the intent of the FFA for remediation of inactive tanks H-209 and T-30. EPA and TDEC will be requested to approve a change to the FFA removing tank H-209 and T-30 from the Appendix F list of inactive tanks. The request for removal of tank 7562 from Appendix F will be submitted pending final disposition of the tank. Since the associated tank piping systems remain in-place, it will further be requested that these systems be included in Appendix C of the FFA for future remedial consideration.

7. RETENTION OF MAINTENANCE ACTION RECORDS

Photo and written documentation for this maintenance action will be retained under Project Record Number (PRN) X1995-0010 for tanks 7562, H-209, and T-30 as described in the Project Records Plan. The engineering drawings identified in Table 4 will be revised and maintained in the Engineering Drawing Information System to show the as-built status of the piping systems remaining at each tank site. Reference drawings for tank T-30 have already been revised and placed into the Engineering Drawing Information System.

8. REFERENCES

Letter from W. Nelson Lingle (LMES) to Doug McCoy (TDEC) and Victor Weeks (EPA), dtd July 9, 1996, *Isolation and In-place Stabilization of Inactive Liquid Low Level Waste Tanks 7562 and H-209 at Oak Ridge National Laboratory (ORNL)*.

Maintenance Action Work Plan Addendum 1 and 2 of ORNL/ER-319 For Inactive LLLW Tanks 7562, H-209, and T-30 at Oak Ridge National Laboratory, Oak Ridge, Tennessee, dtd July 1996 and August 1996.

Table 1. Chronology of events for Tank 7562

Date	Event
9/26/96	Plant and Equipment personnel mobilized to tank 7562 site and conducted radiological survey at top of tank. No contamination detected.
	Began hot tapping, cutting, and capping piping connected to tank.
9/30/96	Completed capping all piping, demobilized from tank site, and returned area to same condition as prior to start of job.

Table 2. Chronology of events for Tank H-209

Date	Event
9/96	Plant and Equipment personnel mobilized to tank H-209 site.
	Unhooked electrical wiring from within Building 3517 that was connected to instrumentation in the tank H-209 manhole.
	Conducted pre-job survey of tank H-209 manhole. No contamination was detected.
	Electrical wiring pulled and dropped into tank H-209 manhole.
	Installed blind flange on piping and removed tank access cover.
	Smears taken from the bottom of the tank cover and field checked. No contamination detected.
	Cut up manhole cover with welding torch so it could be dropped into manhole.
	Cut manhole pipe down to ground level and placed cut pieces into manhole.
	Performed radiation and contamination survey of area around top of manhole. No contamination or radiation was detected.
	Began grouting tank and manhole. Grouting ceased approximately 6 to 12 inches from ground surface due approximately 15 gal of water which floated to the surface of the grout. The water was frisked and read approximately 25,000 dpm at a distance of about 2 inches from the water. The area around the manhole was surveyed and no contamination was detected outside of the manhole.
	Dry concrete was placed into the manhole on top of the grout to absorb the standing water.
	Performed survey on inside of manhole remaining to be filled. No contamination above normal background was detected.
	Completed filling manhole with concrete to ground level forming a surface cap above the grout.
9/20/96	Restored area around manhole to original condition and demobilized from tank site.

Table 3. Chronology of events for Tank T-30

Date	Event
8/96	<ul style="list-style-type: none"> - Mobilized to site and refurbished containment tent. - Removal Irad brick from vault. - Filled tank and vault with low permeable grout. - Removed and disposed of containment tent, miscellaneous equipment, and minimal contaminated surface soil.
8/31/96	<ul style="list-style-type: none"> - Placed concrete cap over tank vault and reseeded area.

Table 4. Reference Drawings to be Revised

Tank	Drawing number	Drawing title
7562	E-24800	Outside Underground Waste & Vent System Piping
7562	D-7587	Evaporator Feed Tank Sheet #1
7562	D-20769	Building 7500 Waste Lagoon and Storage Tank
7562	D-24816	Waste Evap. Instrument Piping Arrgt. & Details
7562	Q-2529-78RO	Waste System Partial Plot Plan & Sections
7562	D-8309	Waste & Vent System Flow Sheet
7562	D-7588	Evaporator Feed Tank Details Sh. #2
7562	D-24804	Yard Piping Plan and Profile
H-209	D-42817	Electrical Plan, Elevations, & Details
H-209	D-46890	Outside Underground Utilities
H-209	D-39909	Chilled Water Return Changes Manipulator Cell Face
H-209	D-39923	Condensate Tank & Pump Piping - Plan & Section
H-209	D-45377	Condensate Tank Plans, Sections, and Details

DISTRIBUTION

1. P. W. Allen
2. L. V. Asplund
3. W. D. Brickeen
4. C. Clark
5. W. R. Clark
6. M. Clauberg
7. K. W. Cook
8. K. L. Deroos
9. J. T. Etheridge
10. D. L. Garrett
11. L. L. Kaiser
12. A. J. Kuhaida, Jr.
- 13-14. D. M. Matteo
15. J. A. Mayo
16. P. T. Owen
17. A. W. Saulsury
18. P. A. Schrandt
19. C. B. Scott
20. D. K. Stair
21. R. C. Stewart
22. M. L. Whitehead
23. F. H. Wright
24. ER Document Management Center—RC
25. J. H. Hawk, Advanced Sciences, Inc. 800 Oak Ridge Turnpike, Suite C-102, Oak Ridge, TN 37830-6927
26. B. Womble, MK-Ferguson, Bldg. 7505, MS 6401