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MARTIN MARIETTA

ENVIRONMENTAL RESTORATION PROGRAM

Risk Characterization Data Manual for Inactive Liquid Low-Level Waste Tank Systems at Oak Ridge National Laboratory, Oak Ridge, Tennessee

MANAGED BY
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FOR THE UNITED STATES
DEPARTMENT OF ENERGY
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Environmental Restoration Division
ORNL Environmental Restoration Program

Risk Characterization Data Manual for Inactive Liquid Low-Level Waste Tank Systems at Oak Ridge National Laboratory, Oak Ridge, Tennessee

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contributed to the preparation of this document and should not be considered an eligible contractor for its review.

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EXECUTIVE SUMMARY

This manual reports the results of a risk characterization of inactive liquid low-level radioactive waste (LLLW) underground storage tanks (USTs) at the Oak Ridge National Laboratory (ORNL). The risk characterization is required by the Federal Facilities Agreement between the Department of Energy-Oak Ridge Office, the Environmental Protection Agency-Region IV, and the Tennessee Department of Environment and Conservation. The intent of the risk characterization is to determine relative priorities for assessment and remediation.

Of the 39 tanks at ORNL that have been accepted into the Environmental Restoration Program, the 29 LLLW USTs that have been sampled for preliminary characterization were considered. Each tank was scored on a scale of 1 to 5 on the basis of three criteria: (1) leak characteristics, (2) location, and (3) toxicological characteristics of residual sludges and liquids. Each criterion was then weighted according to perceived importance. The criterion score multiplied by the weighting factor equaled the tank's total score for that criterion. The three weighted criterion scores for each tank were then summed for a total score for that tank.

When the scores for all tanks had been weighted and summed, the tanks were ranked in descending order on the basis of their total scores. The highest possible score for a tank is 30. The descending rank order represents the recommended priorities for evaluation: the higher the score, the higher the priority for evaluation.

Of the 29 tanks considered in the risk characterization, 15 tanks scored 16 or higher; 6 scored between 10 and 15; and 8 scored between 5 and 9. No tanks scored lower than 5.

1. INTRODUCTION

1.1 BACKGROUND

Oak Ridge National Laboratory (ORNL) is a multidisciplinary research facility that began operation in 1943 as part of the Manhattan Project. The original missions of the Laboratory were to develop a prototypic graphite reactor and to reprocess the reactor fuel for plutonium recovery. After World II, the primary functions of ORNL were fuel reprocessing research; radioisotopes production and applications development; and development, testing, and operation of nuclear reactor concepts. More recently, the Laboratory has increased its role in biological, environmental, energy, and materials research. As a consequence of these multidisciplinary research activities, heterogeneous waste has been generated in varying amounts over time, including solid and liquid radioactive, hazardous, and mixed wastes.

Most of the system to handle the liquid low-level radioactive waste (LLLW) was installed more than 30 years ago. The initial system and its subsequent modifications were designed to minimize radiation exposure to LLLW system users and operators. The system includes features such as unvalved gravity-drained transfer lines to prevent waste backup into generator areas, and provisions for remote operations to minimize personnel exposure. Over the years, tank systems were abandoned as their integrity was breached or as programs were terminated. Some of the tanks were abandoned in place with liquid waste and sludge left in them. As-built drawings for most of the tank systems do not exist. The out-of-service portion of the system consists almost entirely of tanks without secondary containment.

Existing waste and risk characterization information and the results of completed investigations on these out-of-service (inactive) tank systems have been organized into two data manuals. This data manual contains the risk characterization information for the inactive LLLW tanks.

1.2 PURPOSE

Subsection IX.G.2 of the Federal Facilities Agreement (FFA) between the Department of Energy-Oak Ridge office, the Environmental Protection Agency-Region IV, and the Tennessee Department of Environment and Conservation requires risk characterizations for tanks that are removed from service. These risk characterizations must describe and define categories of risk for all systems pending final remediation. The purpose of the risk characterization is not to determine a detailed assessment of risks for each tank system but to establish a ranking that can be used to determine relative priorities for assessment and remediation.

1.3 SCOPE

This manual reports the results of a risk-based analysis[1] to prioritize the inactive LLLW tanks for further evaluation. Inactive tanks are those that are designated as removed from service, currently receive no programmatic waste, and have no intended future use. The

locations of the inactive tanks are shown in Figs. 1.1 and 1.2. Of the 39 inactive LLLW tanks that have been accepted into the Environmental Restoration (ER) Program at ORNL, 29 have been sampled for preliminary characterization. Of the 29 tanks characterized, 3 were empty. Sampling of the ten remaining inactive tanks is currently under way. A risk-based method was used to prioritize the 26 inactive tanks for which sampling results were reported in ORNL/ER-13 (ref. 2) and the 3 inactive tanks for which sampling results were reported in ORNL/ER-19 (ref. 3); the results are summarized in this manual.

The remaining inactive LLLW also will require evaluation and will be subject to prioritization. Information on these remaining tanks will be provided as it becomes available.

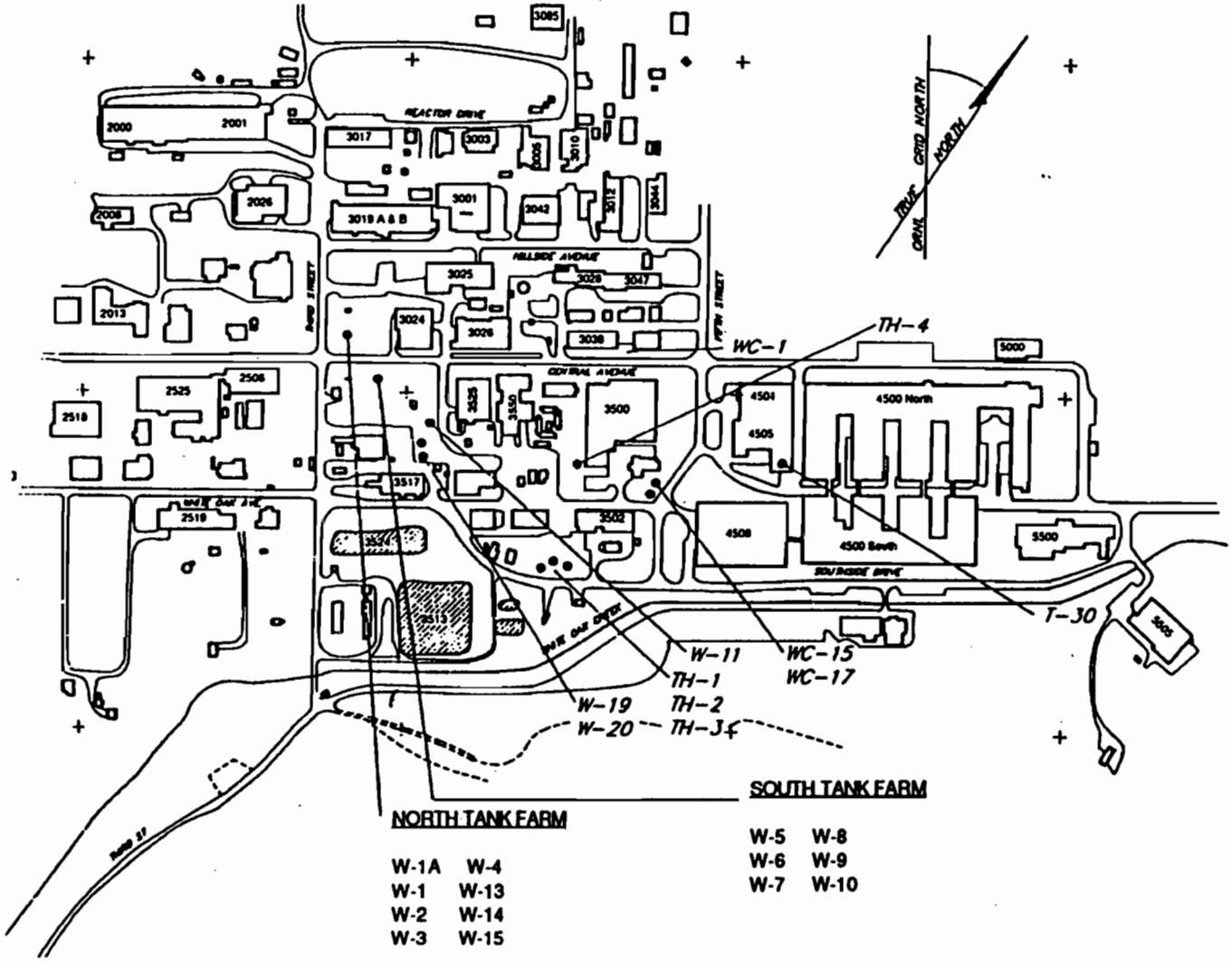

Fig. 1.1. Location of inactive LLLW tanks in the Bethel Valley (main laboratory) area.

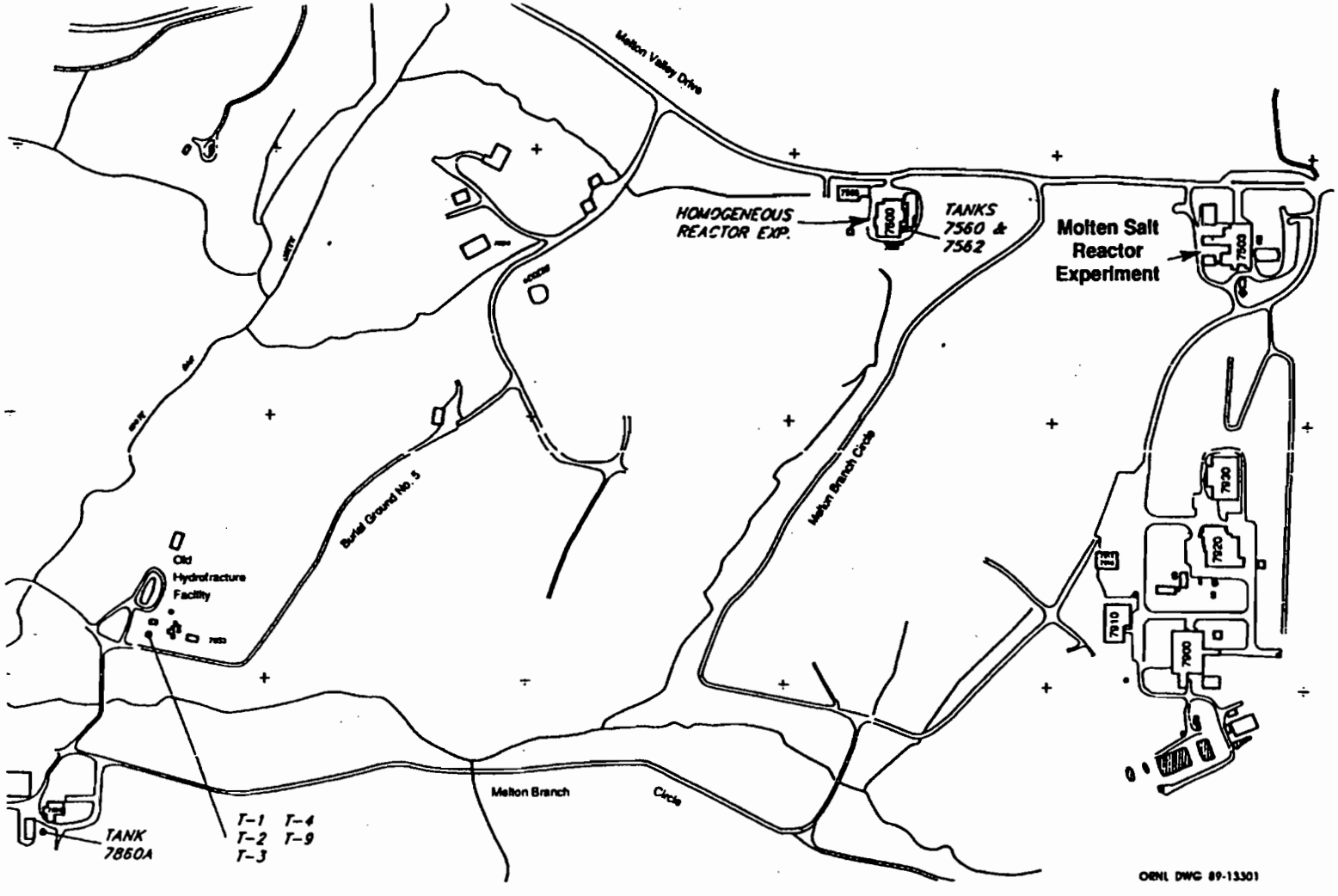

Fig. 1.2. Location of inactive LLLW tanks in the Melton Valley area.

2. DISCUSSION

2.1 METHODOLOGY

The risk-based approach used to prioritize the inactive LLLW tanks for further evaluation is based on three major criteria: (1) leak characteristics of the tanks, (2) location of the tanks, and (3) toxicological characteristics of constituents in the tanks. These three criteria are discussed here. Tank-specific data concerning the leak characteristics are found in the leak-test data manual.[4] Information on the structural material, location, and tank contents is contained in the waste characterization data manual.[5] Further detail on the contents of recently sampled inactive tanks can be found in two sampling and analysis reports.[2,3] The risk-based methodology is described in greater detail in the report on a risk-based approach to prioritize inactive LLLW storage tanks for further evaluation of interim corrective measures.[1]

1. **Leak characteristics.** Leak characteristics of the inactive LLLW tanks help establish the likelihood and extent of contaminant migration to the environment. A leak is defined as the escape of a hazardous substance from either primary or secondary containment. For inactive LLLW tanks currently known to leak, the criterion was based on the quantity or degree of leakage (as determined from the leak data); for tanks with no leak data, the criterion was based on the structural material of the tank. For example, tanks constructed of porous concrete or a mild steel susceptible to corrosion are more likely to leak than tanks constructed of stainless steel.

2. **Location.** The location of the inactive LLLW tanks further establishes the likelihood and the extent of contaminant migration to the environment. The location criterion is site specific; it is based on the proximity of the tank to groundwater and surface water and on the characteristics of the soil surrounding the tank. For the ORNL site, this criterion is based primarily on the proximity of the LLLW tanks to surface water.

3. **Toxicological characteristics.** Toxicological characteristics of constituents detected in the residual liquids of the tanks help establish the potential for adverse impact of contaminant migration on the environment, the food chain, and human health. Although the tanks contain residual liquid waste and sludge, only the toxicological characteristics of liquid wastes are considered because of their greater tendency for mobility and migration from leaking tanks. Constituents of concern identified in the liquid phase in the inactive LLLW tanks are ^{90}Sr, ^{137}Cs, ^{233}U, carbon tetrachloride, trichloroethene, tetrachloroethane, methyl ethyl ketone, mercury, lead, and chromium.

Three factors are considered in establishing the toxicological characteristics of the LLLW tanks: (1) the toxicity of contaminants as determined by the reference dose (RfD) for noncarcinogenic chemicals, the cancer potency factor (CPF) for nonradioactive carcinogens, and the cancer slope factor (CSF) for radionuclides; (2) the concentration of the contaminants of concern in the liquid; and (3) the liquid volume in each tank. These factors are combined into a single dimensionless number called the toxic index (TI). The steps necessary to calculate the TI for an inactive LLLW tank follow.

1. Lifetime reference dose. RfDs for noncarcinogenic chemicals, CPFs for nonradioactive carcinogenic chemicals, and CSFs for radionuclides are converted into lifetime RfDs.

Noncarcinogenic chemicals. For noncarcinogenic chemicals, a lifetime RfD (milligrams) is the total amount of intake at the RfD for 70 years. Lifetime RfD is a product of the RfD (milligrams per kilogram per day), the reference body weight (70 kg), and the average lifetime exposure (70 years).

$$\text{lifetime RfD (mg)} = \text{RfD (mg/kg/d)} \times 70\ \text{(kg)} \times 70\ \text{(years)} \times 365\ \text{(d/year)}$$

Nonradioactive carcinogenic chemicals. For nonradioactive carcinogenic chemicals, a lifetime RfD (milligrams) is the total dose a person receives over a lifetime of 70 years if that person takes in a daily dose equivalent to the 10^{-6} lifetime risk level. Lifetime RfD is a product of the acceptable lifetime cancer risk (10^{-6}), reference body weight (70 kg), and average lifetime exposure (70 years), divided by the oral CPF.

$$\text{lifetime RfD (mg)} = \frac{10^{-6} \times 70\ \text{(kg)} \times 70\ \text{(years)} \times 365\ \text{(d/year)}}{\text{CPF (mg/kg/d)}^{-1}}$$

Radionuclides. For radionuclides, a lifetime RfD (picocuries) is the total amount of radioactivity a person takes in if total exposure over a lifetime produces a 10^{-6} lifetime risk level. Lifetime RfDs are derived by dividing the 10^{-6} acceptable risk level by the ingestion CSFs (in pCi^{-1}).

$$\text{lifetime RfD (pCi)} = \frac{10^{-6}}{\text{CSF (pCi}^{-1})}$$

2. Reference volume. Reference volume is the volume of a contaminant-containing liquid that a person must ingest to receive a lifetime RfD. To define the reference volume in an inactive LLLW tank, a contaminant's lifetime RfD is divided by its highest concentration detected in the liquid.

$$\text{reference volume} = \frac{\text{lifetime RfD for contaminant}}{\text{contaminant concentration}}$$

Concentrations for noncarcinogenic and carcinogenic chemicals are expressed in milligrams per liter. Concentrations for radionuclides are expressed in picocuries per liter. Reference volumes are computed for each contaminant of concern in an inactive LLLW tank. The resultant reference volumes for carcinogens are calculated separately[1] and presented as follows:

$$CRV = (\Sigma\ 1/V_i)^{-1}$$

$$NRV = (\Sigma\ 1/V_i)^{-1}$$

where CRV is the cancer reference volume, NRV is the noncancer reference volume, and i is the identity of a particular contaminant. The lower of the two reference volumes is chosen as the representative reference volume for the particular tank.

3. Toxic index. The TI is the number of reference volumes in the volume of residual liquid found in a tank. The TI considers both the toxicity of the contaminant and the volume of the contaminant in the liquid. To calculate the TI for an inactive LLLW tank, liquid volume (the volume of residual liquid in a tank, which is assumed to be constant over the period of sampling) is divided by the representative reference volume of the tank.

$$\text{toxic index} = \frac{\text{liquid volume}}{\text{reference volume}}$$

A range of TIs will be developed and suitably divided to separate the tanks into distinct groups based on their individual TIs. To identify the range, the TIs for the individual tanks are calculated and arranged so that the high and low ends of the range can be identified. The range of TIs is then subdivided and assigned score values ranging from 1 to 5.

2.2 RISK SCORING PROCESS

The three criteria (leak characteristics, location, and toxicological characteristics) are used to rank the inactive LLLW tanks with respect to potential adverse impact on the environment and human health. A numeric score from 0 to 5 is assigned to each of the three criteria; a score of 5 indicates highest priority. The sum of the scores for the three criteria is the score for a particular tank. The highest possible score for a tank is 30. The following site-specific criteria are used to score the inactive LLLW tanks at ORNL.

Leak characteristics. Inactive LLLW tanks that are known to be leaking are scored higher than those with unknown leaking characteristics.

Leak characteristics	Score
Major outleaker	5
Small outleaker	4
Inleaker	3
Inconclusive evidence	
(a) concrete	2
(b) mild steel	1
(c) stainless steel	0

The leak characteristics category carries a weight of 3. The leak characteristic is considered the most important of the criteria because a leak must occur before any consequences will be experienced. A tank that is leaking, or is likely to leak, represents a greater risk than a stable, contained tank, even one that contains highly toxic material.

Location. Inactive LLLW tanks located south of Central Avenue in the main plant area and near the Old Hydrofracture Facility are scored highest because of their proximity to

White Oak Creek and its tributaries. Other inactive LLLW tanks are considered to be relatively distant from on-site water bodies [tanks to the north of Central Avenue and those near the Homogeneous Reactor Experiment (HRE)] or have their contents pumped directly into the active LLLW waste system (tanks W1A and T30). These tanks are therefore scored lower in the location category.

Location	Score
Old Hydrofracture Facility tanks	5
South of Central Avenue	3
North of Central Avenue	2
HRE tanks	1
Pumped to active waste systems	0

The location category is considered the least important of the three criteria; therefore, it carries a weight of 1.

Toxic potential. Toxic potentials of the contents of the LLLW tanks are scored on the basis of their respective TIs developed for the risk characterization.[1] A screening of TIs indicated that the following ranking is suitable with respect to the toxic potential of tanks.

Toxic index	Score
$>10^{10}$	5
10^{10} to 10^{8}	4
10^{8} to 10^{6}	3
10^{6} to 10^{4}	2
$<10^{4}$	1

The toxic potential category carries a weight of 2. Given that a leak has occurred, the second most important criterion is toxic potential. The release of a more toxic material is of more concern than the release of a less toxic material, even one close to on-site water bodies.

3. SUMMARY OF RESULTS

In Table 3.1 the tanks are ranked in descending order based on their scores calculated in the risk-based prioritization report.[1]

Table 3.1. Summary of risk characterization results

Tank	Score
W-7, W-8, W-10	22
W-5, W-6, W-9	20
W-3, W-4	19
W-1A	17
W-11, T-1–T-4, T-9	16
TH-4	15
W-1, W-2	12
W-13, W-14, W-15	10
TH-1, TH-2, TH-3	9
WC-1	8
WC-15, T-30, 7562	7
WC-17	5

Tanks having the same or similar scores are grouped together. The tanks with the highest scores are given first priority for evaluation. The recommended priority, by group, is shown in Table 3.2. Tanks W-11, and W-13, W-14, and W-15 were included in their respective groups on the basis of proximity rather than score. Tanks W-19, W-20, and 7560 were found to be empty during sampling and will not require further evaluation.

Table 3.2. Inactive LLLW tank group priority

Priority	Tanks
1	South tank farm (W-5 through W-11)
2	North tank farm (W-1 through W-4, W-13 through W-15, W-1A)
3	Old Hydrofracture Facility tank farm (T-1 through T-4, T-9)
4	Thorium tank TH-4
5	Thorium tanks TH-1 through TH-3
6	T-30, 7562, 7560, W-19, W-20, WC-17

4. RISK CHARACTERIZATION RESULTS

The following pages contain the results of the risk characterization of each tank. As the contents of additional tanks are sampled, a risk characterization will be performed and the results will be added to this data manual. If the tank is empty or scheduled to be emptied, no risk characterization will be performed. These tanks are documented in this data manual.

The tank risk characterization data summary sections are ordered in a manner convenient to implementation of the investigation programs, and the order remains consistent throughout all the data manuals. To assist the reader in locating a tank of interest, an alphanumeric listing of tanks is provided in Table 4.1 and cross-referenced to the section in which the results of the risk characterization for each tank appear.

Table 4.1. Alphanumeric cross-reference of LLLW storage tanks

Tank ID No.	Section in data manual	Data source
S-424	4.42	*a*
T-1	4.8	ER-13
T-2	4.9	ER-13
T-3	4.10	ER-13
T-4	4.11	ER-13
T-9	4.12	ER-13
T-14	4.43	*a*
T-30	4.30	ER-13
TH-1	4.13	ER-13
TH-2	4.14	ER-19
TH-3	4.15	ER-13
TH-4	4.16	ER-13
W-1	4.20	ER-13
W-1A	4.21	ER-13
W-1I	4.44	*a*
W-2	4.22	ER-13
W-3	4.23	ER-13
W-4	4.24	ER-13
W-5	4.1	ER-13
W-6	4.2	ER-13
W-7	4.3	ER-13
W-8	4.4	ER-13
W-9	4.5	ER-13
W-10	4.6	ER-13
W-11	4.7	ER-13
W-13	4.25	ER-13
W-14	4.26	ER-13
W-15	4.27	ER-13

Table 4.1 (continued)

Tank ID No.	Section in data manual	Data source
W-17	4.46	*a*
W-18	4.47	*a*
W-19	4.31	ER-13
W-20	4.32	ER-13
WC-1	4.17	ER-19
WC-4	4.45	*a*
WC-5	4.48	*a*
WC-6	4.49	*a*
WC-8	4.50	*a*
WC-11	4.51	*a*
WC-12	4.52	*a*
WC-13	4.53	*a*
WC-14	4.54	*a*
WC-15	4.18	ER-19
WC-17	4.19	ER-13
3001-B	4.33	*a*
3001-S	4.39	*a*
3002-A	4.40	*a*
3003-A	4.34	*a*
3004-B	4.35	*a*
3013	4.36	*a*
4501-P	4.41	*a*
7503-A	4.38	*a*
7560	4.28	ER-13
7562	4.29	ER-13
H209	4.37	*a*

[a]Not available.

4.1 TANK W-5

Tank W-5 is a 170,000-gal gunite tank located in the Bethel Valley South Tank Farm. The underground tank was constructed in 1943 for the storage of LLLW.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Inleak	3
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminants ^{90}Sr ^{137}Cs	4
TOTAL SCORE[1]	20

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.2 TANK W-6

Tank W-6 is a 170,000-gal gunite tank located in the Bethel Valley South Tank Farm. The underground tank was constructed in 1943 for the storage of LLLW.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Inleak	3
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminant	4
^{137}Cs	
TOTAL SCORE[1]	20

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.3 TANK W-7

Tank W-7 is a 170,000-gal gunite tank located in the Bethel Valley South Tank Farm. The underground tank was constructed in 1943 for the storage of LLLW.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Inleak	3
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminant	5
^{137}Cs	
TOTAL SCORE[1]	22

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.4 TANK W-8

Tank W-8 is a 170,000-gal gunite tank located in the Bethel Valley South Tank Farm. The underground tank was constructed in 1943 for the storage of LLLW.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Inleak	3
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminant	5
^{137}Cs	
TOTAL SCORE[1]	22

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.5 TANK W-9

Tank W-9 is a 170,000-gal gunite tank located in the Bethel Valley South Tank Farm. The underground tank was constructed in 1943 for the storage of LLLW.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Inleak	3
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminant	4
^{137}Cs	
TOTAL SCORE[1]	20

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.6 TANK W-10

Tank W-10 is a 170,000-gal gunite tank located in the Bethel Valley South Tank Farm. The underground tank was constructed in 1943 for the storage of LLLW.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Inleak	3
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminant	5
^{137}Cs	
TOTAL SCORE[1]	22

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.7 TANK W-11

Tank W-11 is a 1500-gal gunite tank located in the Bethel Valley South Tank Farm. The underground tank was constructed in 1943 to serve as a waste collection and monitoring tank for research laboratories in Building 3550.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Inleak	3
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminant	2
^{90}Sr	
TOTAL SCORE[1]	16

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.8 TANK T-1

Tank T-1 is a 15,000-gal carbon steel tank located in Melton Valley at the Old Hydrofracture Facility. The underground tank was installed at the site in 1963 to store liquid low-level waste for mixing into grout for waste injection by hydrofracture.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (mild steel)	1
Location	
Old Hydrofracture Facility	5
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr	4
TOTAL SCORE[1]	16

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.9 TANK T-2

Tank T-2 is a 15,000-gal carbon steel tank located in Melton Valley at the Old Hydrofracture Facility. The underground tank was installed at the site in 1963 to store liquid low-level waste for mixing into grout for waste injection by hydrofracture.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (mild steel)	1
Location	
Old Hydrofracture Facility	5
Toxicity	
Primary Contaminant ^{137}Cs	4
TOTAL SCORE[1]	16

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.10 TANK T-3

Tank T-3 is a 25,000-gal carbon steel tank located in Melton Valley at the Old Hydrofracture Facility. The underground tank was installed at the site in 1963 to store liquid low-level waste for mixing into grout for waste injection by hydrofracture.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (mild steel)	1
Location	
Old Hydrofracture Facility	5
Toxicity	
Primary Contaminant ^{137}Cs	4
TOTAL SCORE[1]	16

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.11 TANK T-4

Tank T-4 is a 25,000-gal carbon steel tank located in Melton Valley at the Old Hydrofracture Facility. The underground tank was installed at the site in 1963 to store liquid low-level waste for mixing into grout for waste injection by hydrofracture.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (mild steel)	1
Location	
Old Hydrofracture Facility	5
Toxicity	
Primary Contaminant ^{137}Cs	4
TOTAL SCORE[1]	16

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.12 TANK T-9

Tank T-9 is a 25,000-gal carbon steel tank located in Melton Valley at the Old Hydrofracture Facility. The underground tank was installed at the site in 1963 to store liquid low-level waste for mixing into grout for waste injection by hydrofracture.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (mild steel)	1
Location	
Old Hydrofracture Facility	5
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr	4
TOTAL SCORE[1]	16

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.13 TANK TH-1

Tank TH-1 is a 2500-gal stainless steel tank located in the Bethel Valley central laboratory area south of Building 3503. The underground tank was installed in 1948 and received waste from the thorium pilot plant project in Building 3503.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (stainless steel)	0
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr	3
TOTAL SCORE[1]	9

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.14 TANK TH-2

Tank TH-2 is a 2400-gal stainless steel tank located in the Bethel Valley central laboratory area south of Building 3503. The underground tank was installed in 1952 and received waste from the thorium pilot plant project in Building 3503.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (stainless steel)	0
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr	3
TOTAL SCORE[1]	9

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.15 TANK TH-3

Tank TH-3 is a 3300-gal stainless steel tank located in the Bethel Valley central laboratory area south of Building 3503. The underground tank was installed in 1952 and received waste from the thorium pilot plant project in Building 3503.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (stainless steel)	0
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr	3
TOTAL SCORE[1]	9

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.16 TANK TH-4

Tank TH-4 is a 14,000-gal gunite tank located in the Bethel Valley central laboratory area south of Building 3503. The underground tank was installed in 1952 and received waste from the thorium and uranium pilot plant development projects in Building 3550.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (concrete)	2
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr	3
TOTAL SCORE[1]	15

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.17 TANK WC-1

Tank WC-1 is a 2150-gal stainless steel tank located in the Isotopes Circle area of the Bethel Valley main laboratory area. The underground tank was installed in 1950 to collect liquid low-level waste from isotope production and development.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (stainless steel)	0
Location	
North of Central Ave.	2
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr ^{238}Pu ^{241}Am	3
TOTAL SCORE[1]	8

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.18 TANK WC-15

Tank WC-15 is a 1000-gal stainless steel tank located in the 4500 area of the Bethel Valley main laboratory area. The underground tank was installed in 1951 to collect liquid low-level waste from the Building 4500 research laboratories.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (stainless steel)	0
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr	2
TOTAL SCORE[1]	7

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.19 TANK WC-17

Tank WC-17 is a 1000-gal stainless steel tank located in the 4500 area of the Bethel Valley main laboratory area. The underground tank was installed in 1951 to collect liquid low-level waste from the Building 4500 research laboratories.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (stainless steel)	0
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminant ^{137}Cs	1
TOTAL SCORE[1]	5

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.20 TANK W-1

Tank W-1 is a 4800-gal gunite tank located in the Bethel Valley North Tank Farm. The underground tank was constructed in 1943 and received liquid low-level waste from the Building 3019 radiochemical processing facility.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (concrete)	2
Location	
North of Central Ave.	2
Toxicity	
Primary Contaminant ^{137}Cs	2
TOTAL SCORE[1]	12

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.21 TANK W-1A

Tank W-1A is a 4000-gal stainless steel tank located in the Bethel Valley North Tank Farm. The underground tank was installed in 1951 and received waste from the Radiochemical Processing Pilot Plant (Building 3019) and the High-level Radiochemical Analytical Laboratory (Buildings 3026 and 3019-B).

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Inleak	3
Location	
North of Central Ave.	2
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr ^{238}Pu ^{241}Am	3
TOTAL SCORE[1]	17

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.22 TANK W-2

Tank W-2 is a 4800-gal gunite tank located in the Bethel Valley North Tank Farm. The underground tank was constructed in 1943 and received liquid low-level waste from the Building 3019 radiochemical processing facility.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (concrete)	2
Location	
North of Central Ave.	2
Toxicity	
Primary Contaminant ^{137}Cs	2
TOTAL SCORE[1]	12

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.23 TANK W-3

Tank W-3 is a 42,500-gal gunite tank located in the Bethel Valley North Tank Farm. The underground tank was constructed in 1943 and received liquid low-level waste from the Building 3019 radiochemical processing facility.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Inleak	3
Location	
North of Central Ave.	2
Toxicity	
Primary Contaminant ^{137}Cs	4
TOTAL SCORE[1]	19

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.24 TANK W-4

Tank W-4 is a 42,500-gal gunite tank located in the Bethel Valley North Tank Farm. The underground tank was constructed in 1943 and received liquid low-level waste from the Building 3019 radiochemical processing facility.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Inleak	3
Location	
North of Central Ave.	2
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr	4
TOTAL SCORE[1]	19

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.25 TANK W-13

Tank W-13 is a 2000-gal stainless steel tank located in the Bethel Valley North Tank Farm. The underground tank was constructed in 1945 and received waste from the Radiochemical Processing Facility (Building 3019) and from recovery of fission products.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (stainless steel)	0
Location	
North of Central Ave.	2
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr	4
TOTAL SCORE[1]	10

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.26 TANK W-14

Tank W-14 is a 2000-gal stainless steel tank located in the Bethel Valley North Tank Farm. The underground tank was constructed in 1945 and received waste from the Radiochemical Processing Facility (Building 3019) and from recovery of fission products.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (stainless steel)	0
Location	
North of Central Ave.	2
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr	4
TOTAL SCORE[1]	10

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.27 TANK W-15

Tank W-15 is a 2000-gal stainless steel tank located in the Bethel Valley North Tank Farm. The underground tank was constructed in 1945 and received waste from the Radiochemical Processing Facility (Building 3019) and from recovery of fission products.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (stainless steel)	0
Location	
North of Central Ave.	2
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr	4
TOTAL SCORE[1]	10

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.28 TANK 7560

Tank 7560 is a 1000-gal stainless steel tank located in Melton Valley. The underground tank was installed in 1957 and was originally used as a waste tank for the Homogeneous Reactor Experiment (HRE) and later used as the clean vapor condensate tank for HRE-2.

Tank Risk Characterization Summary

This tank contains no liquid or sludge; therefore, no characterization was performed.

4.29 TANK 7562

Tank 7562 is a 12,000-gal stainless steel tank located in Melton Valley. The underground tank was installed in 1957 and was used as a waste tank for the Homogenous Reactor Experiment (HRE).

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (stainless steel)	0
Location	
HRE Tank	1
Toxicity	
Primary Contaminant	3
^{90}Sr	
TOTAL SCORE[1]	7

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.30 TANK T-30

Tank T-30 is an 825-gal stainless steel tank located south of Building 4507 in the Bethel Valley main laboratory area. The underground tank was installed in 1961 and was used to store radioactive materials for the Curium Recovery Facility.

Tank Risk Characterization Summary

Risk Characteristic	Score
Leaking Characteristic	
Indeterminate Leak Characterization (stainless steel)	0
Location	
South of Central Ave.	3
Toxicity	
Primary Contaminants ^{137}Cs ^{90}Sr ^{238}U ^{239}Pu ^{244}Cm	2
TOTAL SCORE[1]	7

[1]Weighted score:
Leaking Characteristics carries a weight of 3
Location carries a weight of 1
Toxicity carries a weight of 2

4.31 TANK W-19

Tank W-19 is a 2250-gal stainless steel tank located in Bethel Valley South Tank Farm. The underground tank was installed in 1955 and was used to collect waste produced from recovery and reprocessing of uranium and other nuclear material from the Metal Recovery Facility in Building 3505.

Tank Risk Characterization Summary

This tank contains no liquid or sludge; therefore, no characterization was performed.

4.32 TANK W-20

Tank W-20 is a 2250-gal stainless steel tank located in Bethel Valley South Tank Farm. The underground tank was installed in 1955 and was used to collect waste produced from recovery and reprocessing of uranium and other nuclear material from the Metal Recovery Facility in Building 3505.

Tank Risk Characterization Summary

This tank contains no liquid or sludge; therefore, no characterization was performed.

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