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**AN EFFECTIVE WASTE MANAGEMENT PROCESS
FOR SEGREGATION AND DISPOSAL
OF LEGACY MIXED WASTE AT
SANDIA NATIONAL LABORATORIES/NEW MEXICO**

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ABSTRACT

Sandia National Laboratories/New Mexico (SNL/NM) is a research and development facility that generates many highly diverse, low-volume mixed waste streams. Under the Federal Facility Compliance Act, SNL/NM must treat its mixed waste in storage to meet the Land Disposal Restrictions treatment standards. Since 1989, approximately 70 cubic meters (2500 cubic feet) of heterogeneous, poorly characterized and inventoried mixed waste was placed in storage that could not be treated as specified in the SNL/NM Site Treatment Plan.

A process was created to sort the legacy waste into sixteen well-defined, properly characterized, and precisely inventoried mixed waste streams (Treatability Groups) and two low-level waste streams ready for treatment or disposal. From June 1995 through September 1996, the entire volume of this stored mixed waste was sorted and inventoried through this process. This process was planned to meet the technical requirements of the sorting operation and to identify and address the hazards this operation presented. The operations were routinely adapted to safely and efficiently handle a variety of waste matrices, hazards, and radiological conditions. This flexibility was accomplished through administrative and physical controls integrated into the sorting operations.

Many Department of Energy facilities are currently facing the prospect of sorting, characterizing, and treating a large inventory of mixed waste. The process described in this paper is a proven method for preparing a diverse, heterogeneous mixed waste volume into segregated, characterized, inventoried, and documented waste streams ready for treatment or disposal.

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INTRODUCTION

Sandia National Laboratories, New Mexico (SNL/NM) is a research and development facility operated for the U.S. Department of Energy (DOE) by Sandia Corporation, a subsidiary of Lockheed Martin Corporation. For each DOE facility that generates or stores mixed waste, the Federal Facility Compliance Act (FFCAct) of October 6, 1992, required DOE to prepare a plan to treat mixed waste to the standards of the Resource Conservation and Recovery Act's (RCRA's) Land Disposal Restrictions (LDRs). On October 6, 1995, the New Mexico Environment Department (NMED) approved of SNL/NM's Site Treatment Plan (STP) for mixed waste and issued a Compliance Order (CO) requiring compliance of the approved plan [1].

Unique research programs at SNL/NM have generated low volumes of a broad variety of mixed wastes. In general, SNL/NM's mixed waste inventory was unsegregated and inadequately inventoried for purposes of treating the waste in accordance with the CO. SNL/NM's STP identified approximately 300 waste streams that had been accumulated since 1989, with a total volume of approximately 70 m³ (2500 ft³) in storage [2]. These waste streams were organized (on paper) into 16 Treatability Groups (TGs) (which will be listed later in Table II), each with a preferred treatment option, and reported to the state to provide a baseline of mixed waste requiring treatment and/or disposal.

Each treatment technology assigned to a TG had defined parameters in which the treatment unit operated, specifically, the type of contaminants handled, the matrix or medium treated, the type of residual streams that were generated as a result of operation, the limitations, and the complexity or flexibility of the technology. Therefore, additional characterization information was needed and would have to be collected by SNL/NM in order to ensure that the waste was segregated into the appropriate TG and that each TG was linked to an appropriate treatment technology.

Based on the requirements of the CO, SNL/NM developed a process through the Historical Radioactive and Mixed Waste Disposal Request Validation and Waste Disposal (HDRV) Project to physically segregate and sort the inventory of mixed waste into the 16 TGs. HDRV was also tasked with obtaining the necessary characterization information to enable SNL/NM to use the treatment technologies identified in the STP and meet the Waste Acceptance Criteria (WAC) for low-level and mixed waste disposal facilities.

This paper describes the approach and accomplishments of the HDRV Project. The HDRV team's commitment to safety was reflected in the overall planning, analysis and control of hazards, work performance, and continual use of feedback to improve the sorting/segregation process.

PLANNING THE WORK

In 1989, SNL/NM closed its mixed waste landfill, and waste collected from generators was placed into storage. Generators packaged their waste to meet only minimal WAC, usually in

plastic bags with no segregation of waste items in each package. In most cases, the documentation provided by the generators (Disposal Request, or DR) did not include detailed inventories of the waste or potential hazards. Radiological data were frequently incomplete (radionuclides, activities, etc.), except for contact exposure rates on individual waste packages.

Because most of the waste covered by the STP was generated and placed into storage in the 1989-1995 time-frame (before treatability groups were assigned), the mixed waste was not physically identified by treatability groups, either by labeling or segregated storage, except where segregation was required for compatibility (e.g., explosives, liquids, etc.). Therefore, all of SNL/NM's mixed waste required some form of physical segregation and sorting in order to be managed as 16 well-defined treatability groups.

The information that was known about SNL/NM's mixed waste was adequate for identifying treatment options because the treatability groupings were based in part on the physical/chemical matrix of the individual waste streams. SNL/NM's knowledge of the components of the waste streams was often derived from the on-site design and/or construction of the components. Therefore, the initial phase of the sorting project began with an administrative study designed to improve the knowledge regarding the actual contents and characteristics of the waste prior to opening any containers. This study included setting up files for each of the 300 mixed waste streams expected to be sorted by this project and developing a procedure to collect and document additional knowledge of the process that generated the waste, including any chemical or radiological information.

Simultaneously (to conducting this administrative study), the overall project plan was developed, which outlined the project goals and developed all the necessary procedures and plans needed to perform field operations. These plans and procedures included a sorting plan and procedure, a sampling and analysis plan, a Health and Safety Plan (HASP), and a Radiological Work Permit (RWP). A project database was also developed that utilized a bar code system to track the sorted waste. This database provided the ability to trace the waste from the original DR form submitted for each waste stream by the waste generator and reported to the state regulatory agency, to the final sorted waste inventory. Additionally, the assigned TG and characterization information could be recorded.

The next steps to project planning included assembling the project staff and field sorting team, determining the type of facility and equipment/supplies needed, and determining the necessary training needed for each team member. The project staff consisted of 8 or 9 members as follows (all full-time personnel):

- Project leader (Health Physicist)
- Two RCRA specialists who performed office studies and field data recording
- Three or four sorting technicians
- One project support specialist who was responsible for records and database maintenance
- One Radiological Control Technician

Project staff were trained to ensure compliance with both the RCRA and the Occupational Safety and Health Administration (OSHA) requirements. In addition to these requirements, project-specific training emphasized the usage of radiological and chemical monitoring instrumentation, pressure safety, spill control and cleanup, electrical safety, explosive hazards awareness, and the contents and requirements of all project plans and procedures. The HASP and RWP were reviewed daily to ensure that project staff clearly understood the health and safety requirements associated with the project, and how project staff could minimize exposure to both radiological and chemical contaminants.

Once the initial planning tasks were completed, an analysis was conducted of the hazards that personnel could potentially encounter during field sorting operations.

ANALYZING THE HAZARDS

Opening and handling poorly characterized mixed waste presented a wide variety of predictable as well as unknown hazards for the sorting team. To address this issue, a comprehensive “office study” was designed to improve knowledge regarding the actual waste package contents, hazardous constituents, and radiological characteristics of the waste.

The office study began with a review of the existing waste management database and each of the approximately 300 mixed waste DR forms that were completed by the SNL waste generators prior to waste pickup. Each DR was reviewed for completeness and accuracy of information provided, including the process knowledge used to characterize the waste as mixed waste.

As needed, the office study continued: waste generators were contacted to obtain additional information about the specific waste generated; MSDS forms, manufacturers’ data, and other published information was obtained on the hazardous nature of chemicals or items suspected to be present in the waste; analytical or other data related to the waste was tracked down; written experimental procedures were obtained, as were documented experimental results that pertained to waste generation; and any available radiological data was evaluated.

At the conclusion of the office study, the potential hazards associated with the waste were much better understood. The results of the study, along with additional hazard information and warnings, were recorded on Field Verification Forms used by the sorting team for reference during sorting operations. A wide range of hazard types were expected in the waste, including the following:

- Inhalation hazards from radioactive particulates, hazardous metals, tritium off-gassing, solvent vapors, and other airborne contaminants.
- Physical hazards from reactive chemicals such as red phosphorous and perchloric acid; pressurized containers—especially intact compressed gas cylinders and aerosol cans; broken glass, metal shards, or other sharps; and puncture hazards.
- Contact hazards from oxidizers; free liquids that may be corrosive; toxic organics.

- Radiological hazards from highly contaminated items; and high-dose-rate items in the waste such as sources and activated metals.

CONTROLLING THE HAZARDS

Because the waste was expected to contain a variety of hazards, controls were developed to allow flexibility in addressing the hazards. Generally, the controls were divided into administrative and physical controls.

Administrative Controls

All sorting work was performed under the Radioactive and Mixed Waste Department umbrella procedures manual with additional specific procedures written, reviewed, and approved for waste-sorting activities. A HASP was prepared that discussed specific hazards expected to be encountered in the waste and in the general area during sorting operations. The HASP included hold points, stop-work conditions, and emergency response actions. SNL Health and Safety personnel were involved in the review of all procedures specific to waste-sorting activities.

Information obtained during the office study regarding potential hazards in the waste was tabulated to describe the expected waste matrix, radiological characteristics, hazardous chemical constituents, and other physical hazards of each waste bag to be sorted during a campaign. Both Industrial Hygiene and Radiological Protection support personnel reviewed these tables prior to beginning each sorting campaign in order to prescribe appropriate Personal Protective Equipment (PPE) and to constrain work activities. These waste information tables were attached to the RWP for reference when sorting personnel performed daily RWP sign-in. In addition, the information obtained from the office study (radiological and chemical characterization information, plus any additional hazards and warnings) was transcribed into the Field Verification Form, referenced by the RCRA specialists on the field sorting team during the sorting operations.

Real-Time Radiography (RTR) was occasionally used to determine the contents of certain containers prior to opening. Additionally, RTR was used when liquids were suspected, to determine the status of any internal containers. The RTR provided videos that the sorting team could watch prior to handling the specific waste.

Mock-ups were performed prior to handling waste items that presented unique hazards. The mock-ups proved very valuable in giving all personnel involved in the field operations an opportunity to brainstorm and try different methods for performing an activity in a nonhazardous environment. Lessons learned from the mock-ups were incorporated into work plans and resulted in improved on-the-job performance.

Communication was emphasized during mandatory, daily pre-job briefings that were implemented to involve field personnel in discussions of the planned work, type of waste to be sorted, and sampling activities. Checklists and forms were used to document the discussions and

the attendance at each pre-job briefing. Procedural and HASP requirements were discussed during this time, in addition to hold points and stop-work conditions. The waste characteristics requiring the use of the glovebox were reiterated. Briefings were held prior to each entry into the sorting area if changing conditions warranted, for example, a change in the scope of the sorting operations.

Two-way radios and white boards posted in view of the sorting area were used during sorting operations to allow constant communication between the sorting personnel, RCRA specialist/field data recorders, and the Radiological Control Technician.

Physical Controls

Because waste was sorted in campaigns, it was possible to determine the required PPE based on the expected waste characteristics. For example, when liquids were expected, saranex-coated PPE was worn. The governing RWP prescribed the respiratory protection and protective clothing requirements for each sorting campaign. Personnel performing sorting operations wore as a minimum, tyvek coveralls, several layers of gloves, booties, and supplied-air hoods.

The preferred respiratory protection method utilized supplied-air hoods. The uncertainty associated with the exact contents and history of each bag of waste presented a problem in selecting cartridges for full-face respirators; therefore, the supplied-air hoods were the preferred respiratory protection alternative. The supplied-air hoods provided an adequate protection factor for these sorting operations. An additional benefit of the supplied-air system was personnel cooling. This alleviated heat stress concerns.

The Radioactive and Mixed Waste Management Facility (RMWMF) waste-handling building that was used for the sorting operation was designed to ensure air flow from areas with the least possibility of contamination to the most likely contaminated. The building is divided into north and south bays, which are separated by an airlock. Waste-sorting operations were conducted in the sorting rooms in the south bay area of the building (Fig. 1). Airlocks are also located at each entrance to the south bay of the building [3]. This ensures that the section of the building used for waste sorting is kept under negative pressure, thus drawing air into the building and preventing inadvertent contamination of work areas and the surrounding environment.

Fig. 1. RMWMF

Additional containment such as that provided by a glovebox or glovebag was mandatory when the waste presented an airborne or high contamination concern. Criteria were developed to determine the engineering controls to be used during sorting activities. Waste that met the following criteria was opened and sorted inside the glovebox; if the items were too large to fit inside the glovebox, the waste was sorted inside a glovebag.

- All wastes from the reactor and hot cell area, due to the potential presence of hot particles from past research activities.
- Dusty waste, such as vacuum cleaner contents.
- Particulates or powders.
- Filters, including HEPA filters.
- Waste that is off-gassing tritium.
- All radioactive sources, due to the possibility of damaged/leaking sources in the waste.
- Waste known or suspected of containing transuranic radionuclides.
- Metallic tritides, due to possible flaking.
- Waste packages with unknown contents.
- Waste with dose rates greater than 0.10 mSv/hour (10 mrem/hour), due to the potential for high contamination levels.
- Waste that exceeded the contamination limits is listed in Table I. If the radionuclides were unknown, the lowest value on the table—2,000 dpm/100 cm²—was used.

Table I. Contamination Limits [4]

RADIONUCLIDE	Removable Activity Limit (dpm/100 cm²)
U-natural, U-235, U-238, and associated decay products	100,000
Transuranic nuclides, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-129	2,000
Th-natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-125, I-126, I-131, I-133	20,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above. Includes mixed fission products containing Sr-90	100,000
Tritium organic compounds, surfaces contaminated by HT, HTO, and metal tritide aerosols	100,000

Each day that field activities were performed, all relevant safety equipment (such as safety showers, eye washes, and portable survey meters) was function tested. Checklists were used to ensure thorough pre- and post-work reviews of the work area.

Radiation and contamination levels were routinely monitored during field operations. Radiation Area Monitors (RAM) were installed at several locations around the general work area at the RMWMF. Portable survey meters were used during the sorting operations when bags were removed from existing containers prior to sorting, when waste packages were opened, during the sorting process, and again after sorted waste was removed from the sorting area. Both an alpha and a beta Continuous Air Monitor (CAM) were in place inside the sorting room to monitor radionuclide air concentrations. A portable tritium monitor was utilized as needed during handling of waste that was expected to off-gas tritium.

The majority of the historical waste was opened on a sorting table located inside the sorting room. The sorting table (Fig. 2) was equipped with vertical plastic strips covering the open table area and provided additional ventilation.

Other available safety equipment inside the sorting room included flexible exhaust ducts, portable secondary containment, a drum ventilator, and a fume hood.

Fig. 2. Sorting Table

PERFORMING THE WORK

Waste-sorting activities were performed at the RMWMF compound at SNL/NM. To minimize the potential for spread of contamination or exposure to volatile chemical wastes, all outer containers (boxes, drums, etc.) were opened only within the sorting room. The sorting room was a posted contamination area where all waste package opening, sorting, sampling, and repackaging was conducted.

Waste was sorted in campaigns, each concentrating on wastes expected (based on the office study) to belong primarily in one of the Treatability Groups. Most waste packages, however, contained heterogeneous waste that was sorted into several treatability groups or low-level (nonmixed) waste streams. Several containers (boxes, drums, small pails), each used for one treatability group or low-level waste stream, were actively filled at any time. Each container was identified by attaching labels and tags describing the designated waste contents, treatability group (as appropriate), and hazards associated with the waste. An "Allowable Items List" of the waste matrices, specific items, and hazards to be placed in the container was posted on each container to help ensure that containers were filled correctly. During sorting operations, each waste item was inventoried so that a detailed record of the contents of each container was developed.

Although pre-planning the sorting activities was vital to the efficient conduct of this project, unexpected waste items were still encountered. When this happened, on-the-spot decisions had to be made regarding appropriate segregation and sampling and analysis needs. The project was not equipped or staffed to safely manage the high-hazard waste identified during the sorting process; this waste was set aside for the SNL/NM Hazmat Team and its contractors to manage. Such wastes included red phosphorus, intact compressed gas cylinders, and perchloric acid solutions. The discovery of unexpected liquid wastes required the sorting team to stop work, evaluate, and change PPE. When liquids were unknown, they were sampled and analyzed to determine the appropriate TG and the optimum continued management path.

SNL/NM completed sorting the approximate 70 m³ of mixed waste placed in storage between 1989 and the end of FY 1995. The SNL/NM sorted waste volumes are shown in Fig. 3 and Table II for each mixed waste Treatability Group and low-level waste. A portion of the original 70 m³ of mixed waste was determined to be low-level (nonmixed) waste during the sorting/characterization process. As shown in Table II, some of the sorted waste was treated or disposed of (or prepared for shipment), following waste characterization and/or treatment studies performed by this project and other SNL/NM waste management projects.

The project was not intended to sort liquid or reactive wastes; however, such wastes were discovered during sorting operations, and a large volume of oils and oily wastes were managed under the project.

Sorting, along with sampling and analysis data, also allowed a significant volume of the mixed waste to be recharacterized as nonmixed low-level waste, hazardous (only) waste, or solid waste (see Table II). These wastes were managed accordingly, although in some circumstances, the removal of such wastes from the mixed waste-inventory identified in the STP required special notifications and approvals from the state of New Mexico Environment Department.

The project employed a bar-code system to track the waste from the original DR as it was sorted into a treatability group and container. The emphasis on traceability allowed SNL/NM to provide the State of New Mexico with accurate inventories of the waste in each treatability group for purposes of updating the STP/CO.

Fig. 3. HDRV Sorted Waste Volumes (m³)

Table II. SNL/NM Mixed Waste Treatability Groups

Treatability Group	Preferred Treatment Option	SNL/NM Final Inventory, m³	Volume Shipped Off-Site or Treated
TG 1: Inorganic Debris with an Explosive Component	Deactivation	1.86	0
TG 2: Inorganic Debris with a Water Reactive Component	Deactivation	0.03	0
TG 3: Reactive Metals	Deactivation	0.0002	0
TG 4: Elemental Lead	Macroencapsulation	0.1	0.1 m ³ is scheduled for disposal at Envirocare.
TG 5: Aqueous Liquids (Corrosive)	Neutralization followed by (fb) Stabilization	30 ml	This waste will be treated on-site.
TG 6: Elemental Mercury	Amalgamation	97 ml	It is anticipated that 97 ml will be determined to be hazardous waste only.
TG 7: Organic Liquids I	Incineration (Off-Site Commercial Facility)	0	0.2 m ³ was shipped off-site for Recycle/Reuse
TG 8: Organic Debris with Organic Contaminants	Thermal Desorption (or Off-site DOE Facility)	19.2	19.2 m ³ is scheduled to be shipped off-site for incineration in 1998.
TG 9: Inorganic Debris with Toxicity Characteristic Leaching Procedure (TCLP) Metals	Macroencapsulation	5.1	5.1 m ³ is scheduled to be shipped off-site for treatment/disposal in 1998.
TG 9 Classified	Sanitization fb Macroencapsulation	2.1	0
TG 10: Heterogeneous Debris	Sort fb Reclassification	2	1.8 m ³ is scheduled to be shipped off-site for incineration in 1998.
TG 11: Organic Liquids II	Hydrothermal Processing (or Off-site Facility)	6.5	A portion of this waste is scheduled to be shipped off-site in 1998.

Table II. (Continued)

Treatability Group	Preferred Treatment Option	SNL/NM Final Inventory, m³	Volume Shipped Off-Site or Treated
TG 12: Organic Debris with TCLP Metals	Macroencapsulation (or Off-site Facility)	1.1	1.1 m ³ is scheduled to be shipped off-site for incineration in 1998.
TG 13: Oxidizers	Deactivation fb Stabilization	0.02	0.02 m ³ will be treated in 1998.
TG 14: Aqueous Liquids with Organic Contaminants	Evaporative Oxidation (or Off-site Facility)	0.023	0.023 m ³ is scheduled to be shipped off-site for incineration in 1998.
TG 15: Soils with <50% Debris and Particulates with TCLP Metals	Stabilization	8.1	0
TG 16: Cyanides	Oxidation	0	0.001 m ³ was treated in 1996.
Mixed Waste Total		46.1 m³	0.2 m³ has been treated. 29 m³ is scheduled to be shipped for treatment/disposal.
Low-Level Noncompactible	NA	12	This waste has been certified for disposal at the Nevada Test Site (NTS)
Low-Level Noncompactible Requiring Treatment	May require Solidification	1.4	This waste has been certified for disposal at the NTS
Low-Level Compactible Project-Generated Waste	NA	6.4	This waste is scheduled to be shipped off-site for incineration in 1998.
Low-Level Noncompactible Project-Generated Waste	NA	0.01	This waste has been certified for disposal at the NTS
Low-Level Compactible Cut-Off Bags	NA	5.75	This waste is scheduled to be shipped off-site for incineration in 1998.

Table II. (Concluded)

Treatability Group	Preferred Treatment Option	SNL/NM Final Inventory, m³	Volume Shipped Off-Site or Treated
Radioactive Sources	NA	0.002	0
Low-Level Waste Total		25.6 m³	
Hazardous Waste		0.3	This waste may require approval from the State to recharacterize as hazardous.
Hazardous Waste Total		0.3 m³	

Waste Characterization

Many waste items were not identifiable visually and were not sufficiently described in the process knowledge documentation. In such cases, samples were collected for radiological and chemical analysis. Radiological analysis was performed at both on-site laboratories and off-site contract laboratories. All chemical analyses were performed off-site. In many cases, the project worked directly with the analytical laboratories to determine sample needs and analytical methods to characterize unusual waste forms. A mechanical shredder was used to help obtain representative samples of waste streams that were suitable for shredding, i.e., primarily organic debris with little or no metals, glass, or other noncompactible items.

The analytical results were used to characterize waste, as well as to determine the appropriate TG for the waste. Additional sampling and analysis was performed on sorted waste streams to ensure that waste met the WAC of candidate treatment and/or disposal sites (see Fig. 4) or to provide the characterization data required by the facilities prior to shipment. Intended disposal/treatment options are outlined in Fig. 4.

Fig. 4. Expected Disposal of SNL/NM Sorted Radioactive and Mixed Waste

USING FEEDBACK TO IMPROVE THE PROCESS

The HDRV Project was managed to encourage team discussions, feedback, and critiques/re-evaluation of the project approach. This allowed the project to continually revise and improve operations including changing PPE requirements, simplifying/streamlining forms used to record data obtained in the office study and field sorting operations, improving instrumentation, increasing the use of containments during sorting, and improving communications among project personnel.

To improve radiological safety, the following upgrades were implemented:

- Breathing Zone Air Samplers were worn by all personnel performing hands-on sorting operations. These were analyzed daily.
- Additional radiological monitoring of waste was required during all sorting activities.
- Additional area surveys were performed by the Radiological Control Technicians.
- A glovebox was brought on line to use for sorting waste that posed complex hazards.

To improve the overall conduct of the project, the following enhancements were implemented:

- Formalized and documented daily pre-job briefings.
- Revised waste-handling procedures.
- Revised and expanded HASP incorporating revisions suggested by sorting technicians.
- Additional training related to specific expected hazards.

CONCLUSION

The HDRV project has successfully converted a diverse, heterogeneous, unsegregated, and poorly characterized mixed waste inventory into specific, characterized treatability groups ready for treatment and/or disposal. This was accomplished by:

- Planning the project by means of developing written plans and procedures, review of planned operations, and staff training on project-specific plans and safety procedures.
- Analyzing hazards, emphasizing the potential hazards posed by waste to be sorted.
- Controlling hazards through personnel training, the use of innovative technologies and monitoring equipment, frequent and repeated communications regarding potential hazards and hazards mitigation, and the use of physical controls designed to minimize the potential exposure of sorting personnel to hazards.
- Responding to feedback among project staff to improve methods, procedures, equipment, and communications.

As a result of this project, plans, procedures, and checklists are in place and are being utilized at SNL/NM for sorting and segregating the historical low-level waste inventory in storage. The SNL/NM process is applicable to other facilities and can be made available to other organizations that may find it useful.

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LIST OF ACRONYMS

CAM	Continuous Air Monitor
CO	Compliance Order
DOE	U.S. Department of Energy
dpm	disintegration(s) per minute
DR	Disposal Request
fb	followed by
FFCAct	Federal Facility Compliance Act
FY	fiscal year
HASP	Health and Safety Plan
HEPA	High-Efficiency Particulate Air (filter)
HDRV	Historical Radioactive and Mixed Waste Disposal Request Validation and Waste Disposal (Project)
HT	Gaseous tritium
HTO	Tritium oxide
LDRs	Land Disposal Restrictions (under RCRA)
NMED	New Mexico Environment Department
NTS	Nevada Test Site
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
RAM	Radiation Area Monitor
RCRA	Resource Conservation and Recovery Act
RMWMF	Radioactive and Mixed Waste Management Facility
RTR	Real-Time Radiography
RWP	Radiological Work Permit
SNL/NM	Sandia National Laboratories/New Mexico
STP	Site Treatment Plan
Sv	Sievert
TCLP	Toxicity Characteristic Leaching Procedure
TG	Treatability Group
WAC	Waste Acceptance Criteria

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