DOE/LLW-204

Technical Survey of DOE Programs and Facilities Applicable to the Co-Storage of Commercial Greater-Than-Class C Low-Level Radioactive Waste and DOE Special Case Waste

National Low-Level Waste Management Program

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Technical Survey of DOE Programs and Facilities Applicable to the Co-Storage of Commercial Greater-Than-Class C Low-Level Radioactive Waste and DOE Special Case Waste

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ABSTRACT

This report presents information on those U.S. Department of Energy (DOE) management programs and facilities, existing and planned, that are potentially capable of storing DOE Special Case Waste (SCW) until a disposal capability is available. Major emphasis is given to the possibility of storing commercial greater-than-Class C low-level radioactive waste (GTCC LLW) together with DOE SCW, as well as with other waste types. In addition to this primary issue, the report gives an in-depth background on SCW and GTCC LLW, and discusses their similarities.

Institutional issues concerning these waste types are not addressed in this report.

SUMMARY

This report presents information on those U.S. Department of Energy (DOE) management programs and facilities, existing and planned, that are potentially capable of storing DOE Special Case Waste (SCW) until a disposal capability is available. Major emphasis is given to the possibility of storing commercial greater-than-Class C low-level radioactive waste (GTCC LLW) together with DOE SCW, as well as with other waste types. Institutional issues are not addressed in this report.

SCW is defined as DOE-generated or -titled radioactive waste that does not fit into typical management plans developed for the major radioactive waste types: i.e., transuranic (TRU), low-level radioactive waste (LLW), or high-level radioactive waste (HLW). SCW can pose problems to generators, handlers, and disposal facility operations that will require specific management and disposal schemes. SCW is primarily waste that has limited or no planned disposal alternatives. It includes such a wide variety of forms and isotopic mixtures that in recent studies it has been subdivided into several subcategories.

GTCC LLW is radioactive waste generated by the U.S. Nuclear Regulatory Commission (NRC) and Agreement State licensed generators that exceeds the Class C limits defined in Title 10, Code of Federal Regulations, Part 61 (10 CFR 61). The 10 CFR 61 codified disposal requirements for three classes of LLW considered generally suitable for near-surface disposal. They are A, B, and C, with Class C waste requiring the most rigorous disposal specifications. Waste with concentrations above Class C limits for certain short- and long-lived radionuclides is identified as GTCC LLW. Federal law requires that DOE ensure safe disposal of GTCC LLW in a disposal facility licensed by the NRC.

The term GTCC LLW is often incorrectly applied to DOE generated or titled waste. DOE generated or titled waste with concentrations above Class C limits, that does not fit into typical DOE waste management plans, is included within certain subcategories of DOE SCW.

This report presents information that resulted from

- Identifying and surveying existing or planned DOE programs/facilities technically capable of storing SCW.

- Exploring the possibility of storing GTCC LLW together with SCW and other similar waste types. This includes:

  - Programs/facilities designated specifically for storage of SCW

  - Other existing or planned DOE storage capability that may be suitable for SCW.

The basis for this report is information provided by six DOE operations offices and their contractors in response to a survey. Also, additional information was acquired through the Waste Stream and Technology Data System, which contains data on DOE-designated (authorized) radioactive treatment, storage and disposal (TSD) facilities throughout the DOE system.

The data given in this report indicate:

- Currently, a DOE complex-wide comprehensive strategy does not exist for management of SCW. Out of the six DOE field operations offices surveyed for this report, just two SCW management programs were identified at the field operations level; Hanford and INEL.

- Most SCW throughout the DOE system, identified by process knowledge, etc., is being held at the site of generation. Although these are not designated storage facilities as defined for this report, they do comply with DOE Orders and regulations.

- Designated storage facilities capable of managing SCW and GTCC LLW currently exist in the DOE system. However, space may be limited for some waste categories (i.e., RH wastes) at these facilities. Currently some SCW and potential GTCC LLW[a] accepted by DOE, that have passed specific facility waste acceptance criteria (WAC), are being stored together with other typical DOE waste types, i.e., primarily TRU and LLW.

As stated above, most SCW is being held at the site of generation, not stored at a DOE designated storage facility. It would not be feasible to store GTCC LLW at these locations. However, GTCC LLW could be stored together with SCW and other similar waste types at DOE designated storage facilities. Such facilities currently exist in the DOE system. Summary Table S-1 provides information on potential SCW/GTCC LLW storage capabilities at each of the DOE sites evaluated by this survey.

a. Interpretation of a DOE-ID legal opinion regarding the disposal requirements for certain wastes (potential GTCC LLW) presently stored at DOE facilities has determined that this waste should be classified as SCW. This legal opinion is currently at DOE-HQ for review and concurrence.

Table S-1. Potential SCW/GTCC LLW storage capabilities.

DOE Site and Facilities	Existing/planned SCW programs identified	Waste cat.[a]				Potential storage space SCW/GTCC LLW
		CHRW	CHMW	RHRW	RHMW	
Richland Operations	Yes	NA	NA	NA	NA	NA
Hanford Site						
SCW Waste Program	Existing	NA	NA	NA	NA	NA
SCW Facility	Planned	Yes	Yes	Yes	Yes	Yes, expandable
TRUSAF		Yes	Yes	No	No	No
CWC		Yes	Yes	No	No	Limited
218-W		Yes	No	No	No	Yes
Nevada Operations	None identified	NA	NA	NA	NA	NA
NTS						
RWMS TRU Pad		Yes	Yes	No	No	Yes
RWMS MW Pad		Yes	Yes	No	No	Yes
Idaho Operations	Yes	NA	NA	NA	NA	NA
INEL						
SCW Waste Program	Existing	NA	NA	NA	NA	NA
SCW Facility	Planned	Yes	Yes	Yes	Yes	Yes, expandable
CPP-1617 & 1619		Yes	Yes	No	No	No
Monolith. Structure (ICPP)		Yes	Yes	Yes	Yes	Yes
TSA Pads (RWMC)		Yes	Yes	No	No	Yes, planned expansion
ITLSF (RWMC)		Yes	Yes	Yes	Yes	Limited
Savannah River Operations	None identified	NA	NA	NA	NA	NA
SRS (Area G)						
Bldg. 643-29G		Yes	Yes	No	No	Limited
Bldg. 709-2G		Yes	Yes	No	No	Limited
TRU Pads		Yes	Yes	No	No	Limited
GCD facility		Yes	No	Yes	No	Limited
Oak Ridge Operations	None identified	NA	NA	NA	NA	NA
ORGDP (K-25)		Yes	Yes	No	No	Limited
ORNL (X-10)						
Bldg. 7826 & 7834		Yes	Yes	No	No	Limited
Bldg. 7855		No	No	Yes	Yes	Limited
Wells		No	No	Yes	No	No

Table S-1. (continued).

DOE Site and Facilities	Existing/planned SCW programs identified	Waste cat.[a]				Potential storage space SCW/GTCC LLW
		CHRW	CHMW	RHRW	RHMW	
Albuquerque Operations	None identified	NA	NA	NA	NA	NA
LANL (TA-54)		Yes	Yes	Yes	No	Limited

a. Waste categories:

CHRW—contact-handled radioactive waste
CHMW—contact-handled mixed waste
RHRW—remote-handled radioactive waste
RHMW—remote-handled mixed waste.

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TABLES

ACRONYMS

AL	Albuquerque Operations Office
C&S	certified and segregated
CH	contact-handled
CHMW	contact-handled mixed waste
CHRW	contact-handled radioactive waste
CH-TRU	contact-handled transuranic waste
CWC	Central Waste Complex
DOE	Department of Energy
DOE-ID	Department of Energy, Idaho Operations Office
GCD	greater confinement disposal
GTCC LLW	greater-than-Class C low-level radioactive waste
HLW	high-level waste
ICPP	Idaho Chemical Processing Plant
ID	Idaho Operations Office
ILTSF	Intermediate-Level Transuranic Storage Facility
INEL	Idaho National Engineering Laboratory
LANL	Los Alamos National Laboratory
LLRWPAA	Low-Level Radioactive Waste Policy Amendments Act of 1985
LLW	low-level waste
MLLW	mixed low-level waste
M&O	management and operations
MTRU	mixed transuranic
MW	mixed waste
NLLWMP	National Low-Level Waste Management Program
NR	Pittsburgh Naval Reactors Office
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
NV	Nevada Operations Office
OR	Oak Ridge Operations Office
ORGDP	Oak Ridge Gaseous Diffusion Plant

ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PNL	Pacific Northwest Laboratory
R&D	research and development
RCRA	Resource Conservation and Recovery Act
RH	remote-handled
RHMW	remote-handled mixed waste
RHRW	remote-handled radioactive waste
RL	Richland Operations Office
RWMC	Radioactive Waste Management Complex (INEL)
RWMS	Radioactive Waste Management Site (NTS)
SAN	San Francisco Operations Office
SCW	Special Case Waste
SDA	Subsurface Disposal Area
SPAR LLW	Specific Performance Assessment Required low-level radioactive waste
SR	Savannah River Operations Office
SRS	Savannah River Site
SSDP LLW	Site-Specific Disposal Problem low-level radioactive waste
SWEPP	Stored Waste Examination Pilot Plant
TA	Technical Area
TAN	Test Area North
TMI	Three Mile Island
TRU	transuranic
TRUSAF	Transuranic Storage and Assay Facility
TSA	Transuranic Storage Area
TSD	treatment, storage, and disposal
WAC	waste acceptance criteria
WIPP	Waste Isolation Pilot Plant
WIPP-WAC	WIPP Waste Acceptance Criteria
WTIP	waste type implementation plan

1. INTRODUCTION

This report presents information on those U.S. Department of Energy (DOE) management programs and facilities, existing and planned, that are potentially capable of storing DOE Special Case Waste (SCW) until a disposal capability is available. Emphasis is given to the possibility of storing commercial greater-than-Class C low-level radioactive waste (GTCC LLW) together with DOE SCW, as well as with other waste types.

This report presents information that resulted from

- Identifying and surveying existing or planned DOE programs/facilities technically capable of storing SCW.

- Exploring the possibility of storing GTCC LLW together with SCW as well as other similar waste types. This includes:

  - Programs/facilities designated specifically for storage of SCW

  - Other existing or planned DOE storage capability that may be suitable for SCW.

The basis for this report is information provided by six DOE operations offices and their contractors in response to a survey. Also, additional information was acquired through the Waste Stream and Technology Data System, which contains data on designated (authorized) radioactive treatment, storage, and disposal (TSD) facilities throughout the DOE system.

Institutional issues are not addressed in this report.

The major sections of the report include:

- Background: Discusses terminology and history associated with these waste types. Much of this information is taken from recent studies completed on SCW and GTCC LLW on a national basis and, specifically, at the Idaho National Engineering Laboratory (INEL).

- Waste Characteristics and Volumes of SCW Compared to GTCC LLW: Discusses characteristics and similarities of SCW and GTCC LLW, and provides estimated volumes of these waste types.

- Survey Process: Discusses how the survey was performed, gives a series of assumptions for the report, and gives criteria for evaluating survey responses.

- Site Survey Data: Discusses site-specific capabilities based upon information obtained from each DOE operations office and/or management and operations (M&O) contractor.

- Conclusions and Recommendations.

2. BACKGROUND

The information given in this section is essential to understanding the Site Survey Data section and identifying technically suitable DOE storage capability for SCW and GTCC LLW. The pertinent information is presented in three subsections:

- Special Case Waste (SCW)
- Greater-than-Class C low-level radioactive waste (GTCC LLW)
- Terminology of DOE Storage Facilities.

2.1 Special Case Waste (SCW)

When DOE issued Order 5820.2A, "Radioactive Waste Management," in September 1988, it enacted a comprehensive plan for managing its radioactive wastes. The Order addresses three major categories of radioactive waste: high-level radioactive waste (HLW), transuranic waste (TRU), and low-level radioactive waste (LLW). Not all DOE wastes fit the criteria of these three major radioactive waste types. Some wastes may have characteristics of more than one of the major waste types, which can prevent their management as typical HLW, TRU, or LLW. Such wastes can pose potential problems to generators, handlers, and disposal facility operations. DOE has termed these wastes SCW. Currently, SCW has limited or no planned disposal alternatives. For example, the waste may not pass Waste Acceptance Criteria (WAC) or may not be sufficiently characterized to determine disposal requirements. Such wastes will require special management and disposal schemes.

Efforts have begun to characterize DOE's SCW on a national basis and at several DOE facilities. In May 1990, the Radioactive Waste Technical Support Program at the INEL prepared the draft report, *Department of Energy Special Case Radioactive Waste Inventory and Characterization Data Report*, DOE/LLW-96, and associated supplemental data reports.[1] This report presents the results of a DOE complex-wide survey on SCW. Data summaries are presented complex-wide for each DOE operations office, giving the inventory, approximate volumes, and activities in curies for SCW. The study also determined that SCW includes such a wide variety of forms and isotopic mixtures that it must be subdivided into several subcategories. The report proposed dividing SCW into eight subcategories.

In the summer of 1993, a new waste management program was implemented at the INEL. A waste type implementation plan (WTIP) was issued in September 1993. This plan, titled *Special Case Waste and Greater-Than-Class C Low-Level Radioactive Waste Type Implementation Plan*, ER&WM-PD-93-0303,[2] provides a method for implementing the INEL SCW and GTCC LLW management strategy contained in the DOE report *Waste Management Division Strategic Plan*, DOE/ID-10429, May 1993.[3] All of the elements necessary for cradle-to-grave management are included in this WTIP.

In September and October 1993, a series report containing three volumes, titled *DOE Special Case Waste and DOE-Held Greater-Than-Class C Low-Level Radioactive Waste at the INEL*, EGG-

WM-10905,[4] was issued together with the SCW and GTCC LLW WTIP at the INEL. In Volumes 1 and 2 of this report, six revised SCW subcategories were proposed (updated from original subcategories in DOE/LLW-96)[b] and based primarily on disposal requirements.

These SCW subcategories are defined as:

- Noncertifiable Defense TRU.

  Noncertifiable Defense TRU waste is TRU waste that does not meet the Waste Isolation Pilot Plant (WIPP) WAC. Without WIPP acceptance, these wastes presently have no disposal alternative.

- Non-Defense TRU.

  Non-Defense TRU waste is DOE-titled waste generated by Energy Research Programs, Nuclear Energy Programs, or a Nuclear Regulatory Commission (NRC) licensee with TRU radionuclide concentrations >100 nCi/g. WIPP will only dispose of TRU waste generated by DOE Defense Programs. Therefore, these wastes presently have no disposal alternative.

- Special Performance Assessment Required (SPAR) LLW.

  SPAR LLW is DOE-titled waste that exceeds the limits specified in Table 1 and Table 2 of 10 CFR 61.55 for certain radionuclides (see Table 1 in this report). The exception to this would be SCW that exceeds 10 CFR 61 limits because it has TRU radionuclide concentrations >100 nCi/g (i.e., Non-Defense TRU). SPAR LLW is not generally acceptable for disposal in current near-surface land disposal facilities.

- Site-Specific Disposal Problem (SSDP) LLW.

  SSDP LLW is radioactive waste that has radionuclide concentrations below the 10 CFR 61.55 Tables 1 and 2 limits, but cannot meet the site-specific disposal performance requirements and WAC.

- Fuel and fuel debris.

  Fuel and fuel debris are elements similar to those destined for the HLW repository. These components were originally used in research and development applications. Consequently, the configurations are unlike normal commercial fuel elements; this may render them unacceptable to the HLW repository WAC.

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a. In the report DOE/LLW-96, the SCW subcategories cover the whole spectrum of radioactive problem materials and waste within the DOE complex. In the report EGG-WM-10905, the revised SCW subcategories just cover radioactive waste, not materials such as excess nuclear materials and sealed sources. When these materials are declared waste, they can then be placed in the most applicable revised SCW subcategory.

Table 1. NRC limits for Class C low-level radioactive waste.[a]

Long-lived radionuclides (Table 1 in 10 CFR 61.55)	
Nuclide (half-life)	Concentration (curies/m^3)
Carbon-14 (5,730 yr)	8
Carbon-14 in activated metal (5,730 yr)	80
Nickel-59 in activated metal (75,000 yr)	220
Niobium-94 in activated metal (20,000 yr)	0.2
Technetium-99 (214,000 yr)	3
Iodine-129 (16,000,000 yr)	0.08
	(nanocuries/gram)
Alpha-emitting transuranics (half-life greater than 5 yr)	100
Plutonium-241 (14 yr)	3,500
Curium-242 (162.8 days)	20,000

Short-lived radionuclides (Table 2 in 10 CFR 61.55)	
Nuclide (half-life)	Concentration (curies/m^3)
Nickel-63 (100 yr)	700
Nickel-63 in activated metal (100 yr)	7,700
Strontium-90 (29 yr)	7,000
Cesium-137 (30 yr)	4,600

a. Limits are for single radionuclides; for mixtures of radionuclides, limits are obtained by a sum-of-fractions rule separately for long-lived and short-lived radionuclides. The sum of fractions for either short- or long-lived radionuclides is determined by dividing each nuclide's concentration by its Class C limit and adding the resulting values. If the sum exceeds 1 for either short- or long-lived radionuclides, the waste is greater-than-Class C.

- Uncharacterized potential SCW.

The uncharacterized potential SCW subcategory includes containers of waste with unknown contents. The waste is believed to contain SPAR LLW or TRU waste constituents.

Several tasks have been initiated at Hanford by Westinghouse Hanford and Pacific Northwest Laboratories (PNL). These tasks have focused on identifying, characterizing, relocating, and determining storage options for SCW at the Hanford site, and are addressed in Section 5 of this report.

2.1.1 Current Status: SCW

A DOE complex-wide strategy does not exist for management of SCW. As noted, individual efforts have begun to characterize DOE's SCW at the INEL and Hanford. Although this is a start, much more complex-wide guidance will be required.

The initial inventory and characterization study on SCW, DOE/LLW-96, indicates that approximately 80% of the total volume (993,000 m^3) of all SCW is uncharacterized waste from the 177 underground storage tanks and old reactors at Hanford. Volumes 1 and 2 of EGG-WM-10905 indicates that much of SCW at the INEL is also uncharacterized. Hanford possesses over 90% of the total volume of Noncertifiable Defense TRU waste and SPAR LLW. Hanford also possesses over 60% of the total volume of Non-Defense TRU waste. The Savannah River Office possesses more than 85% of the SSDP LLW.

At the INEL, SCW is stored at facilities throughout the site, most at the site of generation. Much of this waste is defined as uncharacterized potential SCW. This leads to erroneous waste volume projections, making future management planning very difficult. A big reason why this waste is uncharacterized is cost. Generally, a waste is only characterized when disposal is imminent. This same situation prevails throughout the DOE complex.

All of this waste must be managed as SCW until more detailed characterization capabilities are available (i.e., with more detailed characterization, some of this waste may move to defined DOE waste types such as HLW, TRU or LLW.). Relatively speaking, as compared to the defined DOE waste types, only a small quantity of SCW exists in the DOE complex. This results in low priority in managing this waste, making it difficult to receive funding for the required activities. Detailed characterization (physical and chemical) of SCW will take some time, resulting in the need for long-term storage.

2.2 Greater-Than-Class C Low-Level Radioactive Waste (GTCC LLW)

GTCC LLW is commercial radioactive waste generated by NRC licensees and Agreement State licensees that exceeds the Class C limits defined in 10 CFR 61. The 10 CFR 61 codifies disposal requirements for three classes of LLW considered generally suitable for near-surface disposal. They are A, B, and C, with Class C waste requiring the most rigorous disposal specifications. Waste with concentrations above Class C limits for certain short- and long-lived radionuclides is referred to as

GTCC LLW (see Table 1).[c] Under Public Law 99-240, "Low-Level Radioactive Waste Policy Amendments Act of 1985" (LLRWPAA), the Federal Government (i.e., DOE) is responsible for the safe disposal of GTCC LLW. GTCC LLW accepted in accordance with the LLRWPAA is required to be disposed of in a facility licensed by the NRC.

The term GTCC LLW is often incorrectly applied to DOE-owned or -generated waste. DOE-owned or -generated waste with concentrations above Class C limits that does not fit into defined DOE waste types (i.e., not HLW, TRU, or LLW) is included within certain subcategories of DOE SCW.

In contrast to SCW, a DOE comprehensive strategy does exist for management of GTCC LLW. The GTCC LLW Program, part of the National Low-Level Waste Management Program (NLLWMP) managed by Lockheed Idaho Technologies Company, was initiated by DOE to plan and develop strategies for the management and disposition of GTCC LLW. As reflected in the document *Reassessment of the Greater-Than-Class C Low-Level Radioactive Waste Program*,[5] EGG-WM-11018, October 1993, the Department's GTCC LLW Program contemplates a strategy of:

- Near-term (or emergency) storage of a limited quantity of GTCC LLW (primarily sealed radiation sources) to address potential threats to public health and safety.

- A dedicated storage system that would allow broader acceptance of GTCC LLW, on an "as needed" basis, before disposal capacity is available.

- Disposal per 10 CFR 61 in a deep geologic environment unless other types of disposal are approved by NRC.

Storage and disposal for GTCC LLW, depending on assumptions, could be at one centralized facility or in multiple facilities. The current timetable for establishing disposal capabilities is approximately in the year 2015.

Efforts are in process to characterize DOE-held potential GTCC LLW on a national basis. Just as for SCW, planning for storage or disposal of GTCC LLW requires detailed characterization of that waste to estimate volumes, radionuclide activities, and waste forms. The NLLWMP, in working towards fulfilling this requirement, prepared and issued the report *Greater-Than-Class C Low-Level Radioactive Waste Characterization: Estimated Volumes, Radionuclide Activities, and Other Characteristics*, DOE/LLW-114, in August 1991. This report was revised as DOE/LLW-114, Revision 1, in 1994.[6] Data within this report come from existing literature, disposal records, and solicited responses from waste generators. The data are used to estimate the characteristics and project the volumes and radionuclide activities to the year 2035. (Only the base case data from DOE/LLW-114, Revision 1, is used within this report.) These data were placed into four categories as defined by generator type:

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c. Commercially generated GTCC LLW is defined by the NRC as having a radionuclide concentration that exceeds the concentration values in NRC Tables 1 or 2 of 10 CFR 61.55. These NRC tables are provided in Table 1 of this report.

1. Nuclear Utility Waste. Nuclear utility waste comes from commercial nuclear power reactors throughout the country. A large part of this waste is activated metals or comes from nonfuel-bearing hardware components. (This waste is similar to the SCW subcategory Non-Defense TRU.) The remainder is operations-generated waste.

2. DOE-Held GTCC LLW. LLW exceeding Class C limits that has already been accepted by DOE under contract arrangements with licensees, or in response to health and safety concerns. A large part of this waste comes from programs sponsored by the government to develop nuclear fuel cycles, equipment design, etc. (Interpretation of a DOE-ID legal opinion regarding the disposal requirements for certain wastes (potential GTCC LLW) presently stored at DOE facilities has determined that this waste should be classified as SCW. This legal opinion is currently at DOE Headquarters for review and concurrence.)

3. Other Generator Waste. The Other Generator waste category consists of wastes from smaller generators such as medical institutions, academic research reactors, industrial research and development firms, etc. Much uncertainty exists concerning the volumes and activity of this waste. The GTCC LLW Program is currently working on more detailed characterization of this category.

4. Sealed Sources. Sealed sources consist of small capsules, usually stainless steel, that enclose relatively high concentrations of a single nuclide. Sealed sources are used in a wide range of applications, including industrial and medical applications. Sealed sources that exceed Class C limits in 10 CFR 61 that may not have safe storage or are abandoned may be of immediate concern to public health and safety. Immediate (near-term) storage may be needed.

Until recently, GTCC LLW has been viewed as a class of waste to be disposed of by one mode of disposal. However the characteristics of the various waste streams from which this waste type is derived vary significantly and will require different management and disposal methods. For example, waste within these categories, accounting for activity, waste form, and certain disposal restrictions, are similar to certain SCW subcategories discussed above. Initial characterization at the INEL has shown that most GTCC LLW characteristics will be similar to Non-Defense TRU or SPAR LLW SCW subcategories.

2.2.1 Current Status: GTCC LLW

As noted, GTCC LLW strategy has been developed on a national basis. Currently, limited amounts of existing waste that have been identified as GTCC LLW are being stored at different commercial facilities, usually where it was generated. One exception is the DOE-held potential GTCC LLW (candidate SCW) that was accepted by DOE and is being stored at various Federal facilities. Projections for GTCC LLW in the 1994 DOE/LLW-114 report, Revision 1 are given through to the year 2035 (see Table 2). Approximately 937 m^3 of GTCC LLW is expected to be generated by nuclear utilities. Much of the nuclear utility waste has not yet been generated, but will be as a result of decontamination and decommissioning of utilities, etc.

Table 2. Base-Case and concentration averaged packaged volumes (m^3) of GTCC LLW through the year 2035.[a]

GTCC LLW category	Total estimated volume (m^3)
Nuclear utilities GTCC LLW	937
DOE-held GTCC LLW	0
Other generators GTCC LLW	465
Sealed sources GTCC LLW	3,385
Total	4,787

a. Excerpt from DOE/LLW-114, Revision 1, 1994.[6]

Approximately 1,000 m^3 of the total projected volume (3,148 m^3) of GTCC LLW reported in the 1990 DOE/LLW-114, Revision 0, is already in the possession of DOE and stored at DOE facilities. This waste is known as DOE-held potential GTCC LLW. It has been recently determined and reported in DOE/LLW-114, Revision 1, that DOE-held potential GTCC LLW will be classified as DOE SCW. The volume of this waste in DOE/LLW-114, Revision 1, will be 0 m^3. This category will be left open for possible future GTCC LLW that could be accepted by DOE.

Approximately 465 m^3 of the total projected volume of GTCC LLW is in the Other Generator category. Storage may be scattered and limited for GTCC LLW in this category and it may require near-term handling.

The total projected volume of sealed sources packaged for a storage scenario is estimated to be approximately 3,385 m^3. It has been estimated in the report *Characterization of Greater-Than-Class C Sealed Sources; Volume 1: Sealed Sources Held by Specific Licensees*, DOE/LLW-163, 1994, that there are nearly 88,000 sealed sources that potentially could become GTCC LLW.[7] However, many of these sources can be recycled or reused, resulting in nuclear materials rather than nuclear wastes. Lost or abandoned sealed sources are an immediate concern, and the NRC will request that DOE provide safe storage for these sources.

The LLRWPAA requires that DOE be responsible for disposal of GTCC LLW in a facility licensed by the NRC. Such a facility will not be available for approximately 20 years. GTCC LLW that is accepted by DOE will have to be safely stored until it can be disposed of in an NRC-licensed facility. Pending legislative and regulatory change, long-term storage will be required.

2.3 Terminology of DOE Storage Facilities

In analyzing data collected on DOE radioactive waste management facilities, certain terms are used to describe these facilities within this report. Defining these terms will help the reader distinguish and understand the difference in these management facilities. These terms are defined as:

- DOE Designated TSD Facility

  A DOE TSD facility is generally designated for management of TRU, LLW, and SCW. Such a facility could accept waste from onsite or offsite if that waste passes specific WAC. Potential GTCC LLW has been stored together with these DOE waste types.

- DOE SCW Designated Storage Facility

  A DOE storage facility is specifically designated for SCW-type wastes. Such a storage facility is likely to be part of a designated TSD facility (above), but could stand alone as a SCW-type facility. Such a facility could accept waste from onsite or offsite if that waste passed specific WAC. A possibility exists that GTCC LLW could be stored together with SCW in such a facility.

- DOE Storage at Site of Generation

  This term refers to the interim storage of waste at site of generation. Although such storage is in compliance with DOE orders and regulations, the facility usually will not accept waste offsite or from other onsite facilities. Much of the waste held in this type of facility has not been characterized sufficiently to meet WAC published for a designated TSD facility. Such a facility would not be feasible to store GTCC LLW.

3. WASTE CHARACTERISTICS AND VOLUMES OF SCW COMPARED TO GTCC LLW

At the INEL, SCW subcategory classification is based primarily on disposal criteria (i.e., radiological waste management restraints or disposal restrictions). By using this principle, waste characteristics of certain SCW subcategories and GTCC LLW categories are likely to be similar. This section will compare these similarities and also compare waste volumes of SCW and GTCC LLW on a national basis. Discussion includes

- Waste characteristics of SCW compared to GTCC LLW
- Volumes of SCW compared to GTCC LLW.

3.1 Waste Characteristics of GTCC LLW Compared to SCW

Based on radiological waste management restraints or disposal restrictions, certain waste characteristics, activities, and forms of SCW and GTCC LLW are likely to be similar. One can assume that a high percentage of wastes from both the DOE and commercial sectors were generated by generally the same type of processes. That is, from processes generally related to nuclear reactors and radiological research and development.

One method of illustrating similarities of these different waste categories is to compare the waste classification management systems for both commercial and DOE wastes. Figure 1 illustrates that GTCC LLW is similar to the SCW subcategories known as Non-Defense TRU and SPAR LLW. For example, some commercial potential GTCC LLW that was accepted by DOE and stored at the INEL have basically the same waste characteristics, radionuclides, and physical forms as certain waste in the DOE TRU waste category (i.e., these wastes were generated through nuclear utility or industrial processes). This potential GTCC LLW has TRU radionuclide concentrations >100 nCi/g TRU and thus, in the DOE system, would be classified as SCW Non-Defense TRU. Another example would be the SCW subcategory SPAR LLW which, in the DOE system, consists of waste that exceeds the 10 CFR 61 Tables 1 and 2 Limits, with the exception of waste with TRU radionuclide concentrations >100 nCi/g. Some potential GTCC LLW at the INEL would fit into this subcategory (i.e., the Surry 2 and Turkey Point 3 skeletons). This would be waste that exceeds Class C limits, but is <100 nCi/g TRU.

3.2 Volumes of SCW Compared to GTCC LLW

With data taken from DOE/LLW-96 and EGG-WM-10905 (References 1 and 4), Table 3 gives estimated current total volumes for each SCW subcategory and the DOE facility where the waste is stored. Also, the table gives a DOE complex-wide estimated total volume of SCW. The table uses the revised subcategories developed at the INEL.

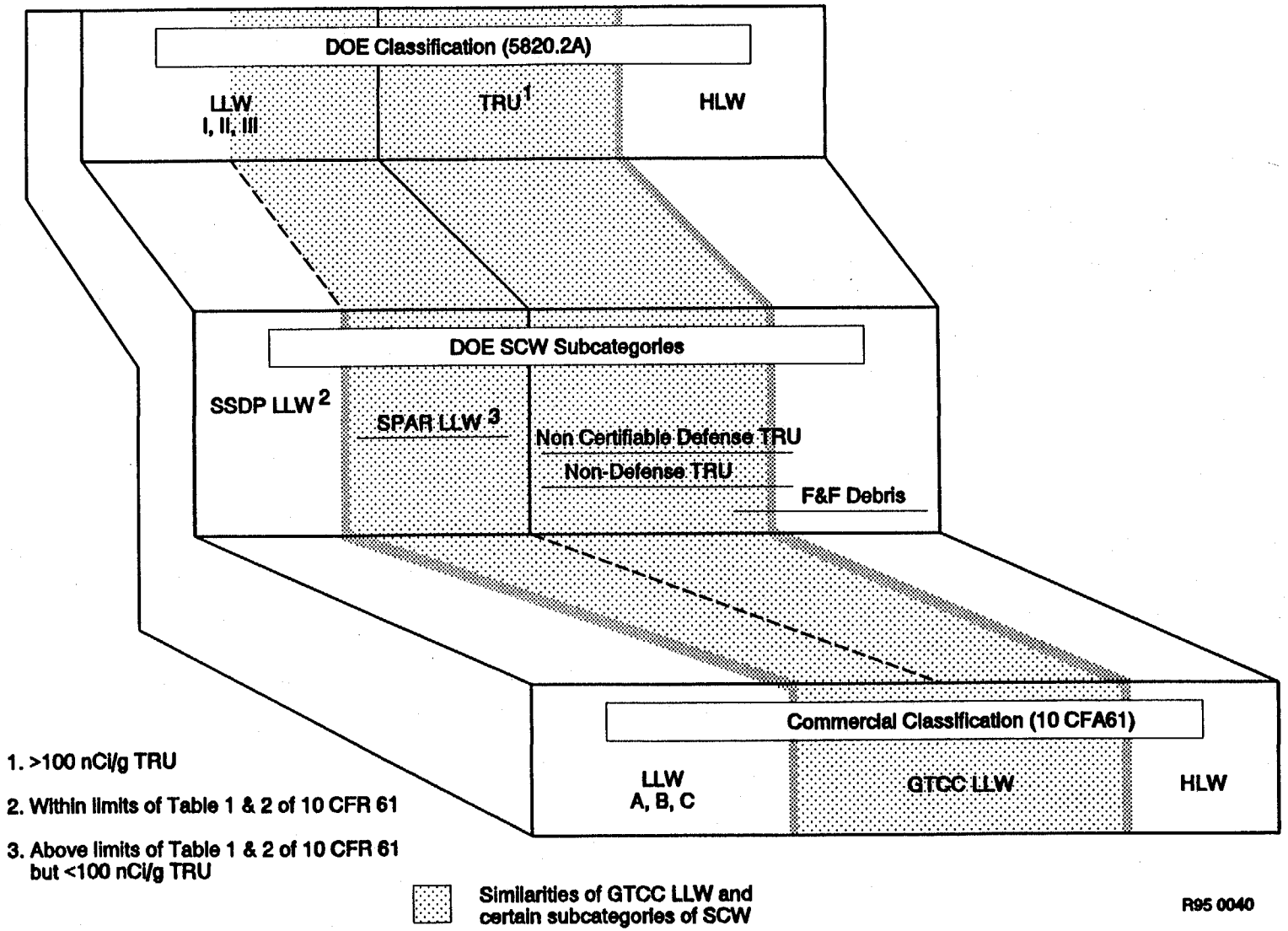

Figure 1. Comparison in radioactive waste classification of DOE and commercial waste.

Table 3. Total volume (m^3) for each SCW subcategory.[a]

Operations office[b]	NCD[c] TRU	NOND[d] TRU	SPAR LLW	SSDP LLW	Fuel debris	Uncharac-terized	Total volume (m^3)
AL	476	2.1	NR	0.52	0.2	19.4	498
CH	6.83	28.3	47.3	4.3	NR	NR	87
ID	9,030	5.2	58	29,000	8,162	[42,023]	46,255
NR	0.65	NR	8.5	NR	NR	96.7	106
NV	486	NR	NR	727.5	NR	NR	1,213
OR	3.86	NR	90.0	47.4	1.4	NR	143
RF	362	NR	NR	NR	NR	NR	362
RL	32,449	547	34,042	0.07	139	870,649	937,827
SAN	154	3.11	NR	0.26	NR	NR	157
SR	1,560	NR	NR	4,836	0.54	NR	6,396
Total	44,528	586	34,246	34,616	8,303	870,765	993,044

NOTE: [ ] means number of containers
NR means not reported

a. Data taken from DOE/LLW-96 Draft (Reference 1) and EGG-WM-10905, Vol 1: Inventory and Characteristics (Reference 4).

b. AL - Albuquerque, CH - Chicago, ID - Idaho, NR - Pittsburgh Naval Reactors Office, NV - Nevada, OR - Oak Ridge, RF - Rocky Flats, RL - Richland, SAN - San Francisco, SR - Savannah River

c. NCD - Noncertifiable Defense TRU.

d. NOND - Non-Defense TRU.

The data in Table 3 indicate that about 993,044 m^3 of DOE SCW exist complex-wide (i.e., potential future SCW would add to this total). A large percentage, approximately 80%, is uncharacterized. When characterized, some of this waste may fall into existing DOE waste categories such as TRU or LLW. However, by using the assumption that 40% of the uncharacterized SCW will be equivalent to GTCC LLW, the estimated volume of uncharacterized SCW will be at least 348,306 m^3 (see Table 4).[d]

Data from the 1994 DOE/LLW-114, Revision 1 report (depicted in Table 2) indicate that the current and projected total volume of GTCC LLW, base case, is approximately 3,148 m^3.

There is some uncertainty about the portion of each SCW subcategory that is equivalent to GTCC LLW (i.e., has generally the same waste characteristics). However, by using data from the recent characterization study completed at the INEL (Reference 4), conservative assumptions can be made of the GTCC-LLW-equivalent SCW in each SCW subcategory (see Table 4). These conservative figures show that approximately 412,000 m^3 of SCW equivalent to GTCC LLW exist in the DOE system.

The point is to compare the approximate total volume of existing SCW that is similar (412,000 m^3) to the approximate total volume of existing and projected GTCC LLW (3,148 m^3). The volumes show that the current and projected GTCC LLW total volume is much smaller than the estimated SCW total volume. These figures suggest that, aside from institutional issues, it would be prudent to integrate the management of the GTCC LLW inventory with the much larger DOE SCW inventory.

These are conservative estimates. Volumes for GTCC LLW could change significantly in the future depending on changing regulatory requirements, new technology, and classification changes. Examples could be the use of concentration averaging[e] or acceptance of nonfuel-bearing components by DOE under the Standard Contract for spent nuclear fuel. Either of these approaches would reduce GTCC LLW volumes to almost nothing.

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d. Glenn Bradley, EG&G Idaho, to Roger Scott, NLLWMP, "GTCC LLW Management," September 9, 1992.

e. Concentration averaging is the practice of placing similar LLW materials together in a container and averaging the radionuclide concentrations of those materials over the volume of the waste containers. For example, when GTCC LLW activated metals are combined with Class A, B, or C metals, the resulting waste package may meet at least Class C or below standards for commercial disposal.

Table 4. Estimated SCW equivalent to GTCC LLW in storage.[a]

SCW subcategory	Total volume SCW stored (m^3)	Assumptions for % SCW equivalent to GTCC LLW	Total volume SCW equivalent to GTCC LLW stored (m^3)
Noncertifiable Defense TRU	44,528	Portion of Noncertifiable Defense TRU may be acceptable at WIPP if processed to meet WAC; Assume 40% eligible	17,811
Non-Defense TRU	586	Assume 100% eligible for SCW equivalent to GTCC LLW	586
SPAR LLW	34,246	Assume 90% eligible for SCW equivalent to GTCC LLW	30,821
SSDP LLW	34,616	Assume 40% eligible for SCW equivalent to GTCC LLW	13,846
Fuel debris	8,303	Assume 0.05% eligible for SCW equivalent to GTCC LLW	415
Uncharacterized	870,765	Assume 40% eligible for SCW equivalent to GTCC LLW	348,306
Total	993,044		412,000

a. Data taken from DOE/LLW-96 Draft (Reference 1) and EGG-WM-10905, Vol 1: Inventory and Characteristics (Reference 4).

4. SURVEY PROCESS

This section describes how information was gathered during the survey and analyzed for use in this report.

This section includes

- Survey strategies
- Assumptions
- Facility evaluation criteria.

4.1 Survey Strategies

Two strategies were used to collect data for this report. These strategies are

1. Telecon interviews with responsible personnel knowledgeable of radioactive management and storage issues at six different DOE operations offices
2. Use of the Waste Stream and Technology Data System, which contains data on planned and existing designated radioactive TSD facilities throughout the DOE system.

4.1.1 Telecon Interviews

A telecon survey was developed for obtaining specific information on planned and existing DOE programs and storage capabilities for SCW and GTCC LLW at different DOE sites. Responsible DOE and M&O contractor personnel were interviewed from the following DOE operations offices: DOE-Richland (RL), DOE-Las Vegas (NV), DOE-Idaho (ID), DOE-Savannah River (SR) DOE-Oak Ridge (OR), and DOE-Albuquerque (AL). San Francisco, Chicago, Pittsburgh Naval Reactors Office, and Rocky Flats, whose volumes were reported in Table 3, were not surveyed because they routinely ship wastes offsite and therefore do not have designated storage capabilities.

The survey was structured to:

- Identify and survey planned and existing management programs and facilities specifically designated for storage of DOE SCW and to explore the possibility of storing commercial GTCC LLW together with SCW.
- Identify other programs and designated storage capability that would be compatible with SCW/GTCC LLW at the particular site. (This would be a designated TSD facility.)
- Identify the current storage situation for SCW and possibly GTCC LLW at each of the six DOE sites.

Items addressed by the survey for each site and storage facility include: (a) personnel contact(s), (b) name of facility(ies), (c) storage medium (type of structure), (d) types of waste approved for storage at that designated facility(ies), and (e) capacity in cubic meters (m^3). Institutional issues were not addressed in this survey.

4.1.2 Waste Stream and Technology Data System

The Waste Stream and Technology Data System was developed by the Radioactive Waste Technical Support Program, which is managed by Lockheed Idaho at the INEL. This system contains current, complex-wide data on DOE-owned TSD facilities that are capable of handling one or more of the following types of radioactive waste: (a) TRU, (b) mixed TRU (MTRU), (c) LLW, and (d) mixed LLW (MLLW). SCW and GTCC LLW with similar waste characteristics as items (a), (b), and (c) that pass specific WAC can be managed in this type of facility. Information in the data system is divided into 10 different fields including: (a) personnel to contact at each site, (b) general waste information, (c) storage capacities, (d) types of acceptable waste, (e) packaging characteristics, (f) physical and chemical characteristics, (g) radiological properties, (h) biological properties, and (i) product flow.

4.2 Assumptions

A number of assumptions were made when performing the survey and developing this report. These are as follows:

- Detailed physical characterization of a large share of SCW has been limited. It will take some time to characterize this waste, resulting in the need for long-term storage. (An approved disposal facility for SCW will not be available for approximately 20 years.)

- Pending legislative and regulatory change, long-term storage will be required for GTCC LLW. (An NRC-licensed disposal facility will not be available for GTCC LLW before year 2015.)

- DOE may have to accept GTCC LLW for storage until disposal capacity is available. This would be on a case-by-case basis.

- Analysis from existing characterization and process knowledge has determined that GTCC LLW and certain portions of SCW have very similar characteristics and technically could be treated, stored, and disposed of in the same way.

- The projected GTCC LLW estimated total volume is much smaller than the SCW estimated total volume.

- SCW and GTCC LLW will be either contact-handled (CH) or remote-handled (RH), depending on radionuclide content, concentration, and waste packaging. CH waste is defined as waste exhibiting less than 200 mR/hr at the surface of the waste container. RH waste exhibits greater than 200 mR/hr at the surface of the container.

- SCW and GTCC LLW, to pass transportation requirements and specific WAC at DOE-designated facilities, will need to be characterized and packaged.

- Portions of SCW and GTCC LLW will be co-contaminated with hazardous materials as defined under the Resource Conservation Recovery Act (RCRA), 40 CFR 261. Waste contaminated with both radiological and hazardous substances is known as mixed waste.

4.3 Facility Evaluation Criteria

The survey was structured to solicit information on a site's solid radioactive waste programs and technical capabilities for storage of SCW and GTCC LLW. As noted, the survey concentrated on two areas:

1. DOE solid waste programs and facilities designated specifically for management of SCW and, possibly GTCC LLW

2. Other designated DOE solid waste program/facilities capable of managing SCW and GTCC LLW.

Since very few programs have been developed to manage SCW throughout the DOE system, most of the survey responses came from established designated TSD facilities. These facilities manage most radioactive waste types in the DOE system.

As shown here and in previous studies, SCW and GTCC LLW have waste characteristics similar to DOE TRU and LLW. Currently, some of these wastes are being stored together with TRU and LLW. By soliciting information on management practices for TRU and LLW, the capabilities for handling waste types with characteristics similar to SCW and GTCC LLW can be identified. In other words, if a facility is currently storing LLW, TRU, MLLW, or MTRU, it was deemed physically capable of storing a specific category of SCW or GTCC LLW.

As mentioned in Section 4.2 (Assumptions), SCW and GTCC LLW will require either RH or CH capabilities. Mixed waste capability will also be an important factor. With these elements in mind, facilities may be required to store one or all of the following waste categories:

- Contact-handled radioactive waste (CHRW) - Radioactive waste with a maximum container surface dose rate of 200 mR/hr

- Contact-handled mixed waste (CHMW) - Radioactive waste co-contaminated with hazardous constituents, as defined in 40 CFR 261, with a maximum container surface dose rate of 200 mR/hr

- Remote-handled radioactive waste (RHRW) - Radioactive waste with a container surface dose rate exceeding 200 mR/hr

- Remote-handled mixed waste (RHMW) - Radioactive waste co-contaminated with hazardous constituents, as defined in 40 CFR 261, with a container surface dose rate exceeding 200 mR/hr.

For each DOE site surveyed, waste management programs/facilities were evaluated for the capability to manage SCW and GTCC LLW. Evaluations were based on the following criteria:

- Presence of existing or planned specific SCW/GTCC LLW programs
- Facility capability for CHRW, CHMW, RHRW, and RHMW
- Storage medium
- Types of acceptable waste (i.e., TRU, LLW, SCW, and GTCC LLW)
- Storage capacity.

Institutional concerns were not addressed in this report. However, it is assumed that a designated facility (as defined in this report) would have, or with limited effort have, the documentation required to be in compliance for management of specified SCW and GTCC LLW. Also, it should be noted that only radioactive solid waste programs/facilities are described in this evaluation.

5. SITE SURVEY DATA

The following discussion concerning site-specific capabilities is based on information obtained from the survey of each DOE operations office or site contractor and from the Waste Stream and Technology Data System.

Each subsection below includes

- Site Description
- Waste Management Programs/Facilities
- Site Storage Capability Summary.

5.1 DOE Richland Operations Office

5.1.1 Site Description

The DOE Richland Operations Office (RL) is responsible for the Hanford Site. The Hanford Site encompasses approximately 560 square miles in a semiarid region of the Columbia River Basin in south-central Washington State. The Site is located north of Richland and Pasco, Washington. Activities at the Hanford Site, which formerly focused on plutonium production, have shifted to environmental restoration, managing the wastes generated by past reactor and processing operations, and research and development for advanced reactors, energy technologies, basic sciences, and waste disposal technologies.

5.1.2 Waste Management Programs/Facilities

Most active solid waste management facilities at the Hanford Site are located in or near the 200 West and 200 East Areas (see map, Figure 2). In general, long-term storage in 200 East Area is not considered to be appropriate since it has not been used for offsite storage in the past. The 200 West Area contains the most active waste management facilities. Key waste management facilities within the 200 West area are the Transuranic Storage and Assay Facility (TRUSAF), the Central Waste Complex (CWC), and the 218-W Burial Ground and Retrievable Storage areas. Planned programs/ facilities for SCW include a Multipurpose Storage Complex, which is not scheduled to be completed before 1997, and a Special Case Waste Temporary Solid Waste Storage Facility planned to be completed in the near future.

5.1.2.1 Special Case Solid Waste Program and Storage Facility (Planned). SCWs have been and will continue to be generated as a result of research and development (R&D) missions in the 300 Area and other areas at the Hanford Site. An SCW program known as the 300 Area Special Case Solid Waste Program has been initiated to specifically study and develop plans for the dedicated storage of RH and CH SCW at Hanford. SCW has been defined at Hanford to include solid HLW, spent nuclear fuel, and DOE GTCC LLW, or, using the terminology developed at the INEL, SPAR LLW. Currently, the majority of these wastes are being stored in hot cells, specifically in the 300 Area, for storage time is indefinite because acceptable, safe, and compliant waste management systems are either not available or involve significant time periods (month to years) to find storage or disposal solutions. Relocation of SCW from hot cells is required to provide laboratory space for the

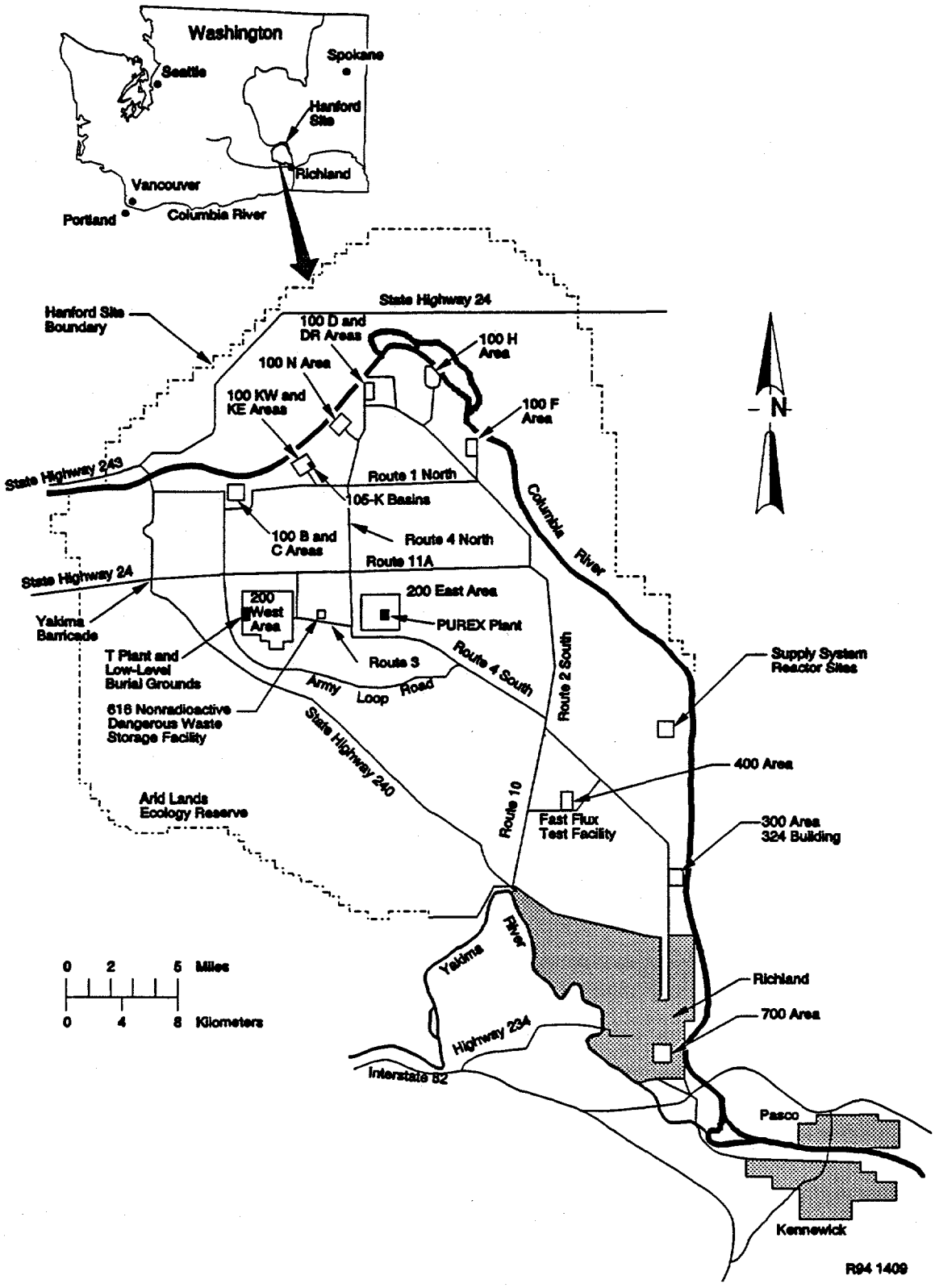


Figure 2. The Hanford Site.

Tank Waste Remediation System Program at Hanford. This program requires that laboratory analytical capabilities be available to support tank farm investigations at Hanford. Cleanout of these hot cells would provide some of the needed laboratory space for the above program.

The Tank Waste Remediation System Program includes the construction of the Multipurpose Storage Complex. The scope of the Multipurpose Storage Complex includes space to store the above SCW. However, the storage complex will not be completed in time to support the cleanout of the hot cells to meet initial R&D activities for the Tank Waste Remediation System Program. Therefore, the Special Case Solid Waste Temporary Storage Program/Facility (Project W-272) is planned to support the temporary storage of SCW until the Multipurpose Storage Complex comes online.

The Special Case Solid Waste Temporary Storage Facility will be located in the 200 West Area, near the Central Waste Complex. As planned, it will be able to receive and temporarily store up to 15,000 ft^3 of RH special case solid waste (RHRW, RHMW). The storage facility and transport equipment will be based on the commercially demonstrated NUHOMS system, which is well established and NRC licensed in the commercial power industry. The NUHOMS system uses storage modules/casks placed on a pad. This type of storage would be procured and expanded on an as-needed basis. The storage area is being designed to accommodate 18 storage modules. Three modules would currently hold the anticipated 3,000 ft^3 of waste from the 300 Area. The waste to be placed in the future 12 modules will be identified at a later date. Subject to institutional concerns, this type of facility may be able to accommodate other SCW and commercial GTCC LLW.

5.1.2.2 Transuranic Storage and Assay Facility. The TRUSAF, a building originally associated with the T Plant Complex, has been upgraded and is used to verify certification activities and store TRU waste. The building is constructed with reinforced concrete walls and contains both CH-TRU and CH MTRU waste that is in the process of being certified to Waste Isolation Pilot Plant-Waste Acceptance Criteria (WIPP-WAC). The TRUSAF building can accommodate approximately 15,000 ft^3 (2,000 55-gal drums) of CH-TRU waste. Storage capacity of the building is of critical concern. Current forecasts of waste generation and waste retrieval operations at Hanford indicate that all the unused capacity will be used by Hanford operations. Final disposal of the waste stored in the building will be at WIPP. Therefore, because of storage capacity constraints (due to delay in WIPP operations), this facility is not readily available for storage of SCW or GTCC LLW.

5.1.2.3 Central Waste Complex. The CWC consists of a series of structures located within the 200 West Area. These structures consist of buildings and concrete and asphalt pads for the storage of CH-TRU, MTRU, LLW, and MLLW. These structures are designed to meet all the requirements for storage of polychlorinated biphenyls and hazardous, mixed, and radioactive wastes.

Buildings 2401 and 2402-W through 2402-WL (13 buildings) are preengineered steel structures with concrete floors. Total capacity for these buildings is approximately 98,000 ft^3. (This assumes each building could accommodate approximately 1,000 55-gal drums or 7,500 ft^3, depending on waste management criteria such as waste types, container types, weights, etc.). Buildings 2403-WA through 2403-WD (four buildings) are the same type of buildings as the 2401 and 2402 Series, but of larger size. Capacity of three of these buildings is approximately 34,000 ft^3 and the fourth building is 54,000 ft^3. These buildings are all allocated for storage of waste presently onsite and assumed receipts in the near future. Future plans include the construction of four more of the larger 2403 Series buildings.

In addition to the storage buildings, two pad areas are located at the CWC. These are used for short-term storage. The mixed waste storage pad is a 9,000 ft^2 concrete pad used for short-term retrievable storage of mixed waste until storage buildings can accommodate these wastes. The Waste Unloading and Staging Area is an asphalt pad used for short-term storage and staging of radioactively contaminated waste, pending disposition for transfer to other storage or disposal areas in the 200 West Area.

The other facilities located at the CWC are the flash point Mixed Storage Modules. These units consist of small (approximately 176 ft^2) preengineered steel buildings that can be procured off-the-shelf from various manufacturers. Generally, these buildings are used to meet the storage requirements of mixed waste containing flammable or low flash-point materials. Although capacity volume is low per unit, this type of storage may be applicable to SCW or commercial GTCC LLW.

5.1.2.4 218-W Burial Complex. CH-TRU, CH SCW, and CH LLW have also been stored in trenches in the 218-W burial complex. This waste, usually TRU but also some SCW and LLW, has been packaged, stacked, and stored in trenches to allow for 20-year retrievable storage. Currently, none of these trenches are receiving TRU or SCW waste for storage. Under RCRA permit, these trenches are called landfill disposal. These trenches are not considered compliant storage for mixed waste. These trenches are approximately 25 × 600 ft with asphalt or compacted soil bottoms and can accommodate about 13,790,000 ft^3 of storage.

5.1.3 Site Storage Capability Summary

Designated facilities at the Hanford Site are currently capable of storing CHRW and CHMW. Generally RH wastes are stored in undesignated areas throughout the Hanford Site (e.g., hot cells, site of generation). An SCW Program has been initiated at Hanford, and facilities are planned that will be capable of handling all four categories of waste: CHRW, CHMW, RHRW, and RHMW. Storage capacity of designated facilities at Hanford are dedicated to Hanford waste and near-term commitments. The planned SCW storage facility could have storage capability for other types of waste, including GTCC LLW.

Site-specific capabilities for storage of SCW/GTCC LLW at Hanford are summarized in Table 5.

Table 5. Richland Operations Office—storage capabilities for SCW/GTCC LLW.

Program/Facility	Storage medium	CHRW	CHMW	RHRW	RHMW	Waste capacity	Expansion/commitments
SCW Program (implemented) (Project W-272) Westinghouse and PNL	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SCW Temporary Solid Waste Storage Facility (planned) Designated 200-W Area	Aboveground storage, concrete cells, NRC-Lic. design (i.e., NUHOMS)	Yes	Yes	Yes	Yes	18 modules, Total of 15,000 ft^3	Six out of 18 units to be used Expandable, buy more modules as needed
TRUSAF (existing) Designated facility 200-W Area Certification activities, storage of TRU waste	Building, Reinforced concrete walls	Yes, CH-TRU	Yes, CH-TRU	No storage of RHRW	No storage of RHMW	Total of 15,000 ft^3 or 2,000 55-gal drums	Storage capacity limited Dedicated for onsite waste
Central Waste Complex (CWC) (existing) Designated facility 200-W Area Building Series 2401, 2402, and 2403 Planned future expansion	Preengineered steel structures, Storage pads, Modules	Yes, CH-TRU, CH-LLW	Yes, CH-TRU, CH-LLW	No storage of RHRW	No storage of RHMW	7,500 ft^3 per existing building, Series 2401 and 2402. 30,000 to 50,000 ft^3 existing building, Series 2403. Total existing storage of approx. 100,000 ft^3 including pads	Expandable, more buildings Existing storage limited and dedicated for onsite storage
218-W Burial Complex (existing) Designated facility 200-W Area	Trenches with asphalt or compacted soil bottoms	Yes, CH-LLW, CH-TRU	Existing MW known as landfill disposal.	No storage of RHRW	No storage of RHMW	No data provided. Total space approximately 13,790,000 ft^3	Yes, may take additional CH-LLW

5.2 DOE Nevada Operations Office

5.2.1 Site Description

The DOE Nevada Operations Office (NV) is responsible for the Nevada Test Site (NTS). The NTS occupies approximately 1 million acres in southwestern Nevada (see map, Figure 3). Las Vegas is the nearest urban center, located approximately 96 miles to the southeast. Nevada's primary mission was conducting nuclear weapons tests, but the site is currently working towards treatment, storage, and disposal of defense and other wastes (waste management), environmental restoration, and technology development.

5.2.2 Waste Management Programs/Facilities

There are two principal waste management sites at NTS: the Area 5 Radioactive Waste Management Site (RWMS), and the Area 3 RWMS. The Area 3 RWMS is primarily for disposal of bulk LLW with most of the LLW being cleanup debris from old atmospheric testing sites. Area 3 RWMS, being mostly a disposal area, would not be currently appropriate for storage of waste. The survey did not identify any planned programs/facilities specifically for management SCW at NTS. Responsible personnel at NTS stated that SCW is being managed together with other waste types, i.e., TRU and LLW. They also stated that a possibility exists that other areas at NTS (not necessarily radioactive waste management areas) could be used for storage purposes, such as Area 25.

5.2.2.1 Area 5 Radioactive Waste Management Site. This RWMS is a 92-acre site dedicated to the management of multiple radioactive waste types from both on- and offsite generation sources. The majority of site operations involve the trench disposal of LLW. Remote-handled and high-specific activity LLW are disposed in greater confinement disposal (GCD) boreholes. The RWMS is presently operating under interim status for mixed wastes.

Limited quantities of CH-TRU waste are stored at the RWMS on a RCRA-compliant asphalt pad. Most of this waste is certified for disposal at WIPP. Mixed wastes, mostly received from offsite, [i.e., Los Alamos National Laboratory (LANL) and Rocky Flats] are also stored in this area. Currently, an agreement exists with the State of Nevada for the RWMS not to accept any more MTRU waste. Also, per agreement with the State, the site is presently not accepting TRU waste and is not allowed to exceed the current inventory of approximately 20,000 ft^3. The capacity of the pad is approximately 40,000 ft^3. Once issues are worked out with the State, and present commitments are satisfied, a potential exists for further storage of CH-TRU and CH MTRU wastes in this area.

Future planning at RWMS includes the construction of an additional pad of approximately the same size as the above asphalt pad. This would be for the storage of CH-TRU and CH MTRU wastes. The NTS has been identified by DOE as a possible storage location for other wastes, including SCW. A possibility exists that GTCC LLW could be stored with SCW and other similar waste types at the RWMS. To be stored at RWMS, RH waste would require appropriate shielding.

In the past, NTS has routinely handled high dose-rate LLW without incident. RH waste has been accepted on a case-by-case basis (i.e., disposal in GCD). However, all shipments to NTS have to meet DOE requirements.

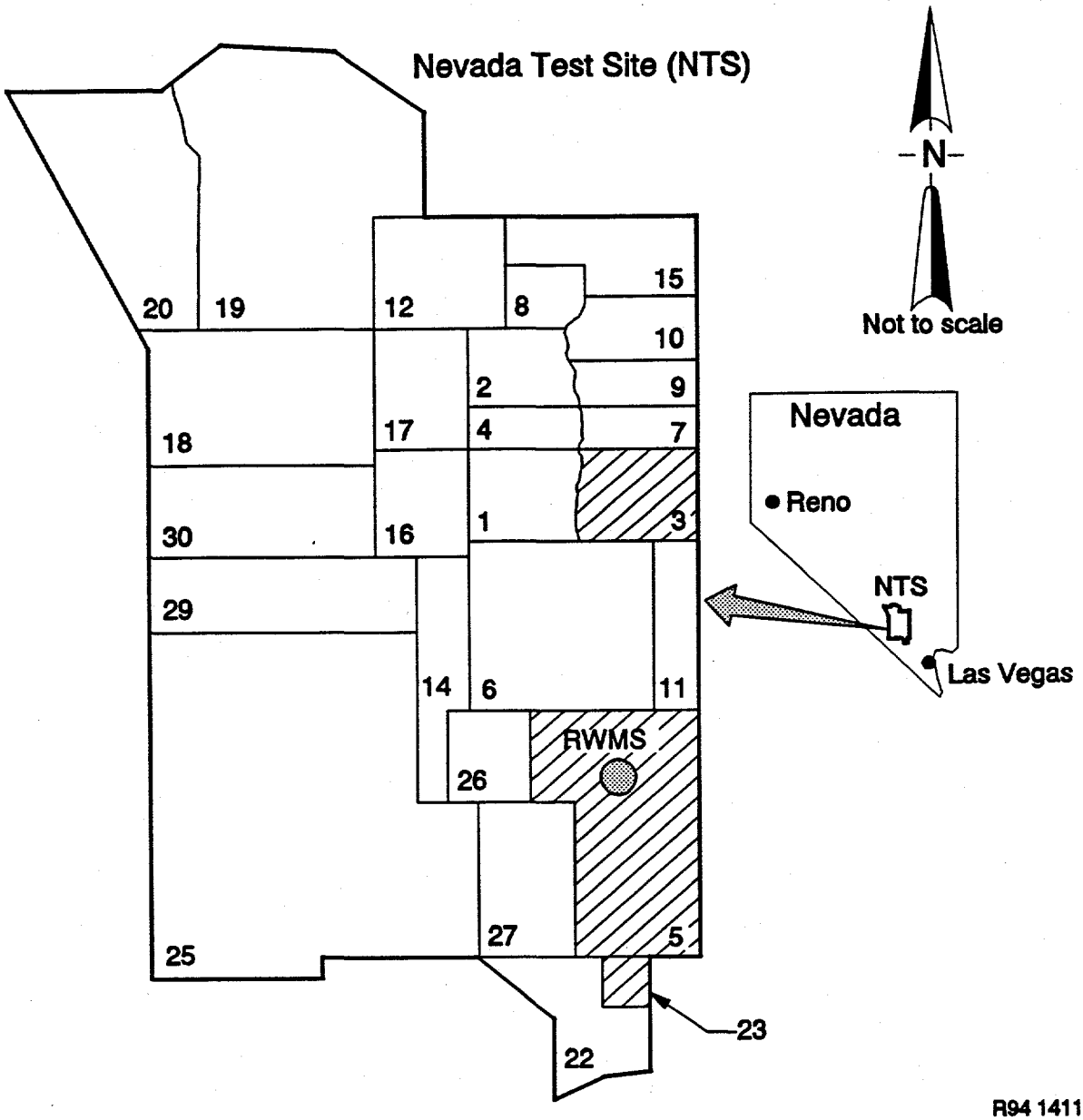


Figure 3. The Nevada Test Site.

5.2.3 Site Storage Capability Summary

Site-specific capabilities for storage of SCW/GTCC LLW at NTS are summarized in Table 6.

The NTS is presently capable of managing CH-TRU and CH-TRU mixed waste. The Area 5 RWMS is the only facility at the NTS that holds RCRA status for the storage of radioactive mixed wastes. Agreements with the State of Nevada have controlled storage of mixed waste at the RWMS. Once issues are worked out with the State, potential storage exists and additional storage is planned for CH-TRU and CH-TRU mixed wastes in this area. No planned programs/facilities specifically for management of SCW at NTS were identified by the survey. The use of some other areas at NTS for storage purposes is a possibility, including Area 3 [buildings such as Engineer-Maintenance Assembly-Disassembly (EMAD)] and Area 25 (bomb craters). On technical terms, a potential does exist for storage of CH-SCW and GTCC LLW at the NTS.

Table 6. Nevada Operations Office—storage capabilities for SCW/GTCC LLW.

Program/Facility	Storage medium	CHRW	CHMW	RHRW	RHMW	Waste capacity	Expansion/commitments
No specific SCW Programs/Facilities for storage of SCW identified SCW-type wastes at NTS are managed under existing waste type management programs (LLW, TRU, etc.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RWMS, TRU storage (existing) Designated facility RWMS, TRU (planned)	Asphalt pads	CH-TRU (CH-LLW disposed in shallow land burial)	CH MTRU, CH mixed waste	RH LLW disposed in GCD	N/A	Existing pad capacity 40,000 ft^3 Planned pad capacity 40,000 ft^3	Uncommitted space available. (see text)
Undesignated areas Area 3 Area 5	Buildings and old bomb craters	N/A	N/A	N/A	N/A	N/A	Possible storage areas

5.3 DOE Idaho Operations Office

5.3.1 Site Description

The DOE Idaho Operations Office (DOE-ID) is responsible for the INEL, the Grand Junction Projects Office in Colorado, DOE projects at Butte, Montana, and the West Valley Demonstration Project in New York. Of the above sites, the survey indicated that only programs and facilities at the INEL will have potential storage capability for storage of SCW/GTCC LLW.

The INEL is situated in southern Idaho along the western edge of the Eastern Snake River Plains and encompasses an area of approximately 890 square miles of desert (see map, Figure 4). The nearest major community is Idaho Falls, which is approximately 22 miles southeast of the INEL. Activities at the INEL include the operation of nuclear reactors (research and development), waste management, environmental restoration, and technology development.

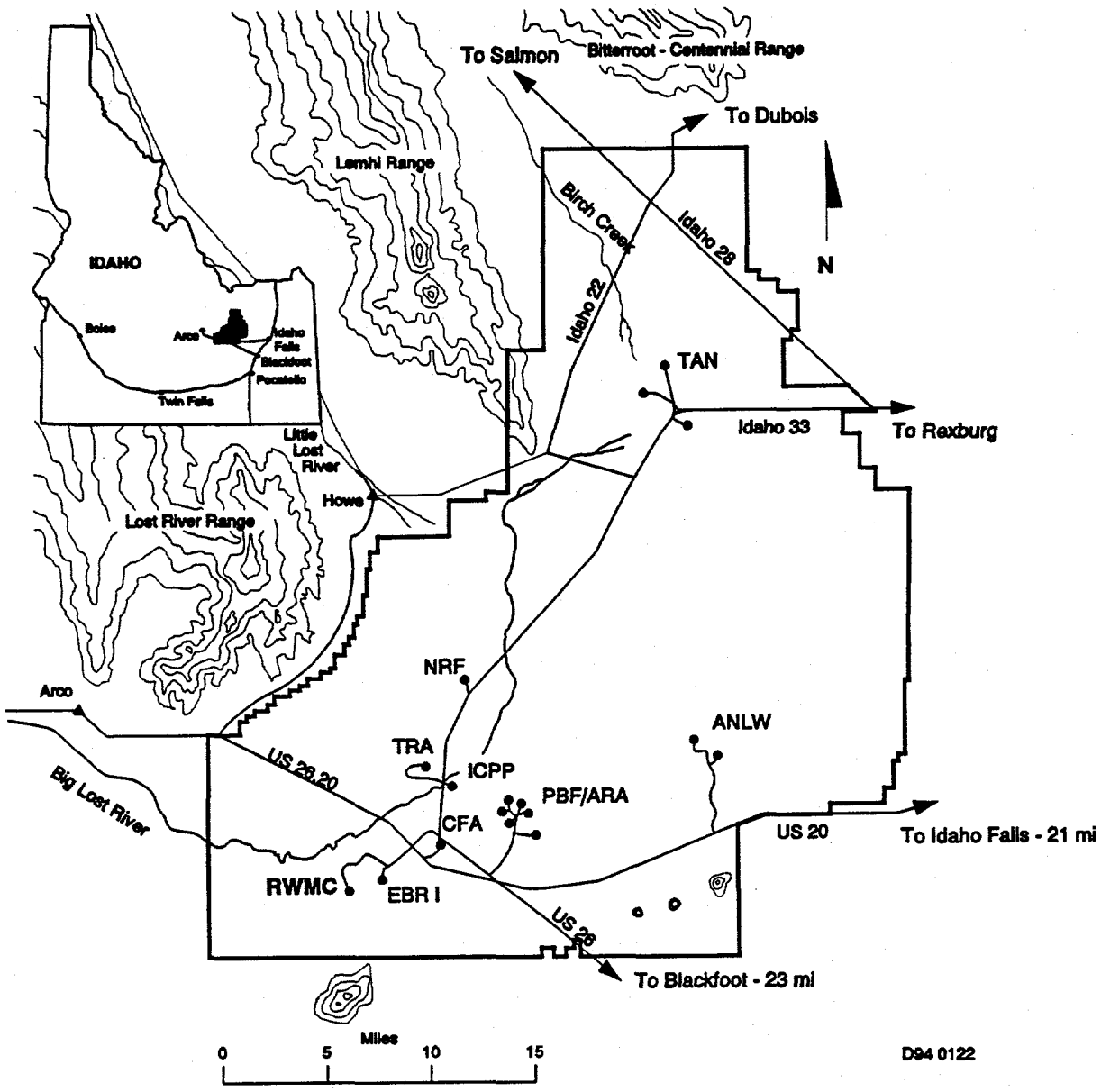
5.3.2 Waste Management Program/Facilities

Designated facilities considered for SCW/GTCC storage capability at the INEL include the Radioactive Waste Management Complex (RWMC) and radiological storage facilities at the Idaho Chemical Processing Plant (ICPP). An SCW/GTCC LLW program has been developed and implemented through DOE-ID at the INEL. Preceding and in concert with this program, several studies have begun identifying and characterizing SCW and GTCC LLW at the INEL as well as throughout the DOE complex (see Section 2).

Undesignated storage facilities existing at the INEL may be ideal future designated storage facilities. One such facility is the abnormal waste pad located at Test Area North (TAN). Three reinforced concrete storage casks capable of storing CHRW and RHRW are currently on this pad. Two of these casks are empty.

5.3.2.1 SCW/GTCC LLW Program. In 1993, a new waste management program was developed and implemented by the INEL contractor for DOE-ID. A waste type implementation plan (WTIP) dealing with SCW and DOE-held commercial GTCC LLW was prepared and issued. The WTIP, a controlled Lockheed Idaho document, contains the current planning basis for these waste types. The plan provides a method for implementing the INEL SCW and GTCC LLW management strategy. All of the elements necessary for cradle-to-grave management are included in the WTIP. A SCW Waste Type Manager has been designated at the INEL and is responsible for the implementation of the WTIP. With this management responsibility clearly established at the INEL, a standard terminology and management approach has been developed. Such a program can provide a basis for consistent terminology and management approaches throughout the DOE system. This program is explained in detail in Section 2 of this report.

5.3.2.2 Radioactive Waste Management Complex. The RWMC provides interim storage for TRU waste and disposal (shallow-land burial) for LLW. CH-TRU waste is stored at the Transuranic Storage Area (TSA) on asphalt pads and RH TRU waste is stored in the Intermediate-Level Transuranic Storage Facility (ILTSF) vaults. The Subsurface Disposal Area (SDA) is used to dispose of LLW in pits and soil vaults. The SDA is not used for storage.



TAN - Test Area North

TRA - Test Reactor Area

ICPP - Idaho Chemical Processing Plant

PBF/ARA - Power Burst Facility/Auxiliary Reactor Area

CFA - Central Facilities Area

EBR-1 - Experimental Breeder Reactor

RWMC - Radioactive Waste Management Complex

NRF - Naval Reactor Facility

ANL-W - Argonne National Lab-West

Figure 4. The Idaho National Engineering Laboratory.

CH-TRU waste at the TSA is stored on three earthen-covered asphalt pads. Pad 1 is closed; the open cell on Pad 2 is covered by a 150 × 150-ft air-support weather shield to aid retrieval; Pad 3 is enclosed by an air/frame-supported weather shield 150 ft wide × 650 ft long called the Stored Waste Experimental Pilot Plant (SWEPP) Certified and Segregated (C&S) Waste Storage Building. Retrieved waste from Pad 2 is sent to SWEPP for examination and WIPP certification, then stored in the C&S building. Nine new storage modules are planned (two will be completed in 1994) to allow reconfiguration of waste to meet modified dense pack requirements as well as RCRA and other compliance requirements. At this time, it is unknown how much excess capacity will be available for storage of additional waste at the TSA. Space will be limited after retrieval of waste from the pads and other current commitments for storage.

The ILTSF at the RWMC consists of earth-shielded, carbon-steel cylinder vaults currently used for storing RH TRU waste, mostly from Argonne National Laboratory.

Some CH SCW (formerly commercial potential GTCC LLW) in 55-gal drums is currently being stored in 8 × 8 × 20-ft cargo containers on the ILTSF pad. This waste, accepted from commercial entities offsite, was evaluated on a case-by-case basis to ensure compliance with the RWMC WAC.

5.3.2.3 Idaho Chemical Processing Plant. Two radiological waste management areas that may be capable of storing SCW/GTCC LLW have been identified at the ICPP. One area includes existing facilities and the other area is a planned facility.

The existing facilities are known as the radiological mixed waste facilities and are CPP-1617 and CPP-1619. CPP-1617's capacity is approximately 18,000 ft^3 and CPP-1619's capacity is approximately 1,604 ft^3. These facilities will store CH LLW and CH MLLW and are committed to ICPP waste.

The planned facility (planned for construction in 1995) consists of aboveground monolithic type structures that will hold 18-ft-long × 15- to 18-in. diameter steel tubes. This storage facility is being built to accommodate dry storage of Three Mile Island (TMI) core/cleanup debris that was generated during the TMI accident. This debris is presently stored in the TAN storage pools at the INEL, which will be deactivated in the near future. Extra storage space (not committed to TMI debris) is included in the current plans. This type of structure is easily expandable. The facility will be able to store CHRW, CHMW, RHRW, and RHMW.

5.3.3 Site Storage Capability Summary

Designated waste management facilities at the INEL are capable of managing all four categories of radioactive waste: CHRW, CHMW, RHRW, and RHMW. These capabilities are summarized in Table 7.

Much of the potential SCW at the INEL is presently stored at several DOE managed facilities throughout the Site (as at other DOE sites), usually at the site of generation. This waste has not been studied or characterized enough to be classified into waste types . A SCW/GTCC LLW program has been implemented at the INEL that is in the process of resolving this problem. A standard terminology and management approach has been developed that will clearly define strategy for storage

and disposal of this waste. Such a program would be an ideal model (basis) for promoting consistent terminology and management approaches for SCW throughout the DOE system.

Subject to institutional concerns, the INEL may have storage capacity for SCW/GTCC LLW at designated facilities. A future possibility exists to develop undesignated facilities (primary focus is not waste management) at the INEL for storage of SCW/GTCC LLW type wastes, i.e., at TAN.

Table 7. Idaho Operations Office—storage capabilities for SCW/GTCC LLW.

Program/Facility	Storage medium	CHRW	CHMW	RHRW	RHMW	Waste capacity	Expansion/commitments
SCW program (implemented)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Various studies researching SCW and GTCC LLW completed. WTIP implemented with Waste Type Manager for SCW. ER&WM-PD-93-030							
Facilities (planned)	TBD	Yes	Yes	Yes	Yes	TBD	TBD
CPP-1617 & 1619 (ICPP) (existing) Designated facility	Small metal building with secured surrounding pad	Yes, LLW	Yes, LLW	No	No	CPP-1617 18,000 ft^3 CPP-1619 1,604 ft^3	Limited, committed all space
Monolithic Structures (ICPP) (planned) Designated facility	Aboveground concrete, steel tubes within.	Yes	Yes	Yes	Yes	18 ft long with 15- to 18-in. diameter steel tubes	Some uncommitted storage available. Facility expandable
TSA Pads (RWMC) (existing) Designated facility	Covered asphalt pads, pre-engineered steel buildings	Yes, TRU, LLW	Yes, TRU, LLW	No	No	Type II storage modules (steel buildings). Each module capacity 17,500 55-gal drums	Nine storage modules planned (two to be completed in 1994) Possible uncommitted storage space, TBD
ILTSF (RWMC) (existing) Designated facility	Shielded underground vaults and storage on ILTSF pad	Yes	Yes	Yes	Yes	Pad top and vaults Pad top could accommodate additional containers	Uncommitted vault space exists at the ILTSF. Expanded vaults is possible
Undesignated Areas							
Abnormal Waste Pad (TAN)	Storage casks	Yes	Yes			Three storage casks	Two casks uncommitted

5.4 DOE Savannah River Operations

5.4.1 Site Description

The DOE Savannah River Operations Office (SR) manages the Savannah River Site (SRS). The SRS is located in southwestern South Carolina, about 25 miles southeast of Augusta, Georgia. The site is nearly circular, with an area of about 300 square miles (see map, Figure 5). The Savannah River forms the southwestern boundary of the site. The site is a key installation for nuclear materials production, research and development, environmental restoration, waste management, and technology development. There are five reactor sites, a fuel element and target element area, two chemical separation areas, and the radioactive waste burial ground, located in Area G, between the two chemical separation areas.

5.4.2 Waste Management Programs/Facilities

This survey did not identify any specific programs/facilities for management of SCW at the SRS. Conversation with responsible personnel at SRS conveyed that most of this type of radioactive waste is stored at undesignated storage areas throughout the site (stored at site of generation). The remainder of this type of waste is stored in the designated waste management area, Area G. The survey indicated that radioactive storage space is limited at SRS. Commitments for additional waste to be accepted at SRS include defense waste, of which the U.S. Navy is a major offsite generator.

5.4.2.1 Area G. Within Area G are two facilities for MLLW storage, designated as 643-29G and 709-2G. The MLLW storage facilities are steel buildings on concrete slabs. Also, TRU Storage Pads 6 through 17 are located in this area and can store CH MTRU waste. They have a combined capacity of 271,887 ft^3. There is also an engineered GCD facility, consisting of a trench holding concrete walled, belowgrade vaults. Each vault is approximately 25 × 50 × 22-ft deep. These vaults would be adequate for storage of CH and RH radioactive wastes, but not mixed wastes.

5.4.3 Site Storage Capability Summary

The SRS is currently capable of storing CHRW, CHMW, and RHRW. These capabilities are summarized in Table 8.

The survey did not identify any specific programs/facilities for management of SCW at the SRS. Currently, SCW type wastes are being managed together with other similar DOE waste types. SRS facilities have limited space for waste other than SRS-generated waste.

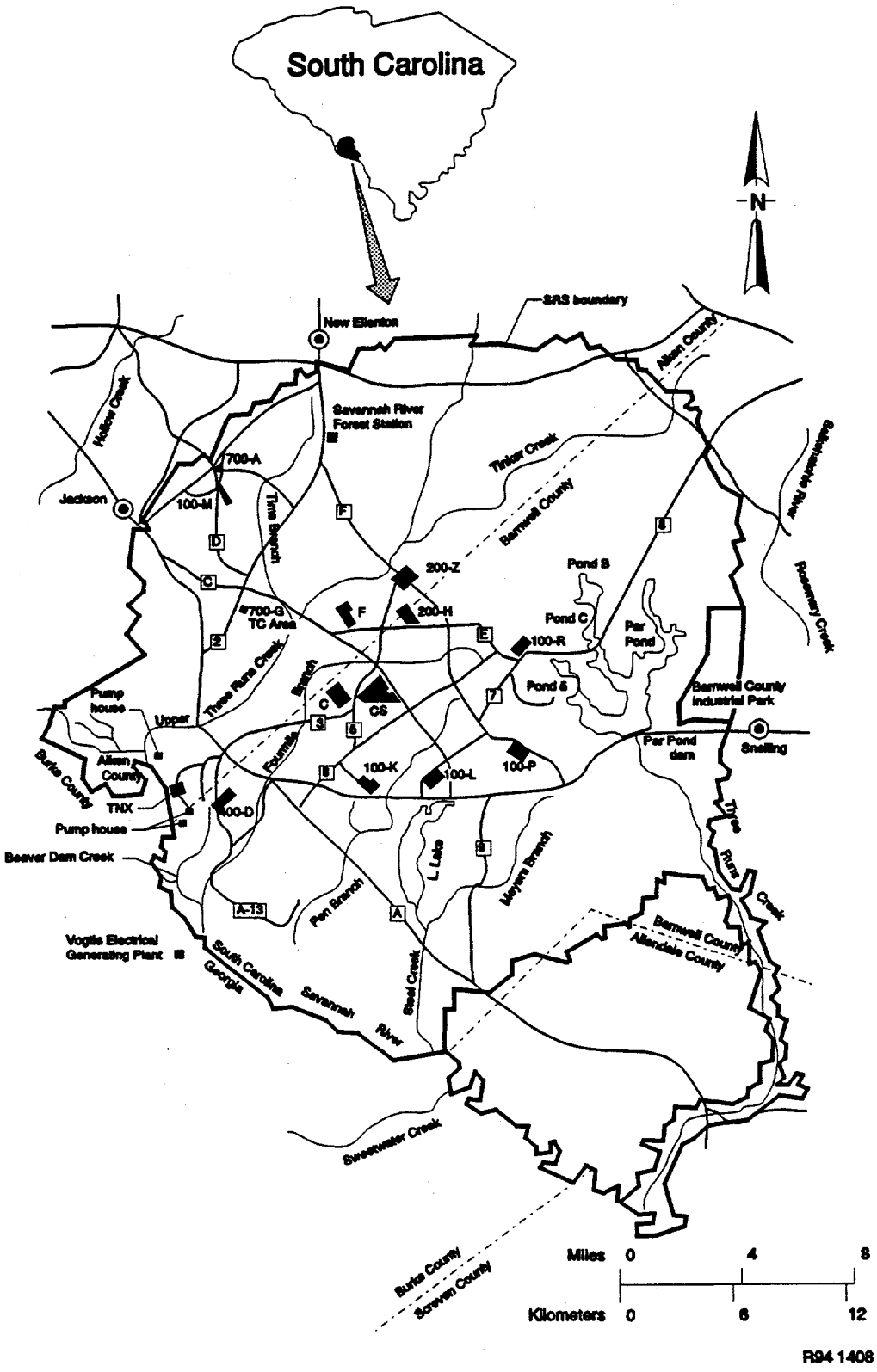


Figure 5. The Savannah River Site.

Table 8. Savannah River Operations Office—storage capabilities for SCW/GTCC LLW.

Program/Facility	Storage medium	CHRW	CHMW	RHRW	RHMW	Waste capacity	Expansion/commitments
No specific SCW Programs/Facilities for storage of SCW identified. SCW type wastes managed under existing waste type management programs (LLW, TRU, etc.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Building 643-29G, Area G (existing) Designated	Preengineered steel buildings on concrete pads	Yes, LLW is disposed	Yes, LLW	No	No	No specific data provided	Limited to SR wastes
Building 709-2G, Area G (existing) Designated	Preengineered steel buildings on concrete pads	Yes, LLW is disposed	Yes, LLW	No	No	No specific data provided	Limited to SR wastes
TRU Storage Pads, Area G (existing) Designated	Storage pads 6 through 17	Yes, TRU, LLW is disposed	Yes, TRU, LLW	No	No	271,887 ft^3	Limited to SR wastes. Pads could be extended.
GCD, Area G (existing) Designated	Concrete-walled, belowgrade vaults	Yes	No	Yes	No	Currently four vaults, each vault is 25 × 50 × 22 ft	Limited space available. Additional vaults could be constructed.

5.5 DOE Oak Ridge Operations Office

5.5.1 Site Description

The DOE Oak Ridge Operations Office (OR) is located on the Oak Ridge Reservation (ORR) at Oak Ridge, Tennessee, approximately 30 miles west of Knoxville, Tennessee (see map, Figure 6). OR Programs support production of nuclear components, production of enriched uranium for defense and commercial nuclear power plant requirements, research and development, environmental restoration, waste management, and technology development.

OR is responsible for facilities located at ORR and three offsite facilities. The ORR facilities include the Oak Ridge Gaseous Diffusion Plant (ORGDP), the Y-12 Plant, and the Oak Ridge National Laboratory (ORNL), also designated as the X-10 Plant. The offsite facilities under OR responsibility are the Paducah Gaseous Diffusion Plant, located near Paducah, Kentucky, the Portsmouth Gaseous Diffusion Plant, located near Portsmouth, Ohio, and the Fernald Feed Materials Production Center, located outside of Cincinnati, Ohio.

5.5.2 Waste Management Programs/Facilities

Conversations with personnel indicated that the three OR offsite facilities have very limited radioactive storage capacity and the space that is available is limited to waste streams with specific characteristics that are generated onsite. Use of these facilities for storage of SCW/GTCC LLW type wastes would require significant modifications. For these reasons, these facilities were not further evaluated. The three ORR facilities were further evaluated and are discussed below.

No specific programs/facilities were identified at ORR for management of SCW. Much of the SCW generated onsite is being stored at undesignated facilities at site of generation. The remainder of the SCW is being stored at designated facilities onsite. This SCW is currently being managed together with other typical DOE waste types, i.e., TRU, LLW.

5.5.2.1 Oak Ridge Gaseous Diffusion Plant (K-25 Building). The predominant facility at the ORGDP is the K-25 Building, which was formerly used for uranium enrichment. Waste management storage activities at the ORGDP are primarily conducted at the K-25 Building. The building is arranged in a U-shaped pattern, which covers approximately 40 acres. The building is a three-story steel structure with concrete flooring, corrugated transit siding, and an asphalt built-up roof. CH LLW and CH mixed waste are currently stored at the facility in the basement level (areas used for mixed waste storage meet RCRA requirements). The basement level is sectioned into 80 vault areas ranging in size from 60 × 25 ft to 360 × 58 ft, with the average being 300 × 50 ft. Not all of these vaults are currently used for waste storage. Many of the unused vaults are used for stores or warehousing activities. Currently, waste identified for storage in the building is generated by OR contractors, but the building could accommodate additional storage. Current WAC at K-25 limit contact dose rates to 50 mR/hr. Therefore, if CH SCW or GTCC LLW were accepted at K-25, they might require additional shielding.

5.5.2.2 Y-12 Plant. The Y-12 Plant occupies an 811-acre site in the Bear Creek Valley on the ORR. Its mission has included production of nuclear weapon components, development and

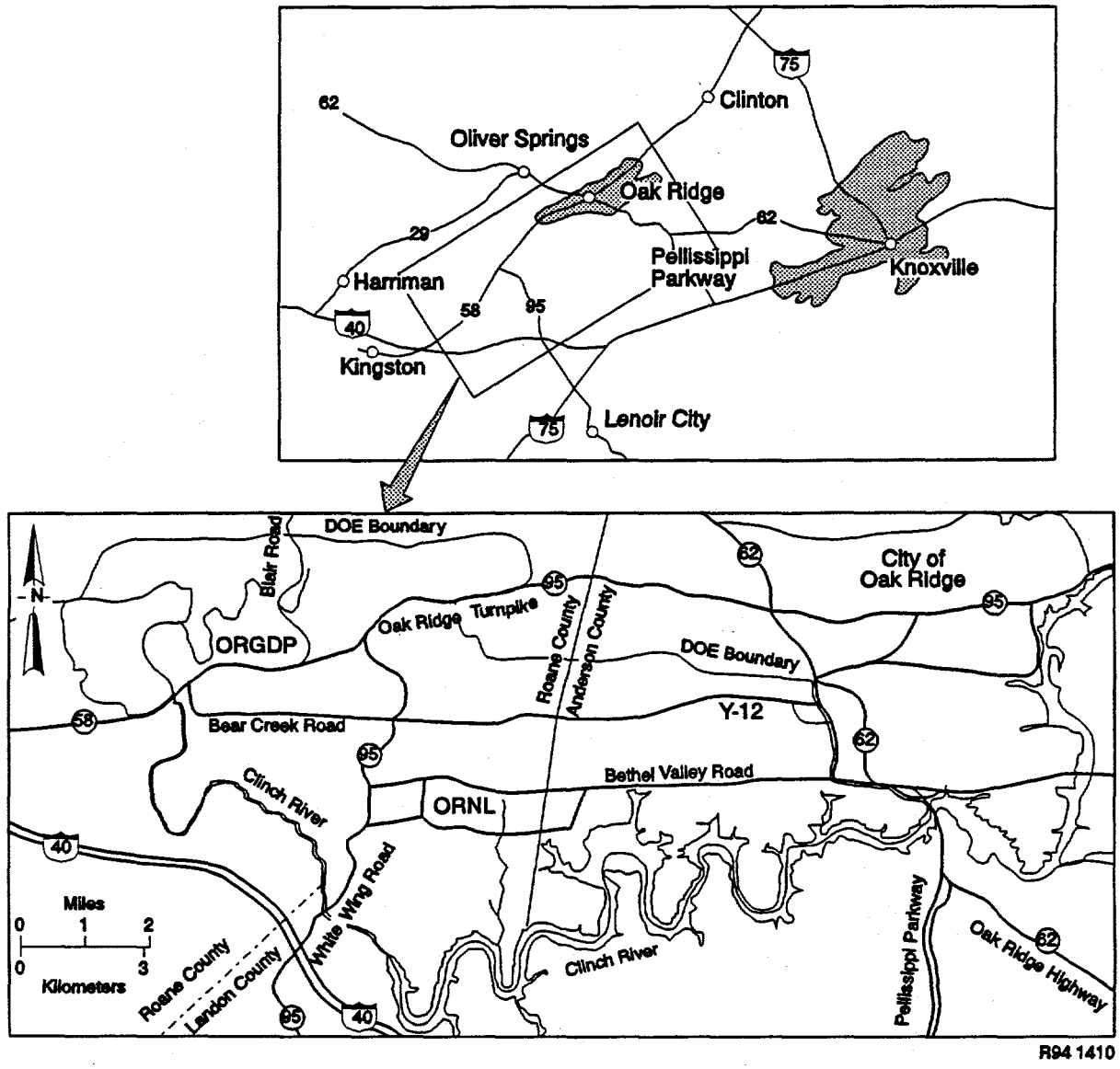


Figure 6. The Oak Ridge Reservation.

fabrication of test hardware for the weapon design laboratories, and recently, waste management. Storage area is currently dedicated to waste material generated at the Y-12 Plant. CHRW and CHMW, although generated at Y-12, are eventually sent to the ORGDP (K-25 Building) for storage. Since storage capability is limited, and major modifications would have to be made to store SCW or GTCC LLW, the Y-12 Plant was not considered for storage of SCW/GTCC LLW.

5.5.2.3 Oak Ridge National Laboratory. The ORNL, also known at one time as X-10, is also located on the ORR. Activities at the laboratory encompass a variety of work, including waste management and research and development. The ORNL manages a variety of radioactive materials. Some CH LLW is disposed onsite, and the rest are processed for shipment to ORGDP (K-25) for storage. RH-LLW, RH-TRU, and CH-TRU are currently stored at various facilities at ORNL. All TRU waste at ORNL is considered mixed as defined under RCRA. SCW and RH-LLW are presently stored in a series of underground steel wells. These wells are approximately 10–15 ft deep, and of varying diameter (8, 16, or 30 in.). These wells are to be phased out because of hydrogeologic concerns in the ORNL area.

CH-TRU wastes are stored in 55-gal drums in underground concrete bunkers. These bunkers are designated as Buildings 7826 and 7834. Each bunker has twenty-four 16 × 16-ft cells and can handle 3,500 drums. Approximately 2,500 drums are presently in storage. The remaining storage capacity is committed to ORNL-generated wastes. Two aboveground storage buildings are planned for storage of CH-TRU in the near future, but are being delayed because of institutional concerns.

RH TRU, considered to be mixed waste, is currently stored in earth-shielded concrete bunkers. These bunkers are designated as Building 7855. This facility has a capacity of 108 storage casks. These storage casks are cylindrical concrete casks with dimensions of 10 × 6 ft. Current utilization of this facility indicates a remaining capacity of six casks. ORNL personnel predict that 1-1/2 casks will be used per year, which indicates that Building 7855 will be full within 4 years (1998). As with other storage areas, most of the storage capacity of these units is projected for ORNL waste. As with the CH-TRU planning, a new facility is planned for storage of RH TRU, but is being delayed because of institutional concerns.

5.5.3 Site Storage Capability Summary

The ORR is currently capable of storing and managing CHRW, CHMW, RHRW, and RHMW. These capabilities are summarized in Table 9. Storage constraints exist for RHRW and RHMW. Current facilities for RHRW and RHMW would require expansion. Existing and planned storage is committed to ORR waste.

The survey did not identify any specific programs/facilities for management of SCW at ORR. Currently, SCW type wastes are being managed together with other similar DOE waste types.

Table 9. Oak Ridge Operations Office—storage capabilities for SCW/GTCC LLW.

Program/Facility	Storage medium	CHRW	CHMW	RHRW	RHMW	Waste capacity	Expansion/commitments
No specific SCW programs/facilities for storage of SCW identified. SCW type wastes managed under existing waste type management programs (LLW, TRU, etc.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
K-25 Building, ORGDP (existing) Designated	Three-story steel structure (40 acres)	Yes	Yes	No	No	80-vault capacity in basement. Vaults average size 300 × 50 ft.	Committed space to ORR. However, extensive vault space uncommitted.
Buildings 7826, 7834, ORNL (existing) Designated	Underground concrete bunkers	Yes	Yes	No	No	Each bunker has twenty-four 16 × 16-ft cells and can hold 3,500 55-gal drums.	Committed space for ORR generated waste. Space for 1,000 55-gal drums still to be used. Two aboveground storage buildings are planned.
Building 7855, ORNL (existing) Designated	Earth-shielded concrete bunkers	No	No	Yes	Yes	Cylindrical concrete storage casks with dimensions of 10 × 6 ft.	Committed space for ORR generated waste A new facility is planned.
ORNL Wells, ORNL (existing) Designated	Underground steel wells	No	No	Yes, SCW and RH-LLW	No	54 underground wells with steel casings that are approximately 10–15 ft deep, and of varying diameter (8, 16, or 30 in.)	Space committed to ORNL generated waste Wells being phased out because of shallow depth to groundwater and a high annual rainfall at ORNL

5.6 DOE Albuquerque Operations Office

5.6.1 Site Description

The DOE Albuquerque Operations Office (AL) manages laboratory activities at four sites: Los Alamos National Laboratory (LANL), Sandia National Laboratories-Albuquerque, Sandia National Laboratories-Livermore, and the Lovelace Inhalation Toxicology Research Institute. Additionally, AL manages activities at the following weapons production sites: Pantex Plant, near Amarillo, Texas; Pinellas Plant near Clearwater, Florida; Mound Site in Miamisburg Ohio; and the Kansas City Plant in Kansas City, Missouri. Also, AL is currently responsible for program overview, but not direct management at the Rocky Flats Plant, near Denver, Colorado.

Of the above sites, the survey only identified LANL as capable of providing long-term storage of TRU and LLW. Waste management facilities at the other named sites are limited. These facilities are generally used as staging areas for onsite generated wastes, which are sent offsite to more permanent storage facilities in the DOE system. An example is that Mound has sent TRU waste to the INEL.

5.6.2 Waste Management Programs/Facilities

5.6.2.1 Los Alamos National Laboratory. The LANL is located about 35 miles northwest of Santa Fe, New Mexico (see map, Figure 7). Most laboratory facilities are located on the tops of long, narrow finger mesas. Most available land has been assigned to specific activities, and is designated by Technical Areas (TAs).

LANL generates and stores CH-TRU and RH TRU wastes. Most LLW is disposed of onsite. MLLW is stored pending availability of a permitted mixed waste land disposal facility. More than 98% of the wastes are LANL generated. Very small quantities of defense LLW and CH-TRU waste, from other AL sites only, have been or are planned to be shipped to LANL.

At LANL, two specific TAs have activities that are related to waste processing, storage, and disposal. One is TA-50, which contains a liquid waste treatment facility for radioactive wastes, a controlled air incinerator for radioactive, hazardous, and mixed waste incineration, and a size reduction facility. None of these facilities has space allocated for waste storage. The other is TA-54.

TA-54 is the main waste storage and disposal area located on Mesita del Buey. Here, in specific locations, both LLW and TRU mixed wastes are stored under interim status. TRU wastes are retrievably stored, awaiting shipment to WIPP or processing at TA-50 for certification, and LLW is disposed onsite. There are provisions for storage and disposal of RHRW, CHRW, and CHMW at TA-54.

LLW is disposed of in large pits, typically 200 to 300 ft long, 50 to 75 ft wide, and 40 to 60 ft deep. It is estimated that there is room for about 15 years more disposal at this site. Asphalt pads for storage of CH-TRU, CH MTRU, and CH MLLW have been constructed on top of closed LLW burial pits.

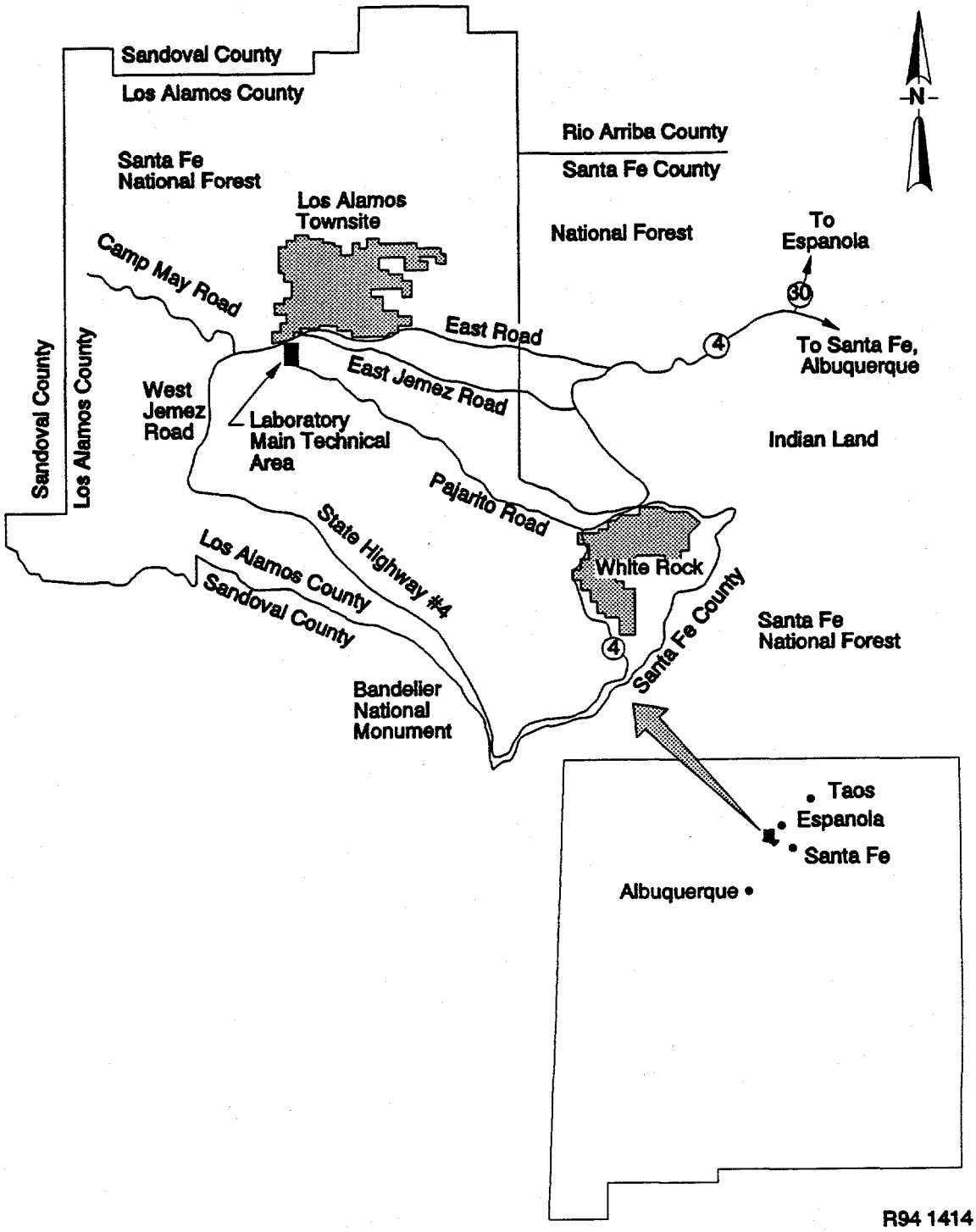


Figure 7. The Los Alamos National Laboratory.

RH TRU wastes are retrievably stored, and RH LLW is disposed of in engineered shafts at TA-54. Additional shafts could be constructed.

There are two TRU-waste-related buildings at TA-54. They are the waste preparation facility for initial sorting, cleaning, and package verification, and the NDE/NDA/Transportation Facility for TRU waste certification and staging for shipment to WIPP. These facilities are not designed for long-term storage, but could be used on a very short-term basis to store SCW type waste.

5.6.3 Site Storage Capability Summary

The LANL is currently capable of storing and managing CHRW, CHMW, and RHRW. These capabilities are summarized in Table 10. To accommodate such additional waste types, adequate storage pads would have to be constructed for CHRW and CHMW and additional construction of engineered shafts for storage of RHRW.

Table 10. DOE Albuquerque Operations Office—storage capabilities for SCW/GTCC LLW.

Program/Facility	Storage medium	CHRW	CHMW	RHRW	RHMW	Waste capacity	Expansion/commitments
No specific SCW programs/facilities for storage of SCW identified. SCW type wastes managed under existing waste type management programs (i.e., LLW, TRU, etc.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TA-54, asphalt pad, LANL (existing) Designated	Trench or pit LLW disposal. Asphalt pads have been constructed on top of closed LLW burial pits covered with earth.	Yes	Yes	No	No	Pads 200–300 ft long, 50–75 ft wide. Drums could be stacked four or five high.	Existing pads dedicated to onsite waste. More pads could be added.
TA-54, engineered shafts, LANL (existing) Designated	Engineered below-surface shafts	No	No	Yes, RH-TRU and RH-LLW (currently used for disposal)	No	Engineered belowgrade shafts, no data provided.	Existing shafts dedicated to onsite RH-LLW. Additional shafts could be prepared.
Buildings - TRU Waste Preparation Facility, and NDE/NDA/Transportation Facility (existing) Designated	Aboveground buildings for certification and staging for shipment of TRU waste.	Yes, TRU		No	No	Limited storage capacity. Used to certify TRU wastes.	Limited storage available. These buildings used to certify TRU waste for shipment to WIPP.

6. CONCLUSIONS AND RECOMMENDATIONS

This report identifies and surveys DOE programs/facilities technically capable of managing SCW and GTCC LLW. The report also examines and analyzes other pertinent data, such as the current status of SCW management and its similarities/differences relative to GTCC LLW. This section includes

- Survey data conclusions
- Other pertinent data, conclusions, and recommendations.

6.1 Survey Data Conclusions

A general summary of the survey results are given in Table 11. A detailed summary of each DOE site's storage capabilities is presented in Tables 5 through 10 in Section 5 of this report.

DOE facilities summarized here are all designated facilities. Designated facilities as defined in this report are TSD facilities that can accept waste onsite or offsite if that waste passes specific WAC. A DOE TSD facility is generally designated for management of TRU, LLW, and HLW.

All six of the DOE sites surveyed are capable of managing SCW/GTCC LLW, CHRW and CHMW. Four sites (INEL, LANL, ORNL, and SRS) can store limited amounts of RHRW, and ORNL and INEL can also store limited amounts of RHMW. Planned facilities at several DOE sites (RL, INEL, and ORNL) may increase the capability of storing RHRW and RHMW.

6.2 Other Pertinent Data, Conclusions, and Recommendations

Further analysis of data within this report indicate the following:

- Currently, a DOE complex-wide strategy does not exist for management of SCW. Although this survey identified specific SCW programs at two DOE sites (i.e., INEL and Hanford), no coordinated effort by DOE for SCW program planning and implementation throughout the DOE system has taken place. A suggestion would be to use these existing SCW program strategies as guidance for a DOE complex-wide SCW strategy. It is noted that a basic strategy for the management of SCW and GTCC LLW at the INEL has been initiated. This strategy includes initial inventory and characterization studies, development of a standard nomenclature for SCW and GTCC LLW, and development of a Waste Type Implementation Plan containing the elements necessary for cradle-to-grave management of these waste types.

- Most SCW throughout the DOE system identified by process knowledge, (i.e., most of this waste has not been sufficiently characterized to determine management and disposal requirements), is being held at the site of generation. Although these are not designated storage facilities as defined for this report, they do comply with DOE orders and regulations. Such facilities are basically interim storage areas that are holding wastes until they can be better characterized and packaged to meet specific Waste Acceptance Criteria

at designated facilities. Since the SCW is specific to the operation it supports it would not be appropriate to ask the responsible program to store GTCC LLW as well.

7. REFERENCES

1. D. Kudera, C. Wickland, *Department of Energy Special Case Radioactive Waste Inventory and Characterization Report*, DOE/LLW-96, Draft, May 1990.

2. M. Magleby, J. Roach, *Special Case Waste and Greater-Than-Class C Low-Level Radioactive Waste Type Implementation Plan*, ER&WM-PD-93-0303, September 1993.

3. *Waste Management Division Strategic Plan*, DOE/ID-10429, May 1993.

4. W. Allred, M. Winberg, *DOE Special Case Waste and DOE-Held Greater-Than-Class C Low-Level Radioactive Waste at the INEL: Vol 1: Inventory and Characteristics; Vol 2: Management Strategies; Vol 3: Feasibility of Integrating Management and Disposition on a National Basis*, EGG-WM-10905, September 1993.

5. *Reassessment of the Greater-Than-Class C Low-Level Radioactive Waste Program*, EGG-WM-11018, Revision 0, October 1993.

6. *Greater-Than-Class C Low-Level Radioactive Waste Characterization: Estimated Volumes, Radionuclide Activities, and Other Characteristics*, DOE/LLW-114, Revision 1, September 1994.

7. G. Harris, *Characterization of Greater-Than-Class C Sealed Sources; Volume 1: Sealed Sources Held by Specific Licensees*, DOE/LLW-163, September 1994.