DOE/LLW-179



# Transportation and Disposal Configuration for DOE-Managed Low-Level and Mixed Low-Level Waste

***Radioactive Waste Technical Support Program***

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# Transportation and Disposal Configuration for DOE-Managed Low-Level and Mixed Low-Level Waste

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# ABSTRACT

This report briefly examines the current U.S. Department of Energy complex-wide configuration for transportation and disposal of low-level and mixed low-level waste, and also retraces the historical sequence of events and rationale that has guided its development. The study determined that Nevada Test Site and the Hanford Site are the only two sites that currently provide substantial disposal services for offsite low-level waste generators. It was also determined that mixed low-level waste shipments are infrequent and are generally limited to shipments to offsite commercial treatment facilities or other Department of Energy sites for storage. The current alignment of generator to disposal site for low-level waste shipments is generally consistent with the programmatic mission of the generator; that is, defense-generated waste is shipped to the Nevada Test Site and research-generated waste is transported to the Hanford Site. The historical development of the current configuration was resurrected by retrieving Department of Energy documentation and interviewing both current and former department and contractor personnel. According to several accounts, the basic framework of the system was developed during the late 1970s, and was reportedly based on the ability of the disposal site to manage a given waste form. Documented evidence to support this reasoning, however, could not be uncovered.

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# ACRONYMS

| | |
|---|---|
| AL | U.S. Department of Energy-Albuquerque Field Office |
| ANL-E | Argonne National Laboratory-East |
| ANL-W | Argonne National Laboratory-West |
| BAPL | Bettis Atomic Power Laboratory |
| BCL | Battelle Columbus Laboratory |
| BNL | Brookhaven National Laboratory |
| CERCLA | Comprehensive Environmental Compensation, Response, and Liability Act |
| CH | U.S. Department of Energy-Chicago Field Office |
| CIF | Consolidated Incinerator Facility |
| D&D | Decontamination and Decommissioning |
| DOD | Department of Defense |
| DOE | Department of Energy |
| EIS | Environmental Impact Statement |
| EM | Environmental Restoration and Waste Management |
| EPA | Environmental Protection Agency |
| ER | Environmental Restoration |
| ETEC | Energy Technology Engineering Center |
| FEMP | Fernald Environmental Management Project |
| FFCA | Federal Facilities Compliance Act |
| FNAL | Fermi National Accelerator Laboratory |
| FO | Field Office |
| FS | U.S. Department of Energy-Fernald Field Office |
| FUSRAP | Formerly Utilized Sites Remedial Action Program |
| GA | General Atomics |

| | |
|---|---|
| GJPO | Grand Junction Project Office |
| HANF | Hanford Site |
| HLW | High-Level Waste |
| HQ | U.S. Department of Energy-Headquarters |
| ID | U.S. Department of Energy-Idaho Field Office |
| INEL | Idaho National Engineering Laboratory |
| ITRI | Inhalation Toxicology Research Institute |
| KAPL | Knolls Atomic Power Laboratory |
| KCP | Kansas City Plant |
| LANL | Los Alamos National Laboratory |
| LBL | Lawrence Berkeley Laboratory |
| LDR | Land Disposal Restriction |
| LEHR | Laboratory for Energy-Related Health Research |
| LLNL | Lawrence Livermore National Laboratory |
| LLW | Low-Level Waste |
| LLRWPAA | Low-Level Radioactive Waste Policy Amendments Act |
| M&O | Management and Operations |
| MLLW | Mixed Low-Level Waste |
| MMES | Martin Marietta Energy Systems |
| NFS | Nuclear Fuel Services |
| NR | Naval Reactors |
| NRC | Nuclear Regulatory Commission |
| NTS | Nevada Test Site |
| NV | U.S. Department of Energy-Nevada Field Office |
| NYSERDA | New York State Environmental Research and Development Agency |

| | |
|---|---|
| OR | Oak Ridge |
| ORNL | Oak Ridge National Laboratory |
| ORR | Oak Ridge Reservation |
| PCB | Polychlorinated Biphenyl |
| PEIS | Program Environmental Impact Statement |
| PDGP | Paducah Gaseous Diffusion Plant |
| POC | Point of Contact |
| PORTS | Portsmouth Gaseous Diffusion Plant |
| PPPL | Princeton Plasma Physics Laboratory |
| PSNS | Puget Sound Naval Shipyard |
| RCRA | Resource Conservation and Recovery Act |
| RF | Rocky Flats |
| RFP | Rocky Flats Plant |
| RI/FS | Remedial Investigation/Feasibility Study |
| RL | U.S. Department of Energy-Richland Field Office |
| RMI | Reactive Metals, Inc. |
| ROD | Record of Decision |
| RWMC | Radioactive Waste Management Complex |
| SEG | Scientific Ecology Group, Inc. |
| SF | U.S. Department of Energy-San Francisco Field Office |
| SLAC | Stanford Linear Accelerator Center |
| SNLA | Sandia National Laboratory - Albuquerque |
| SNLL | Sandia National Laboratory - Livermore |
| SR | Savannah River |
| SRS | Savannah River Site |

| | |
|---|---|
| TRU | Transuranic |
| TSCA | Toxic Substances Control Act |
| TSP | Technical Support Programs |
| UMTRA | Uranium Mill Tailings Remediation Act |
| WAC | Waste Acceptance Criteria |
| WSS | Weldon Springs Site |
| WVDP | West Valley Demonstration Project |

# Transportation and Disposal Configuration for DOE-Managed Low-Level and Mixed Low-Level Waste

## 1. INTRODUCTION

### 1.1 Background

To assist in the development of the U.S. Department of Energy (DOE) Programmatic Environmental Impact Statement (PEIS), the DOE-Headquarters (DOE-HQ) Office of Waste Management (EM-30) has requested information on the current complex-wide configuration for low-level waste (LLW) and mixed low-level waste (MLLW) transportation and disposal. This report identifies each DOE site that generates these wastes and qualitatively describes the current configuration and management plans for storage, transportation, and disposal. This study further investigates the historical rationale which has led to the current DOE LLW transportation and disposal configuration. Additionally, those DOE sites that currently use or plan to use commercial treatment services were also identified.

### 1.2 Method Used to Acquire DOE Low-Level Waste/ Mixed Low-Level Waste Transportation and Disposal Information

Information on LLW and MLLW generation, treatment, storage, transportation, and disposal was obtained through interviews with representatives from each site, primarily contractor personnel. In some instances, DOE field office personnel were interviewed to determine the appropriate contacts at each site. A complete listing of the points of contact is presented in Table 1.

The interviews consisted of a series of questions intended to glean a site-by-site qualitative examination of the current LLW/MLLW transportation and disposal management system. For each site, the following questions were asked:

- Is LLW/MLLW generated?
- If LLW/MLLW is generated, does it leave the site?
- If LLW/MLLW leaves the site, where does it go?
- Why does it go to a particular site?
- Are commercial entities involved in any intermediate treatment?
- If LLW/MLLW does not leave the site, what happens to it onsite? Is it stored or disposed? Are any treatments performed before storage or disposal? Are any commercial entities involved in this treatment?
- If LLW/MLLW is disposed onsite, will the future bring new management requirements?
- If LLW/MLLW is stored onsite, what are plans for its ultimate disposal? What efforts are being made to gain disposal access at another DOE site?

**Table 1.** Points of contact interviewed and additional points of contact obtained.[a]

| FO | Site | POC | Affiliation | Phone | Additional POC | Affiliation | Phone |
|---|---|---|---|---|---|---|---|
| AL | All | Jim Orban | DOE-AL | 505-845-4421 | | | |
| | GJPO | Darlene Depinho | UNC Geotech | 303-248-6576 | Mike Madsen<br>Gary Neff | UMTRA Programs | 303-248-6026<br>303-248-6577 |
| | ITRI, SNLA | Mona Williams | DOE-AL | 505-845-5405 | | | |
| | Mound | Dick Blauvelt | BDM | 513-259-4006 | W. Frankhauser<br>J. Dieckhoener | Past DOE, BDM-Germ'tn<br>Past DOE, BDM-Mclean | |
| CH | Ames | Bruce Hokel | | 515-294-7922 | Bob Staggs | (Semi-retired) | 515-294-7922 |
| | ANL-E | Jim Thuot | Univ. of Chicago | 708-252-4911 | | | |
| | BCL | Bill Lee | DOE-CH | 708-252-6331 | | | |
| | BNL | Carolyn Polanish | DOE-CH | 516-282-5224 | Leonard Emma | Assoc. Universities | 516-282-3334 |
| | FNAL | Billy Arnold | | 708-840-3741 | | | |
| | PPPL | Bill Lee | DOE-CH | 708-252-6331 | | | |
| FS | FEMP | Kim Hayes | | 301-903-8154 | Dave Rast | DOE-FS | 513-738-6322 |
| | RMI | Jim Henderson | | 216-993-1973 | | | |
| ID | INEL | Joel Case | DOE-ID | 208-526-6795 | Max Ruska<br>Bob Berry | EG&G Idaho<br>EG&G Idaho | |
| | WVDP | Sandy Szalinski | Westinghouse | 716-942-4726 | Pete Bourgeois<br>Jackie Jackson | Waste Engr'g<br>Transportation | 716-942-4487<br>716-942-4226 |
| NV | NTS | Gene Kendall | EG&G REECo | 702-295-7406 | Charles Williams | Past DOE | |

**Table 1.** (continued).

| FO | Site | POC | Affiliation | Phone | Additional POC | Affiliation | Phone |
|---|---|---|---|---|---|---|---|
| | NTS | Bruce Becker | EG&G REECo | 702-295-6808 | John Lyons | EG&G Mound | 513-865-5516 |
| | | | | | Jeff Rowe | DOE-FS | 513-738-6099 |
| | | | | | Paul Aguilar | EG&G Rocky Flats | 303-966-4819 |
| | | | | | Jim Thompson | ITRI | 505-845-1049 |
| | | | | | T. Youngblood | Pantex | 806-477-5526 |
| | | | | | Tony Kiem | General Atomics | 619-455-3461 |
| | NTS | Joe Johnston | EG&G REECo | 702-295-6807 | Layton O'Neill | DOE-NV | 702-295-0996 |
| OR | All | Rick Korynta | DOE-OR | 615-576-9664 | Lance Mezga | MMES, CWM | 615-574-7259 |
| | All | Jim Bailey | MMES | 615-576-4489 | | | |
| | WSS | Bruce Ballew | | 314-926-7011 | Alan Gibson | DOE-Weldon | 314-441-8978 |
| RF | RFP | Paul Aguilar | | 303-966-4819 | | | |
| RL | HANF | Rudy Guercia | DOE-RL | 509-376-5494 | | | |
| SF | All | Roy Kearns | DOE-SF | 510-422-7541 | Dan Nakahara | LLNL | 510-423-8394 |
| | | | | | Mary Gross | LBL | 510-422-9943 |
| | | | | | Hannibel Joma | SLAC, ETEC | 510-422-0683 |
| | | | | | Wen Kao | LEHR | 510-422-0674 |
| SR | SRS | Winchester Smith IV | DOE-SR | 803-725-9611 | | | |
| All | All (MLLW) | Tim Kirkpatrick | EG&G Idaho | 208-526-0003 | Beth Heath | EG&G Idaho TSP | 208-526-8052 |

a. See acronym list for Field Office and Site abbreviations.

- Are there any planned future treatment activities onsite or offsite? Are there any potential future disposal options planned that differ from the current?

The same questions were also posed for those LLW/MLLW streams that are managed differently; that is, if some of the waste remains onsite while another portion is shipped offsite, it is addressed separately.

The information obtained in these interviews is presented in Section 3. It was condensed from notes and is arranged by DOE field office, site, and waste type. Additional information associated with the historical perspective and justification for the present DOE system of LLW shipment, disposal, and storage is also presented in Section 4. The historical rationale for selection of particular sites that receive LLW was researched through interviews and record searches.

# 2. SUMMARY

Table 2 summaries the current LLW and MLLW transportation configuration described in this report. The table identifies the sites that generate LLW and MLLW, briefly describes the current management approach, and identifies any planned activities associated with future management strategies.

The map in Figure 1 shows the current complex-wide LLW transportation and disposal configuration.[a] It identifies seven classifications for the 36 DOE sites investigated in this report:

- Sites that store and dispose LLW onsite and also receive LLW from other generators for disposal or storage: Hanford Site (HANF), Nevada Test Site (NTS), and Savannah River Site (SRS)

- Sites that dispose only onsite-generated LLW: Los Alamos National Laboratory (LANL), Idaho National Engineering Laboratory (INEL), and Oak Ridge Reservation (ORR)

- Sites currently storing LLW which plan to eventually dispose it onsite: Weldon Spring Site (WSS) and West Valley Demonstration Project (WVDP)

- Sites storing LLW onsite that are seeking NTS generator approval for shipment to NTS: Kansas City Plant (KCP), Lawrence Livermore National Laboratory (LLNL), Grand Junction Project Office (GJPO), Paducah Gaseous Diffusion Plant (PGDP), Portsmouth Gaseous Diffusion Plant (PORTS), Sandia National Laboratory - Albuquerque (SNLA), and Sandia National Laboratory - Livermore (SNLL)

- Sites that are NTS-approved generators that are only staging LLW onsite before shipment to NTS: Fernald Environmental Management Project (FEMP), General Atomics (GA), Inhalation Toxicology Research Institute (ITRI), Mound Plant, Pantex Plant, and Rocky Flats Plant (RFP)

- Sites that are HANF-generators that are only staging LLW onsite before shipment to HANF: Ames Laboratory, Argonne National Laboratory - East (ANL-E), Battelle Columbus Laboratory (BCL), Brookhaven National Laboratory (BNL), Energy Technology Engineering Center (ETEC), Fermi National Accelerator Laboratory (FNAL), Laboratory for Energy-Related Health Research (LEHR), Lawrence Berkeley Laboratory (LBL), Princeton Plasma Physics Laboratory (PPPL), and Stanford Linear Accelerator Center (SLAC)

- Sites that have made and may continue to make shipments to SRS, but are seeking approval as an NTS generator (The Pinellas Plant).

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a. MLLW shipments are generally not made for disposal purposes, and therefore are not shown in Figure 1. All MLLW shipments are documented in Table 2.

**Table 2.** Summary of DOE low-level waste/mixed low-level waste transportation configuration.[a]

| FO | Site | LLW Gen? | Current Management | Management Plans | MLLW Gen? | Current Management | Management Plans |
|---|---|---|---|---|---|---|---|
| AL | GJPO | Yes | Shipped to Cheney Repository if UMTRA, else stored onsite | Dispose stored LLW at NTS as defense-related | Yes | Stored onsite | |
| | ITRI | Yes | Staged onsite, then disposed at NTS | | No | Past-generated MLLW stored onsite | DSSI, Quadrex |
| | KCP | Small qty. | Stored onsite | Seeking approval as an NTS-generator | No | Past-generated MLLW stored onsite | |
| | LANL | Yes | Disposed onsite | | Yes | Stored onsite | |
| | Mound | Yes | Some stored, some disposed at NTS | Seeking approval as an NTS-generator for all LLW streams | Yes | Stored onsite | Awaiting treatment decision |
| | Pantex | Yes | Disposed at NTS | | Yes | | Seeking commercial treatment |
| | Pinellas | Small qty. | Limited disposal at SRS | Seeking approval as an NTS-generator | No | | |
| | SNLA | Yes | Stored onsite | Seeking approval as an NTS-generator | Yes | Stored onsite | Negotiating with EPA Region VI |
| | SNLL | Yes | Stored onsite | Seeking approval as an NTS-generator | Small qty. | Stored onsite | |
| CH | Ames | Yes | Staged onsite, then disposed at HANF; some treated at SEG | | Small qty. | Stored or treated at SEG | |
| | ANL-E | Yes | Stored onsite or shipped to HANF for disposal or storage; some treated at SEG before disposal | Onsite treatment demonstrations; disposal at Envirocare | Yes | Stored onsite or shipped to HANF for storage | |
| | ANL-W | Yes | Disposed at INEL | | Yes | Stored onsite | |
| | BCL | Yes | Treated at SEG, then disposed at HANF | Disposal at NTS or Envirocare | Yes | Staged onsite, then sent to HANF for storage | |

**Table 2.** (continued).

| FO | Site | LLW Gen? | Current Management | Management Plans | MLLW Gen? | Current Management | Management Plans |
|---|---|---|---|---|---|---|---|
| | BNL | Yes | Staged onsite, then shipped to HANF for disposal | Planning onsite treatment | Small qty. | Some stored onsite | Store at HANF |
| | FNAL | Yes | Compacted onsite, shipped to HANF for storage or disposal | | Yes | Stored onsite; some shipped to HANF for storage | |
| | PPPL | Yes | Staged onsite, then shipped to HANF for disposal | Evaluating offsite treatment at SEG or Quadrex | Small qty. | Stored onsite | |
| FS | FEMP | Yes | Shipped to NTS for disposal | | Yes | Stored onsite | Onsite/offsite treatment or dispose at Envirocare |
| | RMI | Yes | Treated onsite (volume reduction only) and stored | Seeking approval as an NTS-generator | Small qty. | Stored onsite, some treated at OR TSCA incinerator | |
| ID | INEL | Yes | Disposed onsite | | Yes | Stored onsite | |
| | WVDP | Yes | Stored onsite | Treat some at SEG | Small qty. | Stored onsite | |
| NV | NTS | Yes | Stored onsite | Seeking approval as an NTS-generator | Yes | Stored onsite | Onsite treatment |
| OR | ORNL, K-25, Y-12 | Yes | Disposed or stored onsite, some treated offsite at SEG | Evaluating options to dispose at HANF or NTS | Yes | Stored onsite | Onsite treatment demonstrations and offsite commercial treatment |
| | PGDP | Yes | Stored onsite, some treated at SEG | Seeking approval as an NTS-generator | Yes | Stored onsite | |
| | PORTS | Yes | Stored onsite; some treated at SEG | Seeking approval as an NTS-generator | Yes | Stored onsite | |
| | WSS | Yes | Treated and stored onsite | Disposal onsite | | | |

**Table 2.** (continued).

| FO | Site | LLW Gen? | Current Management | Management Plans | MLLW Gen? | Current Management | Management Plans |
|---|---|---|---|---|---|---|---|
| RF | RFP | Yes | Stored onsite; some disposed at NTS; asbestos LLW disposed at HANF | Seeking approval as an NTS-generator for all LLW streams | Yes | Stored onsite | Dispose at Envirocare or NTS |
| RL | HANF | Yes | Treated and disposed onsite; some stored onsite | | Yes | Stored onsite | |
| SF | ETEC | Yes | Staged onsite then disposed at HANF | | Yes | Stored onsite | Store at HANF |
| | GA | Yes | Disposed at HANF and NTS | | | | |
| | LEHR | Yes | Staged onsite then disposed at HANF | | No | Past-generated MLLW stored onsite | Reclassify to LLW or store at HANF |
| | LBL | Yes | Staged onsite then disposed at HANF | | Yes | Shipped to HANF for storage or treated at Quadrex | |
| | LLNL | Yes | Stored onsite | Seeking approval as an NTS-generator | Yes | Stored onsite | |
| | SLAC | Small qty. | Staged onsite then disposed at HANF | | Small qty. | Stored onsite | |
| SR | SRS | Yes | Treated and stored or disposed onsite | | Yes | Stored onsite | Treat in CIF |

a. See acronym list for Field Office and Site abbreviations.

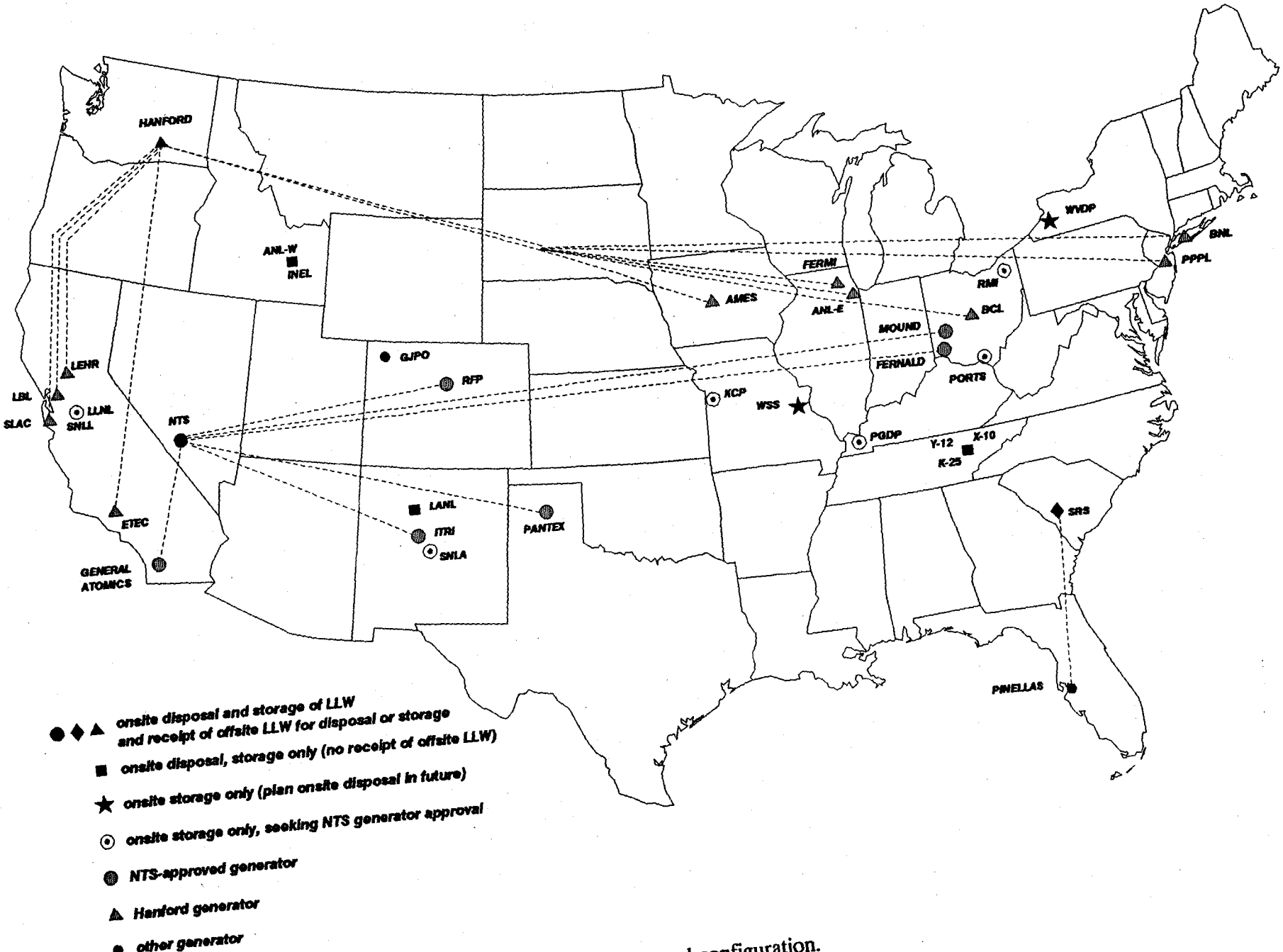


**Figure 1.** Map of DOE low-level waste transportation and disposal configuration.

The history of events that led to the current DOE LLW transportation and disposal configuration was investigated through information searches and by interviewing experienced DOE and contractor personnel who are either retired or still working within the DOE complex. Attempts to retrieve documented evidence to confirm the historical events included only two Telex documents and one memorandum, issued by DOE-HQ in October 1979. The Telex documents and memorandum directed DOE field offices to cease shipping LLW to commercial facilities, and either dispose of LLW onsite (if possible) or ship it to any of six possible DOE disposal sites. Evidence documenting the rationale behind the use of these six sites and for sending certain waste types to each was not found.

According to those interviewed and the retrieved documentation, the major elements of the current alignment were developed during the late 1970s after commercial LLW disposal facilities became unavailable to DOE. The reduction of LLW disposal capacity compelled DOE to establish alternate LLW disposal options for generators that did not have onsite disposal capacity. After further examination, DOE eventually settled upon five major disposal sites to accommodate virtually all LLW generators, namely, LANL, NTS, INEL, HANF, and SRS.

The rationale for determining what generators shipped to what disposal site appears to be based on the ability of the disposal site to manage a given waste form. For example, DOE apparently chose NTS and LANL for disposal of LLW generated from DOE defense-related activities because of their historical affiliations with Defense Programs. Similarly, INEL was selected as the disposal site for LLW generated from research activities because of its history of reactor research and development. HANF was chosen as an alternate to the INEL for disposal of LLW generated from research projects, perhaps by default. For reasons unknown, SRS was chosen to receive Naval Reactors-generated LLW, and as a possible candidate for disposal of non-tritium-contaminated LLW generated at Mound. It must be emphasized that these suppositions are highly speculative. Although it is recommended that further investigation of the apparent decision rationales be pursued, any citing of these conjectures without producing appropriate supporting documentation is highly discouraged.

# 3. DOE LOW-LEVEL WASTE/MIXED LOW-LEVEL WASTE TRANSPORTATION INFORMATION

## 3.1 Albuquerque Field Office

### 3.1.1 Grand Junction Projects Office

***Low-Level Waste.*** LLW generated at this Uranium Mill Tailings Remediation Act (UMTRA) facility is shipped to the Cheney Repository, located 15 miles south of the Grand Junction Projects Office (GJPO). The Chaney Repository, which is licensed by the Nuclear Regulatory Commission (NRC), can only accept UMTRA-related wastes. The facility is currently scheduled for closure in June 1993.

Other LLW at GJPO include lab wastes such as filters, planchettes, etc., not related to UMTRA projects. Based on the results of radioactive screening surveys, the waste is either disposed as sanitary waste or stored onsite as LLW. GJPO is currently exploring disposal options at HANF or NTS, and also possible treatment before shipment. Currently, GJPO is seeking to categorize the stored LLW as defense-related so that it may be accepted for disposal at NTS.

***Mixed Low-Level Waste.*** Some extraction uranium mill tailing samples taken at Grand Junction are analyzed for polychlorinated biphenyls (PCBs) and RCRA-listed materials. The sample wastes are currently stored onsite.

### 3.1.2 Inhalation Toxicology Research Institute

***Low-Level Waste.*** LLW currently generated at the Inhalation Toxicology Research Institute (ITRI) is shipped to the Nevada Test Site (NTS) for disposal. ITRI has been an NTS-approved generator since January 1992 (the Waste Acceptance Criteria (WAC)-program was approved December 1991). ITRI stores LLW for accumulation purposes only and conducts some limited treatment of the waste by compaction and repackaging before it is shipped. There are no onsite LLW disposal facilities at ITRI.

***Mixed Low-Level Waste.*** ITRI is currently storing a very small quantity of past-generated MLLW (two to three drums). Waste minimization efforts eliminated this waste stream by using solvents not regulated by the Resource Conservation and Recovery Act (RCRA). The backlog MLLW is currently stored onsite at ITRI pending finalization of contractual negotiations with DSSI of Kingston, Tennessee. ITRI has also sent scintillation cocktails to Quadrex in Gainesville, Florida for treatment.

### 3.1.3 Kansas City Plant

***Low-Level Waste.*** The Kansas City Plant (KCP) currently generates LLW at a rate that results in only one shipment about every four years. KCP is currently storing this waste onsite and is planning to ship it to NTS for disposal, pending completion and approval of the application process.

***Mixed Low-Level Waste.*** KCP currently generates no MLLW. Past-generated MLLW consists of historical wastes (e.g., leaky sources), which are presently being store onsite. No information was obtained on plans for future disposition of these wastes.

### 3.1.4 Los Alamos National Laboratory

***Low-Level Waste.*** LLW currently generated at the Los Alamos National Laboratory (LANL) is disposed onsite by shallow-land burial at the LANL TA-54, Area G disposal facility.

***Mixed Low-Level Waste.*** Small quantities of MLLW are currently generated at LANL and stored onsite. LANL had previously planned to construct a Land Disposal Restriction (LDR)-treated MLLW disposal facility; this project, however, has been placed on hold.

### 3.1.5 Mound Plant

***Low-Level Waste.*** Mound is an approved NTS-generator for several different LLW waste streams that are generated onsite. Mound is also seeking NTS approval to ship additional decontamination and decommissioning (D&D)-generated LLW and some previously generated solidified sludge wastes.

***Mixed Low-Level Waste.*** MLLW generated at Mound is currently stored onsite, awaiting determination of final treatment methods. The waste is comprised mostly of scintillation cocktails that are presently stored in a RCRA Interim Status-permitted facility. Mound is attempting to use process knowledge to reclassify some of the waste to LLW.

### 3.1.6 Pantex Plant

***Low-Level Waste.*** LLW generated at the Pantex Plant is shipped to NTS for disposal; Pantex is an approved NTS generator.

***Mixed Low-Level Waste.*** Pantex is currently negotiating with commercial entities for treatment of MLLW currently stored onsite. No RCRA-permitted storage capacity for MLLW presently exists at Pantex.

### 3.1.7 Pinellas Plant

***Low-Level Waste.*** Small quantities of LLW are currently generated at the Pinellas Plant in Clearwater, Florida. In the past, Pinellas made two to three shipments per year to the Savannah River Site (SRS) for disposal of these wastes.

Because of differences between hazardous waste classification in South Carolina and Nevada, Pinellas is currently seeking approval to ship radioactively-contaminated waste oil to NTS. The Nevada definition of hazardous waste is based on the definition of the state in which it is generated. Florida, the state of origin for this waste, does not define waste oil as a hazardous material; South Carolina, however, considers waste oil hazardous regardless of origin.

***Mixed Low-Level Waste.*** Currently, no MLLW is generated at Pinellas as defined by the State of Florida. No information was obtained regarding possible storage of past-generated MLLW.

### 3.1.8 Sandia National Laboratory-Albuquerque

***Low-Level Waste.*** Although Sandia National Laboratory-Albuquerque (SNLA) has historically generated defense-related LLW, none has ever been shipped to NTS for disposal. Until the 1980s, SNLA disposed LLW and MLLW in onsite disposal cells. The existing LLW disposal pit has since

been inactivated and designated an environmental restoration (ER) "Solid Waste Management Unit." Future remediation activities of the former disposal pit are expected to yield large quantities of LLW and MLLW.

Currently, SNLA-generated LLW is stored onsite. Some limited treatment of these wastes, such as compaction and solidification, is conducted before storage. SNLA is currently pursing the application process for NTS disposal, and is estimated to be about 8–12 months from approval.

***Mixed Low-Level Waste.*** MLLW at SNLA is limited to a few small disassembled weapons parts that are presently stored onsite. No MLLW treatment capability currently exists at SNLA. Currently, SNLA is negotiating with the Environmental Protection Agency (EPA) Region VI for resolution of LDRs. The Federal Facilities Compliance Act (FFCA) site-specific plan at SNLA will likely include proposals of treatment studies for the stored MLLW.

### 3.1.9 Sandia National Laboratory-Livermore

***Low-Level Waste.*** Sandia National Laboratory-Livermore (SNLL) generates LLW resulting from weapons-related research. Following solidification, compaction, and other treatments, the waste is stored onsite. SNLL recently submitted a waste program review at NTS, and is anticipating approval for shipments in June or July 1993. LLW generated at SNLL also cannot be disposed at HANF because it is defense-related.

***Mixed Low-Level Waste.*** SNLL currently generates very small quantities of MLLW, which are stored onsite.

## 3.2 Chicago Field Office

### 3.2.1 Ames Laboratory

***Low-Level Waste.*** LLW generated at the Ames Laboratory is maintained in storage until accumulated quantities can be shipped to the Hanford Site (HANF) for disposal. Some Ames-generated LLW consisting of slightly contaminated metal scrap is converted to shielding blocks at the Scientific Ecology Group, Inc. (SEG) treatment facility in Oak Ridge, TN, and then redistributed for reuse throughout the DOE complex. This agreement was negotiated between SEG and DOE-HQ through the DOE Chicago Field Office (CH).

No other onsite or offsite intermediate LLW treatment is presently conducted by Ames. CH is currently investigating the use of additional commercial treatment options in the future.

***Mixed Low-Level Waste.*** Although very little MLLW is generated at Ames from research activities, more is expected to be generated during future D&D operations. Ames has previously shipped contaminated lead bricks to SEG in Oak Ridge for treatment. SEG decontaminates the bricks and redistributes them throughout the DOE complex for use as shielding.

### 3.2.2 Argonne National Laboratory-East

***Low-Level Waste.*** LLW generated at Argonne National Laboratories-East (ANL-E) is either stored onsite or shipped to HANF for subsequent disposal or storage. Before shipment, intermediate treatment of certain LLW streams is conducted at the Oak Ridge SEG facility. The treatment by-

products are returned to ANL-E, where they are stored or shipped to HANF. ANL-E is currently planning to conduct at least three onsite LLW treatment demonstrations in the near future.

Additional LLW generated from ER activities is anticipated at ANL-E. Current plans are to ship these wastes to Envirocare in Utah for disposal.

***Mixed Low-Level Waste.*** MLLW generated at ANL-E is stored onsite in RCRA- or TSCA-mixed waste storage facilities. A portion of ANL-E-generated MLLW is also shipped to HANF for storage.

### 3.2.3 Argonne National Laboratory - West

See Section 3.4.1 for details of Argonne National Laboratory - West (ANL-W) LLW and MLLW management.

### 3.2.4 Battelle Columbus Laboratories

***Low-Level Waste.*** A portion of Battelle Columbus Laboratories (BCL)-generated LLW is currently shipped to the SEG facility in Oak Ridge for treatment. The treatment by-products are then shipped directly from SEG to HANF for disposal. BCL currently does not have onsite treatment or disposal capabilities, other then some limited evaporation processing at the West Jefferson complex.

BCL has historically been a small generator of LLW, and therefore does not store significant quantities of LLW. In general, BCL accumulates LLW until it can ship the waste to SEG or HANF. BCL anticipates increased LLW generation from upcoming D&D activities, and is currently pursuing additional disposal options at NTS or the Envirocare commercial disposal facility to accommodate the larger volumes.

***Mixed Low-Level Waste.*** BCL is currently shipping MLLW to HANF for storage. No information was obtained regarding future management strategies associated with MLLW.

### 3.2.5 Brookhaven National Laboratory

***Low-Level Waste.*** LLW generated at the Brookhaven National Laboratory (BNL) is stored onsite until budgeting allows shipment to HANF for disposal. There are currently no LLW commercial or onsite treatments available before the waste is shipped to HANF. BNL is planning some treatment capability onsite in the planned Radioactive Waste Handling Facility line-item project.

BNL is listed on the National Priorities List and may become a significantly larger generator of LLW during future ER projects, which are expected to begin in approximately five years. BNL may seek treatment and disposal of some of these ER-generated wastes at commercial sites.

***Mixed Low-Level Waste.*** BNL sporadically generates MLLW during research projects, and has also generated some historical MLLW in the form of toluene-based scintillation cocktails. MLLW currently stored at BNL is slated for shipment to the HANF MLLW storage facilities.

### 3.2.6 Fermi National Accelerator Laboratory

***Low-Level Waste.*** LLW that is currently generated at Fermi National Accelerator Laboratory (FNAL) is compacted onsite and then shipped to HANF for either disposal or storage.

***Mixed Low-Level Waste.*** Many LLW streams continue to be reclassified as MLLW in accordance with the State of Washington's ever-increasingly stringent waste definitions. For example, sodium chloride wastes contaminated with LLW are now considered MLLW at HANF. Other MLLW streams generated at FNAL include lead batteries, lead shielding, and lead-coated vacuum seals. All FNAL-generated MLLW is stored in a RCRA-permitted storage facility until sufficient quantities are accumulated for shipment to the HANF storage facilities.

### 3.2.7 Princeton Plasma Physics Laboratory

***Low-Level Waste.*** LLW generated at the Princeton Plasma Physics Laboratory (PPPL) is generally transported directly to HANF for disposal at the direction of DOE. No commercial facilities are involved in treatment, storage, or disposal of LLW streams. LLW stored onsite for accumulation purposes is examined for potential onsite recyclability before shipment to HANF. Potentially contaminated waste is routinely surveyed for radioactivity, and if none is found, the material is reused as necessary.

PPPL is also investigating the feasibility of using offsite commercial vendors, such as SEG or Quadrex, for future treatment of LLW.

***Mixed Low-Level Waste.*** MLLW is generated in such small quantities at PPPL that its disposition is currently not a high priority. There are currently no known management strategies for the small volume of MLLW currently stored onsite.

## 3.3 Fernald Field Office

### 3.3.1 Fernald Environmental Management Complex

***Low-Level Waste.*** According to the Fernald Field Office, all LLW streams generated at the Fernald Environmental Management Complex (FEMP) are being accepted for disposal at NTS, where FEMP is an approved generator. This includes about 500,000 $ft^3$ shipped to the NTS in 1992. Some onsite storage of LLW is conducted for staging purposes only, before shipment. Predisposal treatment consists of offsite volume reduction at SEG in Oak Ridge and also some onsite D&D treatments that yield reusable metal scrap.

***Mixed Low-Level Waste.*** Small quantities of MLLW generated at Fernald are stored in a RCRA Interim Status facility. Fernald is investigating various possible onsite and offsite commercial treatments for these wastes, and is also examining the option of disposal at the Envirocare facility in Utah.

### 3.3.2 Reactive Metals, Inc.

***Low-Level Waste.*** RMI currently generates uranium-contaminated LLW as part of ongoing D&D and ER activities. Currently stored onsite is a backlog of several hundred drums of LLW generated during past uranium extrusion operations, and another 48,000 $ft^3$ of contaminated soil. Treatment of LLW at RMI is limited to volume reduction by compaction.

All LLW will be shipped to NTS when RMI becomes an approved NTS generator. NV is currently planning to conduct "mock" audits of the RMI WAC-certification program as the next step in the process; final approval for shipment is approximately one year away. This approval process is critical because of the very limited storage capacity at RMI that currently restricts the scope of planned D&D and ER activities.

***Mixed Low-Level Waste.*** Very small quantities of MLLW are currently generated at RMI. Past operations produced 70 to 80 drums of mostly liquid MLLW consisting of contaminated solvents, lead contaminated oils, uranium-contaminated oils, and barium salts. About 4,000 gallons of this waste is stored onsite in a Part B, RCRA-permitted facility. Some MLLW liquids have also been sent to Oak Ridge for treatment in the TSCA incinerator.

During former operations, all wastes generated at RMI were sent to Fernald for treatment. RMI had been a subcontractor to Fernald and also a Prime Operating contractor to the Oak Ridge Field Office (OR).

## 3.4 Idaho Field Office

### 3.4.1 Idaho National Engineering Laboratory

***Low-Level Waste.*** LLW currently generated at the Idaho National Engineering Laboratory (INEL) is disposed onsite at the Radioactive Waste Management Complex (RWMC). LLW generated at ANL-W, as well as ANL-E-generated LLW shipped to ANL-W, is also disposed at the RWMC.

***Mixed Low-Level Waste.*** MLLW generated at INEL is stored onsite at the MLLW Storage Facility. MLLW generated at ANL-E is stored in three RCRA-permitted storage facilities located onsite.

Currently, the INEL does not accept any offsite shipments of LLW or MLLW.

### 3.4.2 West Valley Projects Office

Although once the only U.S. site for commercial spent fuel reprocessing, the West Valley Demonstration Project (WVDP) is now a nonoperational ER project. The site has always been owned by the state of New York and operated by the New York State Environmental Research and Development Agency (NYSERDA). ER activities, however, are now the responsibility of DOE.

Between 1966 and 1972, the private company Nuclear Fuel Services (NFS) reprocessed commercial spent nuclear fuel and some DOE reactor fuels at the site. In 1972, NFS terminated reprocessing activities to expand facilities and operations. Because of additional nuclear facility seismic requirements imposed by the NRC, NFS elected to close the facility rather than pursue the expansion effort.

Following termination of NFS operations at WVDP, NYSERDA became directly responsible for maintenance and remediation of the site. NYSERDA appealed to Congress for assistance with this responsibility. As a result, Congress passed the West Valley Demonstration Project Act, which mandated DOE involvement in the solidification of all liquid high-level waste (HLW) at WVDP. In 1981, DOE assumed responsibility of WVDP, and in 1982, Westinghouse became the site management and operations (M&O) contractor for DOE.

***Low-Level Waste.*** As a consequence of past history, the site now primarily stores liquid HLW that requires solidification (vitrification) before it can be placed in a future geologic repository. Some supernate from these liquids has been solidified, producing solid LLW. The waste has been packaged in 70-gal square drums and is currently stored onsite in aboveground storage buildings.

Construction of vitrification equipment at WVDP has required decontamination of some existing facilities to allow their reuse. These activities generated additional solid LLW. The waste is composed mainly of contaminated concrete and chemical process equipment, which is currently stored in boxes onsite.

Currently, all LLW remains in onsite storage pending completion of the site EIS and resulting Record of Decision (ROD). There are some radioactively-contaminated waste oils onsite that WVDP is also considering for shipment to the SEG facility in Oak Ridge for incineration.

***Mixed Low-Level Waste.*** A small quantity of contaminated lead generated at WVDP is presently being stored onsite. There are currently no known management strategies for future disposition of this waste.

## 3.5 Nevada Field Office

### 3.5.1 Nevada Test Site

The Nevada Test Site (NTS) is a major DOE disposal facility that receives offsite shipments of LLW from DOE sites and other generators. In 1990, NTS established a moratorium on the receipt of all waste shipments as a result of DOE Tiger Team investigation findings. These findings showed that both NTS and the generator sites were not adequately complying with the requirements of DOE Order 5820.2A and the NTS WAC.

NTS has since adopted a program that requires all generator sites to complete a thorough approval process before shipments of LLW can be made. As of January 1993, seven generators have achieved approval. Of the seven, one is the Department of Defense (DOD)-operated Aberdeen Proving Grounds in Aberdeen, Maryland, whose waste has been categorized as defense-related. The other six NTS-approved generators include the Mound Plant, FEMP, RFP, ITRI, Pantex, and General Atomics in San Diego.

The required NTS approval process for acceptance of offsite-generated LLW consists of five major steps. The elements of the process, which is presented below, takes about a year to complete:

- The prospective NTS generator must receive DOE-HQ approval that it is a defense-related facility. "Defense-related" implies that the majority of the generator's funding is provided by DOE Defense Programs.

- The generator must apply to the Nevada Field Office (NV) Manager to receive copies of the NTS WAC and the associated conditions required for development of the generator waste certification program.

- The generator, as part of the application, must develop and submit a program that will certify that the waste to be shipped will comply with the NTS WAC and applicable EPA and State of Nevada requirements. The NV Field Office will approve the program upon successful completion of a series of reviews and audits.

- NTS conducts a NQA-1 audit to verify that the generator LLW certification program is acceptable. Deficiencies are listed, satisfactorily resolved, and verified by follow-up investigations.

- Upon successful completion, the generator will receive an approval letter that identifies the LLW streams that will be accepted by NTS. Additional waste streams can only be added upon reiterating the above process.

Approval from NV for receipt of LLW implies that the offsite generator has implemented a program that will ensure compliance with the NTS WAC (NVO-325, Rev. 1). Approximately 30 sites are currently seeking NV/NTS approval to ship LLW to NTS.

All onsite LLW generators will be required to comply with a similar process governed by an internally developed REECo NTS approval application. This program, which has not yet been approved, will require that the wastes be managed by the REECo Waste Control Group before disposal at NTS. One onsite NTS generator currently produces a very limited LLW stream that is not managed by the Waste Control Group. The waste is generated by the DOD Defense Nuclear Agency, Field Command, Nevada Operations, and is approved for disposal at NTS.

## 3.6 Oak Ridge Field Office

### 3.6.1 Oak Ridge Reservation

***Low-Level Waste.*** Currently, LLW is generated at all three Oak Ridge Reservation (ORR) sites, which include the Oak Ridge National Laboratory (ORNL), Y-12 Plant, and the K-25 Site. Some of the LLW is disposed at ORNL "as is" while other LLW streams are treated and then disposed. Additional LLW streams are placed in long-term storage onsite, with or without treatment.

Many LLW streams generated at the ORR can be either compacted onsite or shipped to the commercial Oak Ridge SEG facility for treatment. LLW sent to SEG is volume-reduced by either smelting, compaction, or incineration, and then returned to the ORR generator facility. Although these treatment measures preserve ORR storage and disposal space and produce a homogeneous waste by-product that can be more readily characterized, they also increase the isotopic concentration of the waste. The increased isotopic concentration of the treated waste often exceeds ORNL LLW disposal WAC limits, precluding onsite disposal.

All onsite disposal of ORR-generated LLW is conducted at the ORNL Solid Waste Storage Area-6 (SWSA-6). The volume-reduced LLW and nontreatable LLW that meets the disposal WAC are either disposed in a Tumulus configuration on concrete pads, or by placement in engineered vaults. The primary criteria for onsite LLW disposal is the presence of only short half-life radionuclides, which eliminates disposal of wastes contaminated with uranium or technetium.

LLW containing longer-lived isotopes such as uranium or technetium must be stored in a retrievable configuration. Current efforts are directed toward shipping and disposing of these longer-lived wastes at other DOE sites such as HANF or NTS. Because of increasingly stringent storage limits for uranium concentrations in ORR wastes, long-term storage is no longer a viable option.

Liquid LLW generated at ORR facilities is treated at the Oak Ridge Toxic Substances Control Act (TSCA) incinerator provided that it meets the facility WAC. The TSCA incinerator has been in operation for about three or four years and processes approximately three million lb of liquid

wastes per year. Currently, efforts are underway to develop a solid waste feed system to support additional incineration of TSCA-contaminated solid LLW. The present system is limited to only liquid wastes and a few solid wastes that are compatible with the current feed configuration.

***Mixed Low-Level Waste.*** All MLLW generated at the ORR sites is currently maintained in onsite storage. Some treatability studies and demonstrations are planned for the near future. Martin Marietta Energy Systems (MMES), the ORR M&O contractor, is also considering commercial treatment options for MLLW, and is currently helping DOE prepare a procurement subcontract.

### 3.6.2 Paducah Gaseous Diffusion Plant and Portsmouth Gaseous Diffusion Plant

***Low-Level Waste.*** No onsite disposal options exist at the Paducah Gaseous Diffusion Plant (PGDP) or Portsmouth Gaseous Diffusion Plant (PORTS). LLW generated at these sites is either volume reduced onsite or at commercially-operated facilities, and then stored onsite. LLW generated at PGDP and PORTS generally contains only longer-lived isotopes. Both PGDP and PORTS are currently pursuing the application process to become approved NTS generators; PGDP has also made a pilot shipment of LLW to HANF.

***Mixed Low-Level Waste.*** All MLLW generated at PGDP and PORTS is being stored onsite until future treatment or disposal options become available.

### 3.6.3 Weldon Spring Site

All LLW and MLLW currently generated at the Weldon Spring Site (WSS) is produced from ER activities. The waste includes contaminated soils and sludges that are generated from treatment of contaminated surface water.

The sludges are currently stored at WSS awaiting completion of the CERCLA process. The WSS Remedial Investigation/Feasibility (RI/FS) Study, which has been prepared and submitted for public comment, recommends that the sludges be treated by chemical stabilization and then disposed onsite. An interim storage area will be constructed onsite to accommodate the waste until stabilization and disposal can be implemented. The option to ship the stabilized sludges offsite (to either HANF or USPCI in Clive, Utah) has not been proven to be more advantageous than onsite disposal. Currently, it is WSS policy that the wastes will not be shipped offsite.

## 3.7 Richland Field Office

### 3.7.1 Hanford Site

The HANF Site near Richland, Washington operates a large LLW disposal facility that receives LLW shipments from various DOE sites and other generators. HANF waste generators are divided into five groups: Chicago Operations Office, San Francisco Operations Office, Oak Ridge Operations Office, Naval Reactors, and Miscellaneous Generators. A list of individual generators within the above groups is given in Table 3.

***Low-Level Waste.*** LLW generated at HANF is treated and disposed onsite. Some higher activity LLW is also stored onsite.

**Table 3.** Generators currently disposing low-level waste at the Hanford Site.

| Field Office | Site |
|---|---|
| CH | Ames Laboratory |
| | ANL-E (includes New Brunswick Laboratory) |
| | BCL |
| | BNL (includes Environmental Measurements Laboratory) |
| | FNAL |
| | Massachusetts Institute of Technology (includes Bates Accelerator and Reactor Facilities) |
| | PPPL |
| | University of Utah |
| SF | Atomics International |
| | GA[a] |
| | KMS, TRW |
| | LBL |
| | Rocketdyne (Energy Technolgy Engineering Center)[a] |
| | SLAC |
| | University of California-Davis (LEHR) |
| | University of California-Los Angeles |
| OR | FUSRAP - nine generators |
| | PGDP |
| | PORTS |
| NR[b] | BAPL[c] |
| | KAPL[c] |
| | Mare Island Naval Shipyard |
| | Pearl Harbor Naval Shipyard |
| | PSNS |
| Misc. | Babcock and Wilcox |
| | Bonneville Power Administration |
| | High Burnup Effects Program |
| | National Bureau of Standards |
| | Rocky Flats Plant-Asbestos |
| | Superconducting Super Collider[d] |
| | U.S. Army Corps of Engineers |

a. Shared generator with NTS.
b. No transuranic (TRU) waste acceptance in accordance with EM-32 instructions.
c. HANF is the alternate site.
d. Future project.

***Mixed Low-Level Waste.*** The majority of MLLW generated at HANF is being stored until technologies become available which can treat them. HANF has also shipped radioactively-contaminated hexone waste for treatment at DSSI in Kingston, Tennessee. Several sites are currently shipping MLLW for containerized storage at the HANF Central Waste Complex. A listing of these sites was given in Table 2 (see Section 2).

## 3.8 Rocky Flats Office

### 3.8.1 Rocky Flats Plant

***Low-Level Waste.*** Of the 25 different LLW streams currently generated at the Rocky Flats Plant (RFP), only seven have been approved for disposal at NTS. These streams, which are produced during analytical laboratory sample analyses, compose only a small fraction of the LLW volume generated at RFP. The remaining LLW is currently stored onsite pending approval for shipment and disposal at NTS. Final approval for disposal of these LLW streams will not be granted until NV completes audits of the RFP waste certification program.

In the interim, RFP completed a 1992 shipment of radioactively-contaminated asbestos to HANF for disposal. HANF granted RFP a "small quantity generator" status for the one-time shipment, which included a total of 89 drums. Although a feasibility study had concluded that shipment of the LLW to NTS would be more cost-effective, the wastestream was not immediately accepted. NTS is permitted to receive asbestos-contaminated LLW for disposal.

***Mixed Low-Level Waste.*** MLLW generated at RFP consists of streams such as pondcrete, saltcrete, and sludge wastes. These wastes are solidified and will be stored onsite in a RCRA-permitted temporary facilities until further treatment and disposal options become available.

Feasibility studies are also being prepared for potential commercial disposal of pondcrete and saltcrete at the Envirocare facility in Utah. This facility, however, is currently not permitted to receive Pu-contaminated wastes and needs to meet additional requirements specified by RFP.

In the future, there is the potential that NTS may be authorized to accept certain MLLW streams for disposal. RFP generates a variety of MLLW streams containing LDR-wastes, which are currently stored onsite. RFP is investigating the possibility of shipping these wastes to NTS for disposal, and is currently conducting studies to resolve the LDR issue for each of the streams.

## 3.9 San Francisco Field Office

### 3.9.1 Energy Technology Engineering Center

***Low-Level Waste.*** LLW generated at the Energy Technology Engineering Center (ETEC) is stored onsite for staging and accumulation purposes to support periodic shipments to HANF for disposal.

***Mixed Low-Level Waste.*** In the past, MLLW generated at ETEC had been shipped to HANF for storage. Because of a reduction in the generation rate of MLLW at ETEC, the waste can now be stored onsite. The San Francisco Field Office is tentatively planning to ship the waste to HANF pending the results of the FFCA site-specific plan currently under development.

### 3.9.2 General Atomics

***Low-Level Waste.*** The General Atomics (GA) facility is a former radioactive materials processing site located near San Diego, California. All LLW generated at the site is the result of D&D activities. Although the GA facility is commercially operated, its waste is still managed by DOE because of previous operations. LLW generated at the GA facility is shipped to both NTS and HANF for disposal.

***Mixed Low-Level Waste.*** There is no MLLW generated at the GA facility.

### 3.9.3 Laboratory for Energy-Related Health Research

***Low-Level Waste.*** The Laboratory for Energy-Related Health Research (LEHR) is currently undergoing D&D. LLW generated typically consists of concrete rubble from D&D activities, as well as other miscellaneous forms of LLW generated from characterization studies of the various ER sites at LEHR. Following generation, the waste is shredded, compacted, packaged, and then stored onsite in a staging facility. When sufficient quantities are accumulated and funding is secured, the staged LLW is shipped to HANF for disposal.

***Mixed Low-Level Waste.*** LEHR does not currently generate MLLW; however, approximately 10–15 drums of past-generated MLLW remains onsite. The wastes, which consist of laboratory wastes, tracer wastes, specimens, and contaminated acids and formaldehyde, are stored onsite in the RCRA interim status-permitted Mixed Waste Storage Building. Currently, LEHR is developing the work plan to conduct adequate characterization of these wastes. Proper characterization is expected to allow reclassification of some of the MLLW to LLW. The remaining MLLW that cannot be reclassified will be shipped to HANF for storage.

### 3.9.4 Lawrence Berkeley Laboratory

***Low-Level Waste.*** The Lawrence Berkeley Laboratory (LBL) generates solid activated wastes and solid and liquid laboratory wastes. LLW treatment includes onsite solidification and compaction as well as some offsite incineration. Generally, LLW is stored onsite until sufficiently accumulated quantities can be sent to HANF for disposal.

***Mixed Low-Level Waste.*** Quantities of MLLW generated by LBL have been shipped in the past to HANF for storage. LBL has also sent scintillation cocktails to Quadrex in Gainesville, FL for treatment.

### 3.9.5 Lawrence Livermore National Laboratory

***Low-Level Waste.*** Lawrence Livermore National Laboratory (LLNL) generates defense-related LLW consisting of laboratory wastes, sample wastes, debris, soils, etc. In the past, these wastes were treated onsite by volume-reduction and solidification methods. Although many of these treatments have since been eliminated, some onsite solid and liquid waste treatment is still performed.

LLW is stored onsite pending approval of LLNL as an NTS generator. LLNL recently submitted a waste program application for review to NTS and is anticipating a June or July 1993 timeframe to start shipping LLW. LLW generated at LLNL cannot be disposed at HANF because it is defense-related.

***Mixed Low-Level Waste.*** MLLW generated at LLNL is stored onsite pending the development of final treatment options.

### 3.9.6 Stanford Linear Accelerator Center

***Low-Level Waste.*** The Stanford Linear Accelerator Center (SLAC) currently generates only small quantities of LLW. The waste is staged onsite and shipped to HANF for disposal when sufficient quantities have accumulated.

***Mixed Low-Level Waste.*** MLLW is only generated in very minimal quantities at SLAC. The waste will be stored onsite pending further disposition as directed by the future FFCA site-specific plan.

## 3.10 Savannah River Field Office

### 3.10.1 Savannah River Site

***Low-Level Waste.*** The Savannah River Site (SRS) generates LLW in the Raw Materials, Reactors, Separations, Site Services, Tritium, High-Level Waste Management, Technology Center, and Solid Waste Management Departments. These wastes typically consist of sump and basin drainage, condensates, filters, clothing, laboratory wastes, decontamination residues, etc. Most of the LLW is treated onsite using incineration, solidification, compaction, precipitation, and other treatment technologies. Depending on the types of isotopes and concentration, the wastes are then either placed in long-term onsite storage or disposed onsite in large disposal vaults at the Radioactive Waste Burial Ground.

Other offsite generators who ship LLW to SRS for disposal include the Pinellas Plant and the U.S. Navy. The Pinellas Plant makes occasional LLW shipments and the U.S. Navy routinely ships contaminated corebarrels, valves, and other wastes generated during maintenance and decommissioning of its nuclear fleet.

***Mixed Low-Level Waste.*** MLLW generated at SRS is stored onsite pending the final development of treatment options. The currently preferred plan is to treat the waste at the Consolidated Incineration Facility (CIF) after facility construction and startup.

# 4. HISTORICAL PERSPECTIVE ON THE CURRENT DOE LOW-LEVEL WASTE TRANSPORTATION AND DISPOSAL CONFIGURATION

Early in the history of LLW generation in the United States, the only disposal capacity for commercially-generated LLW existed within the DOE complex. When commercial LLW disposal facilities later became available, DOE's predecessor, the Atomic Energy Commission, shipped LLW to these facilities mainly to provide increased business to the fledgling commercial sites. Eventually, six commercial facilities were constructed, which included Hanford, WA; Beatty, NV; Barnwell, SC; Maxey Flats, KY; Sheffield, IL; and West Valley, NY.

The Maxey Flats, Sheffield, and West Valley LLW disposal sites eventually became problematic because of poor management and geologically unsuitable settings that combined high annual rainfalls with shallow groundwater. Ultimately, these sites were forced to terminate LLW disposal operations. Later, the Beatty, NV and Hanford, WA sites were also closed by the respective governors of their host states because of apparent problems with packaging and storage. With only one site remaining for disposal of all commercially-generated LLW, it soon became clear that DOE could not continue to rely on commercial disposal.

DOE-HQ subsequently directed all sites to dispose of LLW within the complex.[a] Sites unable to dispose onsite were obliged to negotiate with other DOE field offices to arrange for shipment of LLW to another site. This policy change was implemented by an informal DOE-HQ Telex, issued on October 26, 1979, which directed all DOE field offices and NR Programs to terminate disposal of LLW at commercial facilities. The correspondence also specifically instructed NR Programs to redirect LLW shipments from the Barnwell, South Carolina commercial site to SRS. It further stated that wastes generated at nondefense facilities should not be sent to SNLA, LANL, LLNL, SRS, Y-12, Pantex, or NTS, although no rationale for this requirement was cited. The DOE-HQ Office of Public Affairs followed with a news release the same day that confirmed the new policy. The release listed LANL, INEL, NTS, HANF, and SRS as potential sites for DOE LLW disposal.

A later DOE-HQ memorandum, issued November 19, 1979 from the Office of Nuclear Waste Management (NE-951), provided formal guidance for implementation of the October 26 policy change.[3] In addition to instructing sites to develop aggressive waste minimization programs, the memorandum also aligned each generator with two or three field offices to contact for possible disposal services (see Table 4). No rationale is included in the memo however, to support the directed alignment.

To some extent, the alignment shown in Table 4 appears to have been based on the ability of each disposal site to manage a specific waste form. For example, NTS and LANL were apparently chosen for disposal of all DOE defense-generated wastes because of their historic Defense Program affiliations. The INEL, because of its history of reactor testing and other nuclear research activities, was evidently selected as the disposal site for research-generated LLW. HANF was chosen as an alternate to the INEL for disposal of LLW generated from research projects, perhaps by default. For reasons unknown, SRS was chosen to receive Naval Reactors-generated LLW, and as a possible candidate for disposal of non-tritium-contaminated LLW generated at Mound.

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a. This policy was later reaffirmed by memorandum issued in March 1988 (see Reference 1). Later that year, DOE Order 5820.2A[2] was issued, which required DOE-generated LLW to be disposed at DOE facilities.

**Table 4.** DOE Field Office contacts and sites for disposal services.[3]

| Waste Generator | Field Office to Contact for Disposal Services | Respective Disposal Site(s) |
|---|---|---|
| KCP | NV, AL | NTS, LANL |
| ITRI | NV, AL | NTS, LANL |
| SNLL | NV, AL | NTS, LANL |
| LLNL | NV, AL | NTS, LANL |
| Mound | NV, SR | NTS, SRS[a] |
| RMI | ID, RL, OR | INEL, HANF, ORNL |
| BNL | ID, RL | INEL, HANF |
| BCL | ID, RL | INEL, HANF |
| Ames | ID, RL | INEL, HANF |
| Fermi | ID, RL | INEL, HANF |
| ANL-E | ID, RL | INEL, HANF |
| LBL | ID, RL | INEL, HANF |
| LEHR | ID, RL | INEL, HANF |
| Atomics International | ID, RL | INEL, HANF |
| Naval Reactors | SR | SRS |

a. No tritium waste should be sent to SRS.

In the midst of this transition period, an alleged meeting took place between representatives from HANF, INEL, and NTS, and other sites to develop the realignment configuration. An apparent decision was subsequently reached that aligned the DOE complex-wide disposal of LLW to five disposal sites, namely NTS, INEL, LANL, HANF, and SRS. Although no documentation regarding the alleged meeting or record of decision could be retrieved, several contacts associated with DOE-HQ, HANF, NTS, and INEL offered this account. In any case, the realignment is shown in Table 5.

Further changes in the initial realignment were later implemented as a result of increasingly stricter LLW disposal site WAC and additional host state restrictions and controls. Because of various political and environmental reasons, INEL, LANL, and ORNL terminated acceptance of offsite wastes for disposal. This caused KCP, ITRI, and RMI to pursue NTS for disposal services, and BCL and ANL-E to redirect shipments to HANF. Offsite shipments of NR-generated LLW to the INEL were also rerouted to HANF and SRS for disposal.

All of the historical information presented above is based on two retrieved DOE-HQ Telex documents, one memorandum, and several verbal recounts of experienced DOE and contractor

**Table 5.** Initial realignment of DOE sites for disposal of low-level waste.

| Waste Generator | Disposal Site(s) |
|---|---|
| KCP | NTS and LANL |
| ITRI | NTS and LANL |
| SNLL | NTS |
| LLNL | NTS |
| Mound | NTS |
| RMI | ORNL |
| BNL | HANF |
| BCL | INEL |
| Ames | HANF |
| Fermi | HANF |
| ANL-E | INEL |
| LBL | HANF |
| LEHR | HANF |
| Atomics International | HANF |
| Naval Reactors | INEL and SRS |

personnel who are either retired or still working within the DOE complex. Unfortunately, attempts to retrieve additional documented evidence to provide the rationale for the directed realignment have not been successful. Therefore, it is strongly recommended that the undocumented and largely speculative nature of the decisional bases for the current DOE LLW transportation and disposal configuration not be cited without further substantiation.

# 5. REFERENCES


1. U.S. Department of Energy Memorandum, Bruce Twining (DP-122) to John E. Baublitz (NE-10) "Department of Energy (DOE) Policy on Low-Level Radioactive Waste (LLW) Disposal at Comercial Facilities," March 3, 1988.

2. DOE Order 5820.2A, "Radioactive Waste Management," U.S. Department of Energy, September 26, 1988.

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