



Department of Energy
Albuquerque Operations Office
Los Alamos Area Office
Los Alamos, New Mexico 87544

APR 16 2001

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. James P. Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2044-A Galisteo Street
P. O. Box 26110
Santa Fe, New Mexico 87505



Dear Mr. Bearzi:

Subject: 60-Day Response to Request for Information (RI) Pursuant to the New Mexico Hazardous Waste Act and the Resource Conservation and Recovery Act, Los Alamos National Laboratory, EPA ID NM 0890010515

The purpose of this letter is to provide the Department of Energy (DOE) and University of California (UC) response to the New Mexico Environment Department's (NMED), Request for Information (Mr. James Bearzi, Hazardous Waste Bureau, to Dr. John Browne, LANL, and Mr. David Gurulé, U.S. Department of Energy [DOE] February 12, 2001). This response includes answers for the information requests numbered 1 through 17, 20, and 21, as required within sixty days by Instruction 7, page 3 of the letter. The complete response and supporting documentation are included as enclosures to this letter.

This document consists of responses to the 19 information requests and appendices with supplemental information, as referenced in the numbered information requests. The responses contain waste stream information from the DOE/UC waste management and corrective action organizations. The information presented has been obtained from waste management and Environmental Restoration (ER) project records and various previously submitted or published reports. The enclosed information consists of database retrievals, tables, and reports. Information available from previously published or submitted documents is also referenced in the individual responses as appropriate.

In accordance with Instruction 4, page 3 of the letter, DOE/UC is responding as fully as possible to this request within the allotted sixty-day period. Most of the information contained in this response has been developed and kept by DOE/UC in response to procedures developed since the 1970s in compliance with advancing regulations and policies. These sources represent the majority of the information available for the generation and management of operational radioactive and mixed waste streams and for



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waste generated by ER activities since that point. However, the time period allotted in the request has not been sufficient to answer the request completely. DOE/UC is continuing to collect historical information for wastes managed and disposed of before the regulatory dates, in addition to current data, supplementing that presented in this response. We propose a similar submittal schedule as that suggested (and subsequently approved by the NMED in a letter dated March 13, 2001) for ongoing submittals in the first 15-day response to this RI for Request No. 18. The proposed dates for the submittal of data supplementing that collected for this sixty-day response are May 15, June 15, and July 15, 2001. DOE/UC will provide the data collected and prepared for submittal for those dates (if available) in order to maintain a consistent data submittal for NMED review. Please consider this correspondence as a request for an extension for that time to fully answer this question as explained above.

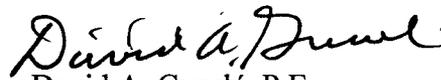
DOE/UC has concerns about the request for this data in light of the fact that much of the requested information cannot be used in setting conditions to be included in the new hazardous waste facility permit as indicated by the request letter. As stated in the discussion portion of the enclosed response, certain types of data are presented for informational purposes, although the materials discussed are not subject to regulation either under the Resource Conservation and Recovery Act (RCRA) or the New Mexico Hazardous Waste Act.

This response lists the persons who compiled the data used to answer each question, and identifies the documents that contain responsive information as required by Information requests 20 and 21 in the February 12, 2001 letter. A certification for the submitted data is also enclosed as required by 20.4.1 NMAC, Subpart IX, §270.11(d)(1).

We are hopeful that this extensive information submittal will expedite the current schedule for the renewal of the DOE/UC hazardous waste facility permit.

If you have questions concerning this submittal, please contact Gene Turner of my staff at (505) 667-5794, or Jack Ellvinger, UC/LANL, at (505) 667-0633.

Sincerely,



David A. Gurulé, P.E.
Area Manager

LAAME:3GT-008

Enclosures

cc:

See page 3

cc w/o enclosures:
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ATTACHMENT A
LIST OF ENCLOSED MAPS

MAP NUMBER	MAP TITLE	NMED PRS NAME	NMED SWMU NUMBER
G109605	MDA-A	MDA-A	21-014
G109603	MDA-B	MDA-B	21-015
G109596	MDA R	MDA-R	16-019
G109604	MDA-U	MDA-U	21-017(a)-99
G109606	MDA-V	MDA-V	21-018(a)-99
G109607	MDA W	MDA-W	35-001
G109608	MDA X	MDA-X	35-002
G109609	Surface Impoundments 35-003(d)-00	Surface Impoundments	35-003(d,r)
G109610	Surface Impoundments 35-010(a)-99	Surface Impoundments	35-010(a-e)
G109599	MDA AB, Area 1	MDA-AB	49-001(a-g)
G109598	MDA AB, Areas 2, 2A, 2B	MDA-AB	49-001(a-g)
G109601	MDA AB, Area 3	MDA-AB	49-001(a-g)
G109600	MDA AB, Area 4	MDA-AB	49-001(a-g)
G109612	Background locations at MDA AB	MDA-AB	49-001(a-g)

**Response to Request for Information
Pursuant to the New Mexico Hazardous Waste Act
and the Resource Conservation and Recovery Act,
Los Alamos National Laboratory
EPA ID No. 0890010515**

April 2001

**Prepared by:
Los Alamos National Laboratory
Hazardous and Solid Waste Group (ESH-19)
Los Alamos, New Mexico 87545**

**Response to Request for Information
Pursuant to the New Mexico Hazardous Waste Act
and the Resource Conservation and Recovery Act
Los Alamos National Laboratory
EPA ID No. 0890010515**

Introduction

The following information is the submittal for the 60-day portion of the response by Los Alamos National Laboratory (LANL) to a Request for Information (RI) sent by the New Mexico Environment Department (NMED) on February 12, 2001. The full title of the RI is "Request for Information Pursuant to the New Mexico Hazardous Waste Act and the Resource Conservation and Recovery Act, Los Alamos National Laboratory, EPA ID No. 0890010515," officially received by LANL on February 16, 2001. The RI asked for additional information to prepare corrective action requirements in conjunction with the renewal of the LANL Resource Conservation and Recovery Act (RCRA) Hazardous Waste Facility Permit, originally issued on November 8, 1989.

This document consists of responses to 19 information requests contained in the RI. As stated in Instruction No. 7 on page 3 of the RI letter, the response to these 19 requests was required within sixty (60) days of the receipt of the RI. This response includes appendices with supplemental information, as referenced in the individual responses to the numbered information requests. NMED's original information requests are included in this document as italicized text for ease of review. A copy of the original RI is also included as Appendix A.

A general point regarding LANL's responses to the RI is that continuing efforts are being made to obtain the information requested. The effort involved in identifying and retrieving information responsive to the comprehensive nature of the RI will, of necessity, involve a longer timeframe than the 60 days stipulated. The information presented to date was obtained from existing waste management and Environmental Restoration (ER) Project databases, and various previously submitted or published reports. The information has been collected using waste management documentation and site characterization procedures developed since the 1970s in compliance with developing regulations and policies. These sources represent the majority of the relevant information available for recent radioactive and mixed waste streams at LANL and for the hazardous and solid waste generated by ER activities discussed in the responses to Request Nos. 12-17.

LANL has initiated efforts to collect historical and other process-generation documentation from internal waste-generating organizations to supplement the information presented in this response, and will submit this supplemental information as soon as it is received, reviewed, and prepared for transmittal. LANL proposes a similar submittal schedule as that suggested (and subsequently approved by the NMED in a

letter dated March 13, 2001) for ongoing corrective action information submittals in the first 15-day response to this RI for Request No. 18, submitted to the NMED on March 1, 2001. Proposed dates for submittal of supplemental data collected for this 60-day response are May 15, June 15, and July 15, 2001. These proposed submittal dates may need to be modified, subject to NMED approval, if unforeseen circumstances (e.g., amount of information required to be collected, additional information request clarifications, and security review and classification requirements) further affect the information retrieval schedule. Specific details regarding supplemental submittals of data are included in the individual responses below, as appropriate for the discussion.

Discussion

The information contained in this response has been developed from existing data and databases, consultation with appropriate internal LANL organizations, and from previously published documents and reports, in accordance with Instruction Nos. 3 and 6 of the RI. The following discussion is provided for clarification of specific issues raised in LANL's presentation of this information.

In answer to Request Nos. 4, 14, and 15, the regulatory waste characterization classifications (i.e., characteristic hazardous waste, listed hazardous waste) discussed have not been determined for wastes or waste streams managed prior to the regulatory development of the classification system. The only exception may be 'retroactive' listing if the waste or waste stream has been subsequently managed.

It should be noted that certain material is not subject to RCRA regulation as a hazardous waste or a hazardous constituent but may nonetheless be included in this response. This includes material that is not "hazardous waste" because:

- it is either not the prerequisite solid waste, or
- it is solid waste but does not exhibit a characteristic, is not listed, or does not pose a substantial threat to human health or the environment.

It may also include material that would not be considered a "hazardous constituent" subject to corrective action because:

- it did not emanate from a solid waste management unit (SWMU) as prescribed by the statute, or
- it was released from a SWMU but was otherwise subject to a different Act.

For example, although source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (as amended, 42 U.S.C. 2001 *et seq.*) (AEA) is exempt from the definition of solid waste and hence not a hazardous waste, LANL has provided this information in response to Request No. 2. Another example is material discharged from an outfall subject to the National Pollutant Discharge Elimination System. Pursuant to statute, regulation, and supporting interpretive *Federal Register* preamble,

this material is neither solid waste nor does it contain hazardous constituents subject to RCRA corrective action. Information regarding this material is also provided to the extent it is available (LANL's Water Quality and Hydrology Group has additional outfall data collected under Clean Water Act requirements).

In addition to data provided regarding material not regulated by RCRA, information about several Potential Release Sites (PRS) that are not subject to the Hazardous and Solid Waste Amendments (e.g., active firing sites that do not manage waste or are not yet closed) is also included in this submittal. However, because the requested information pertains to materials and areas regulated by other authorities, LANL reserves its objections to this request and subsequent use of the data for any resulting draft permit conditions.

Information Requests and Responses

1. *Please identify each radionuclide waste or waste stream, including mixed and non-mixed wastes, that is currently or has been at any time generated, treated, stored, disposed of, otherwise managed at, or transported to the LANL Facility, and that meets the statutory definition of "hazardous waste" in section 1004(5) of RCRA, 42 U.S.C. § 6903(5). (Please note that the statutory definition is broader than the regulatory definition.)*

LANL began generating radioactive waste in the 1940s and continues to manage radioactive and mixed waste as a result of research and development activities supporting its national role in nuclear weapons development and maintenance, energy research, and medical studies. Radioactive waste generated at LANL includes operational or routine waste, non-routine waste, and waste from ER and decontamination and decommissioning (D&D) activities. Operational waste consists of a wide range of laboratory materials, including compactible trash (e.g., paper, cardboard, and plastic), rubber, glass, disposable protective clothing, solidified powders and ash, biological waste, and suspect radioactive waste (material that may have been contaminated due to its presence in a radioactive materials management area). Non-routine waste includes classified waste and large contaminated equipment. ER and D&D waste generally consists of equipment and scrap metal, building debris, and soil.

The management and description of these types of waste at LANL has changed as different regulatory mechanisms have come into being. These have included improved radioactive waste stream management procedures implemented through the U.S. Department of Energy (DOE) and the regulation of mixed waste (hazardous waste with a radioactive component) through RCRA.

Prior to the late 1950s, radioactive waste generated or stored at LANL was handled without significant distinctions and was disposed of in various formal and informal areas, now referred to as Material Disposal Areas (MDA) and PRSs. The best source

of records obtained for these wastes at this time is ER Project data associated with site characterization efforts for these sites. Appendix B is a list of all LANL PRSs that are suspected or confirmed to contain radionuclide concentrations, as defined by the DOE.

LANL also retrieved the available information pertaining to the radionuclide wastes or waste streams that may be present in PRSs whose corrective action is being managed by the ER Project. LANL searched the ER Project PRS Database for all PRSs identified as having radionuclides associated with them. As part of DOE's Integrated Planning, Accountability, and Budgeting System-Information System, the "radioactive site" code in the PRS Database initially was assigned by the DOE to any PRS for which radionuclides were known or suspected to be present at the site. The PRS Database does not specify the source of the radionuclides, nor does it provide any information regarding exemptions pertaining to the AEA; therefore, LANL's search was all-inclusive and unbiased. This search identified a subset of 299 PRSs, listed in Appendix B, with the potential to have had radionuclide wastes or waste streams initially disposed of in them. Any PRSs that were previously recommended for No Further Action and that were subsequently and formally removed from LANL's Hazardous Waste Facility Permit were not included in this list. Data from these 299 PRSs were reviewed to respond to Request Nos. 1-11 of this RI. Because some of the 108 PRSs described in the response to Request No. 12 have radioactive wastes or waste streams associated with them, data regarding these PRSs are discussed in Request No. 12 and will not be discussed further in the responses to Request Nos. 1-11.

The available information about radionuclide wastes and waste streams disposed at LANL PRSs, including determinations as to whether or not a waste met the statutory definition of hazardous waste at the time of initial disposal, falls into two categories:

- information contained in published documents previously provided to the U.S. Environmental Protection Agency (EPA) and the NMED, including the RCRA Facility Assessment (RFA), the SWMU Report, and the Operable Unit (OU) RCRA Facility Investigation (RFI) workplans; and
- data about wastes removed from PRSs, which are included in Appendix C of this response.

These two categories of information are discussed further below.

Unless the PRS has been excavated, the information contained in published documents about wastes and waste streams disposed of at a PRS, although limited, is all that has been identified as relevant to this request. Most or, in some cases, all the wastes were disposed of at the PRS before the enactment of RCRA, or before the effective date of regulation (and the applicability of the regulatory definition of hazardous waste). Exhaustive investigations were conducted by EPA contractors, and subsequently by LANL personnel and subcontractors in the 1980s and early 1990s to locate all existing information about the LANL PRSs, including waste information, as

documented in the RFA, the SWMU Report, and the OU RFI workplans and their associated correspondence.

The historical information available regarding these wastes was generally obtained from interviews of personnel responsible for the waste or the site in which it is now located. Occasionally, the information could be supplemented by file memoranda, reports, historical photographs, or other documents that may have provided information regarding physical or chemical properties of the waste at the time of disposal. The information has not always been sufficient to allow LANL to determine whether or not the waste would meet a statutory or regulatory definition of hazardous waste. Upon excavation, determinations were made to confirm appropriate management requirements; meanwhile, the waste was and/or is being managed subject to an approved corrective action program.

Understanding and managing the wastes disposed of in PRSs has been the basis of the ER Project's corrective action program. This approach follows the corrective action requirements of the proposed RCRA Subpart S regulations, and has received the concurrence of the EPA and the NMED via their approval of the LANL Installation Work Plan and subsequent RFI reports, voluntary corrective action reports, and reports of other activities at LANL PRSs.

The second category of available information about radionuclide wastes and waste streams at LANL PRSs consists of data about wastes that have been removed from PRSs and were subsequently sent on- or off-site for disposal. This category of information is included in Appendix C of this response, or in documents previously submitted to the NMED or those listed herein in Appendix D. At the time of removal, the excavated materials became subject to current waste management definitions and regulations. Therefore, the data available regarding those wastes are obtained and analyzed using the same system as for other LANL wastes, and maintained within the same database. The ER Project currently is reviewing its records to identify sites among the 299 PRSs from which wastes have been removed. This analysis was not complete at the time of this submittal; therefore, it will be provided to the NMED in a separate submittal, in accordance with Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

The ER Project PRS database does not distinguish between low-level waste (LLW), mixed low-level waste (MLLW), transuranic (TRU) waste, and mixed TRU (MTRU) waste. A list of documents not previously submitted to the NMED and that contain radiological waste information (e.g., wastes generated or disposed of) for these ER-characterized sites is provided in Appendix D.

The Technical Area (TA) 54, Area G, disposal area began receiving radioactive waste for disposal in pits in 1957. Waste disposal activities were recorded in paper logbooks that are currently being reviewed for security issues. Examples of these logbooks are included with this response as Appendix E. The logbooks contain a large amount of

handwritten information that appears to be irrelevant for the disposal and waste management purposes of this RI. LANL proposed (during a meeting on April 2, 2001, between Carl Will [NMED Hazardous Waste Bureau], Gene Turner [DOE Los Alamos Area Office], and Jack Ellvinger [LANL]) that complete copies of these logbooks not be produced until the NMED reviews the examples in Appendix E.

In accordance with 1970 DOE policy (Atomic Energy Commission Immediate Directive 0511-21), waste at Area G was categorized by its radionuclide content and managed separately as LLW or TRU waste. At that time, the types and quantities of LLW and TRU waste stored or disposed of at TA-54 were recorded on manifests as separate shipments. Information about each waste shipment managed since 1970 at TA-54, Areas G and L, is presented in the database included herein as Appendix C. The database captures all available information from TRU Waste Storage Records (TWSR) and from Radioactive Solid Waste Disposal (RSWD) and Chemical Waste Disposal Request (CWDR) forms used for waste shipping and management at LANL. Tables explaining the waste description codes used in the database are also provided with Appendix C. A review of the wastes buried at Area G, including waste descriptions, radionuclide content, and operational history, was conducted during preparation of the "Radioactive Waste Inventory for the TA-54, Area G Performance Assessment and Composite Analysis," which is available electronically at <http://swo.lanl.gov/PA/PDF>. In addition, pit and shaft inventories for Areas G and L are included in the "Operable Unit 1148 Data Report," submitted in 1992.

Prior to 1986, no distinction was made between storing and/or treating mixed waste and management of non-mixed radioactive waste. Almost all radioactive waste (including mixed) generated at LANL prior to 1986 was stored and/or treated on site. After July 1986 when the EPA clarified authority over the regulation of the hazardous component of mixed waste, LANL managed mixed waste separately from non-mixed radioactive waste through on-site storage and/or treatment. In 1991, LANL established interim status storage and treatment areas for mixed waste, pending the RCRA permitting of these units. Identification of these units and, for the purposes of this response, descriptions of these wastes were provided in the January 25, 1991, "Hazardous Waste Permit Application: Part A Permit Application for Mixed Waste," and in waste analysis plans of Part B permit applications subsequently submitted to the NMED. The most recent mixed waste stream descriptions are contained in Appendix B of the "Los Alamos National Laboratory General Part B Permit Application," Revision 1.0, submitted to the NMED in October 1998.

Additional supporting documents with detailed records describing and documenting radioactive and mixed waste streams previously submitted to the NMED include:

- The "Compliance Order Site Treatment Plan FFC Act" (STP), which was originally submitted in 1995. The most recent approved revision of the STP was submitted to the NMED in January 2000. In 1995, LANL prepared and implemented the STP in accordance with the Federal Facility Compliance Act. The Background Volume of

the STP discusses the preferred options for treating MLLW stored or generated at LANL and includes waste stream descriptions and existing inventories. Appendix F presents a crosswalk of the DOE Treatability Groups used in the STP for tracking mixed waste with the waste categories described in Appendix B, the Waste Analysis Plan, of the "Los Alamos National Laboratory General Part B Permit Application," Revision 1.0, submitted to the NMED in October 1998.

- The 1990-92 Waste Stream Characterization Survey (WCS) was conducted to meet the reporting requirements contained in Attachment I of the 1989 LANL Hazardous Waste Facility Permit. For the WCS, LANL prepared and submitted summary reports with room-by-room records of the wastes generated at the Laboratory, including descriptions and generation processes for radioactive and mixed wastes. Although the information is no longer current, the survey is still indicative of the types of wastes generated and the waste-generating processes at LANL.
- The LANL Biennial Report, submitted to the EPA and the NMED as required by the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart III, §262.41, provides information on the hazardous waste component and volumes for mixed waste streams generated and subsequently managed at LANL. The most recent report was submitted in March 2000.

Treatment is discussed further in the response to Request No. 8, and a discussion of wastes transported to TA-54 is provided in the response to Request No. 7.

Ray Hahn (Facility and Waste Operations Division (FWO) Solid Waste Operations (SWO) Group Leader) and Paul Schumann (ER Project Team Leader) provided information used to prepare the ER Project portion of this response. Ray Hahn provided information used to prepare the TA-54 portion of this response, and Gian Bacigalupa (Hazardous and Solid Waste Group [ESH-19] Technical Staff Member [TSM]) collected information used to prepare the remaining waste management portion of this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 1 are identified in the text above.

Any additional waste management information that can be identified regarding generation, treatment, storage, disposal, recycling, and transportation of radioactive and mixed waste will be produced in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

2. *Please identify each radionuclide waste or waste stream, including mixed and non-mixed wastes, that is currently or has been at any time generated, treated, stored, disposed of, otherwise managed at, or transported to the LANL Facility, and that meets the following criteria: a) LANL claims the waste to be exempt from regulation as a solid waste under section 1004(27) of RCRA, 42 U.S.C. § 6903(27), because such waste meets the definition of source, special nuclear, or*

by-product material as defined by the Atomic Energy Act, 42 U.S.C. §§ 2011 et seq.; and b) the waste would meet the statutory definition of "hazardous waste" in section 1004(5) of RCRA, 42 U.S.C. § 6903(5), but for such exemption.

Each radioactive waste that is currently or has been managed since 1970 at TA-54, Areas G and L, at LANL and that is exempt from regulation as solid waste because the waste meets the definition of source, special nuclear, or by-product material as defined by the AEA is presented in the database included herein as Appendix C. In this database, identified AEA waste is indicated by a checkmark in the column titled "AEA." A discussion of wastes managed prior to 1970 is presented in the response to Request No. 1.

Mixed waste is not addressed in this response because the criteria set forth in Request No. 2a and 2b could not be met. If a waste was by definition mixed, LANL would not have claimed it to be exempt from regulation as solid waste (2a). By its very nature, it is a combination of a radioactive waste component exempt from RCRA and a hazardous waste component subject to RCRA. Such a mixture could never simultaneously be exempt from the definition of solid waste in its entirety, as suggested in the criterion set forth in Request No. 2a, while meeting the definition of solid waste necessary to be a mixed waste.

All information about the radionuclide wastes and waste streams *in situ* in unexcavated LANL PRSs, including their AEA status, to the extent it is available, was provided to the EPA and the NMED in the RFA, the SWMU Report, and the OU RFI workplans, unless those data have since been supplemented by additional investigations and reported in subsequent RFI reports, voluntary corrective action reports, and/or reports of other activities at LANL PRSs. All information about the radionuclide wastes and waste streams removed from LANL PRSs, including their AEA status, to the extent it is available, is included in Appendix C of this response, or in documents previously submitted to the NMED or listed herein in Appendix D.

LANL is submitting information on material that is AEA exempt and also, but for the exemption, may meet the statutory definition of "hazardous waste." These materials possess certain qualities that may be similar to EPA's definition of ignitable, corrosive, reactive, or toxic materials. Because neither EPA nor DOE have prescribed constituent-specific criteria for concentrations of radioactive material that would pose a substantial threat to human health and the environment if improperly managed, LANL believes the information presented adequately describes, to the extent possible, exempt AEA material that would meet the conditions of this request.

Ray Hahn (FWO-SWO Group Leader) provided information used to prepare the TA-54 portion of this response. Ray Hahn and Paul Schumann (ER Project Team Leader) provided information used to prepare the ER Project portion of this response. Alice Barr (ESH-19 TSM) also provided information used to prepare this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Any additional waste management information that can be identified regarding the generation, treatment, storage, disposal, recycling, and transportation of AEA exempt radioactive waste at LANL will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

3. *For each waste and waste stream identified in response to Request #1 and #2, please provide a detailed description of the radioactive, chemical, and physical properties of the waste. Include in your response a description of all radionuclides, all radioactive decay chains, and the half-lives of both the radionuclides and their daughter products.*

For wastes managed at TA-54, Areas G and L, a description of the radioactive, chemical, and physical properties of the waste, to the extent known, is provided in the database included herein as Appendix C. In this database, the radioactive properties are described in the column titled "Radioisotope Content." The chemical properties are described in the columns titled "Code" and "RCRA Codes Assigned." EPA Hazardous Waste Numbers (RCRA Codes) have been assigned only for those mixed wastes managed after the effective date of regulation (July 25, 1990). The physical properties are described in the column titled "State," and are denoted as solid (S), liquid (L), or gas (G).

The radionuclides and levels of radioactivity determined at the time the waste was received at TA-54 are described in the database. A description of radionuclides, radioactive decay chains, and the half-lives of radionuclides and their daughter products can be found in the publication titled *Table of Radioactive Isotopes*, written by Edgardo Browne and Richard B. Firestone, edited by Virginia S. Shirley, and published by John Wiley & Son, 1986. A comprehensive commercial database on radioactive wastes is available at <http://radwaste.org>.

As discussed under Request No. 1, LANL retrieved the information pertaining to radionuclide wastes or waste streams that may be present in PRSs whose corrective action is being managed by the ER Project. Data from the 299 PRSs identified in the PRS database search were reviewed to respond to this request. All available information about radioactive, physical, and chemical properties of the radionuclide wastes and waste streams *in situ* in unexcavated LANL PRSs was provided to the EPA and the NMED in the RFA, the SWMU Report, and the OU RFI workplans, unless those data have since been supplemented by additional investigations and reported in subsequent RFI reports, voluntary corrective action reports, and/or reports of other activities at LANL PRSs. All available information about radioactive, physical, and chemical properties of the radionuclide wastes and waste streams removed from LANL PRSs is included in Appendix C of this response, or in documents previously submitted to the NMED or listed herein in Appendix D.

Ray Hahn (FWO-SWO Group Leader) provided information used to prepare the TA-54 portion of this response. Ray Hahn and Paul Schumann (ER Project Team Leader) provided information used to prepare the ER Project portion of this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 3 are identified in the text above. The TA-54 database, provided herein as Appendix C, captures information from TWSRs and from RSWD and CWDR forms, as discussed in the response to Request No. 1.

Any additional waste management information that can be identified regarding the descriptions of radioactive, chemical, and physical properties of radioactive and mixed waste generated at LANL will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

4. *For each waste and waste stream identified in response to Request #1 and #2, please state whether or not the waste exhibits any of the characteristics of a hazardous waste under 40 C.F.R. pt. 261, subpt. C:*
 - a. *Ignitability under 40 C.F.R. § 261.21;*
 - b. *Corrosivity under 40 C.F.R. § 261.22;*
 - c. *Reactivity under 40 C.F.R. § 261.23;*
 - d. *Toxicity under 40 C.F.R. § 261.24.*

For wastes managed at TA-54, Areas G and L, the hazardous waste characteristics for each waste and waste stream identified in response to Request Nos. 1 and 2, to the extent known, are presented in the database included herein as Appendix C. The hazardous waste characteristics are identified in the column titled "RCRA Codes Assigned." EPA Hazardous Waste Numbers (RCRA Codes) have been assigned only for those mixed wastes managed after the effective date of regulation (July 25, 1990).

As discussed under Request No. 1, LANL retrieved the information pertaining to radionuclide wastes or waste streams that may be present in PRSs whose corrective action is being managed by the ER Project. Data from the 299 PRSs identified in the PRS database search were reviewed to respond to this request. All available information about whether the radionuclide wastes and waste streams *in situ* in unexcavated LANL PRSs meet any of the characteristics of a hazardous waste was provided to the EPA and the NMED in the RFA, the SWMU Report, and the OU RFI workplans, unless those data have since been supplemented by additional investigations and reported in subsequent RFI reports, voluntary corrective action reports, and/or reports of other activities at LANL PRSs. All available information about whether the radionuclide wastes and waste streams removed from LANL PRSs meet

any of the characteristics of a hazardous waste is included in Appendix C of this response, or in documents previously submitted to the NMED or listed herein in Appendix D.

Ray Hahn (FWO-SWO Group Leader) provided information used to prepare the TA-54 portion of this response. Ray Hahn and Paul Schumann (ER Project Team Leader) provided information used to prepare the ER Project portion of this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

5. For each waste and waste stream identified in response to Request #1 and #2, please state whether or not the waste contains any hazardous constituents listed under 40 C.F.R. pt. 261, Appendix VIII and name the specific constituent or constituents.

LANL waste management organizations do not have a process in place that specifically tracks or identifies only those hazardous constituents that are listed under 20.4.1 NMAC, Subpart II, Part 261, Appendix VIII. Beginning in the early 1990s, individual waste generators at LANL were required to complete a Waste Profile Form (WPF) that documents the characterization of each generated waste stream. The WPF requires the generator to identify the hazardous and inert components in the waste stream. Some, but not all, of the chemicals and waste components listed are contained in Appendix VIII. Paper copies of all WPFs are maintained within the document control organization at TA-54. In addition, an electronic Waste Profile Management Database (WPMD) has been developed. This electronic database contains specific information on all WPFs related to hazardous waste determinations. It includes a data field that identifies constituents and contaminants. The WPMD does not, however, contain any radiological information. Therefore, it cannot be searched to provide a list of the constituents and contaminants within radiological waste streams. For hazardous and mixed waste shipments that are sent off site, LANL completes a Land Disposal Restriction (LDR) certification. As part of this certification, LANL identifies all Underlying Hazardous Constituents that are contained in the waste. The LDR certifications are maintained with the Hazardous Waste Manifests for each shipment and are stored in the document control organization at TA-54. These records are reviewed by NMED during their periodic inspections. LDR certifications are generated only at the time of shipment and are not generated for waste that has solely a radioactive component. LANL has not yet fully developed an electronic database from the LDR records.

The TA-54 database (Appendix C) does not contain complete details regarding hazardous constituents identified in Appendix VIII. The information contained in this database for the ER-characterized sites is at the same level of detail.

Ray Hahn (FWO-SWO Group Leader) provided information used to prepare the TA-54 portion of this response. His address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 5 are included herein as Appendix C. The TA-54 database captures information from TWSRs and from RSWD and CWDR forms, as discussed in the response to Request No. 1.

6. *For each waste and waste stream identified in response to Request #1 and #2, please provide a detailed description of the generation of the waste, including the location of its generation, the date of its generation, the process or processes by which it was generated, and the volume of waste that was generated.*

Mixed waste-generating processes are described in Appendix B, the Waste Analysis Plan, of the "Los Alamos National Laboratory General Part B Permit Application," Revision 1.0, submitted to the NMED in October 1998. Radioactive and mixed waste-generating processes were also identified and described in the "Los Alamos National Laboratory Site-Wide Environmental Impact Statement" (SWEIS), submitted to the NMED in 1999. The most recent revision of this information is contained in the "SWEIS Yearbook-1999," included as Appendix G of this response. Detailed process and waste descriptions for MTRU waste generated and managed at the TA-55 facility have been developed recently and are provided in Appendix H of this response. This information consists of electronic copies of acceptable knowledge reports developed for the LANL Transuranic Waste Certification Program that are used for waste disposal documentation at the Waste Isolation Pilot Plant. The reports provide information on waste-generating processes and locations and types of waste generated.

As discussed under Request No. 1, LANL retrieved the information pertaining to radionuclide wastes or waste streams that may be present in PRSs whose corrective action is being managed by the ER Project. Data from the 299 PRSs identified in the PRS database search were reviewed to respond to this request. All available information about the generation of the radionuclide wastes and waste streams *in situ* in unexcavated LANL PRSs (including location, dates, process, and volumes) was provided to the EPA and the NMED in the RFA, the SWMU Report, and the OU RFI workplans unless those data have since been supplemented by additional investigations and reported in subsequent RFI reports, voluntary corrective action reports, and/or reports of other activities at LANL PRSs. All the available information for radionuclide wastes and waste streams removed from LANL PRSs is included in Appendix C of this response, or in documents previously submitted to the NMED or listed herein in Appendix D.

Ray Hahn (FWO-SWO Group Leader) and Gian Bacigalupa (ESH-19 TSM) provided information used to prepare the operational waste management portion of this response. Ray Hahn and Paul Schumann (ER Project Team Leader) provided information used to prepare the ER Project portion of this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 6 are identified in the text above.

Any additional waste stream descriptions that can be identified for radioactive and mixed waste at LANL will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

7. For each waste and waste stream identified in response to Request #1 and #2 that was transported to the LANL Facility from elsewhere, please state the origin of the waste, the volume of the waste transported to the LANL Facility, broken down by shipment if possible, and the date or dates the waste was received at the LANL Facility.

For wastes transported to TA-54, the requested information is presented in a report titled "Disposal of Offsite Generated Radioactive Waste," which is provided herein as Appendix I. The report summarizes the wastes received for storage or disposal at Area G from off-site generators. An additional shipment of waste received from the New Mexico Health Department was disposed of on March 30, 1970. This was radium waste (estimated at 100 Curies) in a stainless steel cask. In the database included herein as Appendix C, wastes from off-site sources are indicated with an "XX" in the column titled "TA."

LANL periodically receives small amounts of Nuclear Regulatory Commission-licensed material from off site in the form of radioactive sealed sources that are stored at TA-54, Area G. Additional information regarding this material will be made available upon request.

As discussed under Request No. 1, LANL retrieved the information pertaining to radionuclide wastes or waste streams that may be present in PRSs whose corrective action is being managed by the ER Project. Data from the 299 PRSs identified in the PRS database search were reviewed to respond to this request. In no known cases have wastes from non-LANL sources been transported to and/or disposed of in these PRSs. Some of the 299 PRSs listed in Appendix B, particularly those identified in TA-0, TA-1, TA-73, and a few other sites, are in locations that were within the facility boundary at the time of initial disposal of wastes at the PRS. Although property ownership may have been transferred outside DOE, the PRSs remain under the control of LANL, and continue to remain listed in (and subject to the requirements of) Module VIII of LANL's Hazardous Waste Facility Permit. Where wastes have been excavated and subsequently removed from these PRSs, all available information about the radionuclide wastes and waste streams from the PRSs, including origin, volumes transported, and dates the wastes and waste streams were received, is included in Appendix C of this response, or in documents previously submitted to the NMED or listed herein in Appendix D.

In most such instances, the excavated wastes were transported to TA-54 for further management and/or disposal. Therefore, they are reported in this response as wastes

"transported to the facility from elsewhere," although they are from LANL PRSs located within former facility boundaries. In 1994-1995, waste was received from off-site PRSs using temporary EPA Identification Numbers. Reports on these shipments were submitted to the NMED. Subsequently, Table 2-1 of Module II of the 1989 LANL Hazardous Waste Facility Permit was modified to include other off-site PRSs that could require transport of wastes to the facility. As stated in the response to Request No. 1, the ER Project currently is reviewing its records to identify off-site PRSs among the 299 PRSs from which wastes have been excavated, if any.

Ray Hahn (FWO-SWO Group Leader) provided information used to prepare the TA-54 portion of this response. Ray Hahn, Terry Rust (ER Project Team Leader), and Paul Schumann (ER Project Team Leader) provided information used to prepare the ER Project portion of this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 7 are identified in the text above.

Any additional waste management information regarding the transportation of radioactive and mixed waste to LANL that can be identified will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

8. *For each waste and waste stream identified in response to Request #1 and #2 that was treated at the LANL Facility, please provide a detailed description of the treatment, including the method or process of treatment, the effectiveness of the treatment in reducing the hazardous properties of the waste, and the volume of waste treated.*

For the purposes of this response and resulting submittals, past and current radioactive and mixed waste treatment methods or processes at LANL are described as:

- Non-RCRA radioactive waste treatment
- Treatment that is not subject to RCRA interim status or permitting requirements (e.g., reclamation, elementary neutralization, wastewater treatment units)
- Mixed waste treatment
- Maintenance activities that allow the continued use of radioactively-contaminated material.

The basis for these categories includes the need to distinguish between treatment processes for radioactive and mixed waste streams, the RCRA definition of "treatment," and processes managed under separate regulatory mechanisms. LANL is continuing to identify and collect information about treatment processes.

Radioactive waste treatment methods or processes used at LANL have included non-traditional *in-situ* vitrification (NTISV) of low-level radioactively-contaminated soils, the Thermo-Nuclear™ Segmented Gate System (SGS) for radioactively-contaminated soils, and incineration. A description of the NTISV treatment process is available electronically at <http://www-emtd.lanl.gov/SubCon/NTISV.html>. A description of the SGS was presented in the Voluntary Corrective Action Report for SWMU No. 33-007(c), dated September 30, 1996, and submitted to the NMED. A description of the treatment process, effectiveness, and waste volumes for incineration at the Controlled Air Incinerator at TA-50, for which RCRA-closure was approved in July 1998, is presented in "Los Alamos National Laboratory Controlled Air Incinerator Resource Conservation and Recovery Act Closure Report and Certification," submitted to the NMED in April 1998.

Sort, survey, and decontamination (SSD) and lead decontamination treatment processes have been used for reclamation and maintenance. Descriptions of SSD and lead decontamination treatment processes, effectiveness, and waste volumes are discussed in the Background Volume of the "Compliance Order Site Treatment Plan, FFC Act," submitted to the NMED in 1995.

Mixed waste treatment processes at LANL include cementation of MTRU waste and MLLW. A description of the treatment process, effectiveness, and waste volumes for cementation at TA-55 is provided in the "Technical Area 55 Part B Permit Application; Building 4, Container Storage Areas 1-11, Storage Tank Systems, Cementation Treatment Unit; Container Storage Pad; Building 185, Container Storage Area," Revision 0.0, submitted to the NMED in June 1996. A description of the treatment process, effectiveness, and waste volumes for cementation at TA-50 is provided in the "Los Alamos National Laboratory Technical Area 50 Part B Permit Renewal Application," Revision 1.0, submitted in January 1999.

Gian Bacigalupa (ESH-19 TSM) and Paul Schumann (ER Project Team Leader) provided information used to prepare this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Further details regarding the volumes of mixed waste treated at LANL, including generator treatment, can be found in the STP and in the LANL Biennial Report, as discussed in the response to Request No. 1. Other documents providing information used to prepare the response to Request No. 8 are identified in the text above.

Any additional waste management information that can be identified regarding treatment of radioactive and mixed waste will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

9. *For each waste and waste stream identified in response to Request #1 and #2 that was stored at the LANL Facility, please state the location of such storage at*

the LANL Facility, the method of storage, the volume of waste stored, and the dates during which each volume of such waste was stored at each such location.

For wastes managed at TA-54, Areas G and L, the location of storage, volume of waste stored, and dates of storage at each location are presented in the database provided herein as Appendix C. The information is shown in the columns titled "Storage History," "Volume," and "RCV Date." Supporting storage information is presented in "Disposal and Storage Facility Information at Area G." As indicated in Appendix J, two copies of this document are provided as a separate package with this submittal.

Wastes are normally shipped to Area G for storage in U.S. Department of Transportation (DOT)-approved containers. A detailed container inspection is performed at the staging area(s) adjacent to the storage location to ensure that the containers are within acceptable parameters. The parameters for acceptance are identified in the LANL Waste Acceptance Criteria (WAC). Waste containers that meet the LANL WAC are accepted for storage and are removed from the transport vehicle by forklift or other waste-handling equipment. Waste containers are surveyed for external contamination and dose rates prior to placement into storage. Drums are placed on metal pallets and then placed into a storage array. Containers are stored in rows separated by aisles that are consistent with applicable permits and codes. Drums banded with metal straps may be stacked three layers high. The container/waste types are grouped/segregated in designated locations. Remote-handled (RH) TRU wastes are stored in shafts. Waste management in shafts is discussed further in the response to Request No. 10.

Trenches have also been used to manage waste. These trenches are approximately 13 feet (ft) long and 4 to 6 ft deep. Waste was placed in two rows of augered holes cut into the floor of the cell. Into each hole was placed a concrete cask. The cask was filled with two 30-gallon metal drums. Each array was backfilled with crushed tuff up to the rims of the casks. After placement of the waste into the casks, the lids were sealed and the area mounded with crushed tuff.

At Area L, mixed wastes are stored inside a dome with secondary containment. The wastes are in DOT-approved containers that meet packaging standards in the Code of Federal Regulations, Title 49, Parts 173-177. The largest container used for storage is the 83-gallon drum. All liquid containers are stored on containment structures. Stored wastes are segregated by chemical compatibility groups and include physical separation and engineered structures. Shaft Nos. 36 and 37 are used at Area L for retrievable storage of high-activity mixed waste lead stringers. Each shaft is constructed of corrugated metal pipe, has a welded metal plate and 1-ft-thick concrete plug at the base, and has a steel cover at the surface. Additional information on storage at Area L is presented in the "Los Alamos National Laboratory Technical Area 54 Part B Permit Renewal Application," submitted to the NMED in January 1999. Storage information for ER-characterization waste that has not yet been shipped off site, if any, is included in the TA-54 database.

The locations for storage of mixed waste at LANL are generator storage areas, and permitted and interim status tanks or container storage areas. A listing of over 2,000 active or closed out generator storage areas (i.e., satellite accumulation areas or <90-day storage areas, as defined by 20.4.1 NMAC, Subpart III, §262.34) that have been or are currently used for storage of mixed waste at LANL is provided as Appendix K of this response. Identification of permitted or interim status mixed waste storage units was originally provided in the January 25, 1991, "Hazardous Waste Permit Application: Part A Permit Application for Mixed Waste." This Part A was subsequently revised due to the addition of new storage areas or closure of existing areas. The most recent listing of approved locations and storage capacities is included in the "Los Alamos National Laboratory General Part A Permit Application," Revision 0.0, submitted to the NMED in April 1998. The methods of storage for these mixed wastes are discussed in TA-specific Part B permit applications, which include:

- "Los Alamos National Laboratory Technical Area 3, Building 29, Chemistry and Metallurgy Research Building Part B Permit Application, Container Storage Unit," Revision 0.0, submitted to the NMED in September 1999
- "Los Alamos National Laboratory Technical Area 50 Part B Permit Renewal Application," Revision 1.0, submitted to the NMED in January 1999
- "Los Alamos National Laboratory Technical Area 54 Part B Permit Renewal Application," Revisions 0.0 and 0.1, submitted to the NMED in January and September 1999, respectively
- "Technical Area 55 Part B Permit Application; Building 4, Container Storage Areas 1-11, Storage Tank Systems, Cementation Treatment Unit; Container Storage Pad; Building 185, Container Storage Area," Revision 0.0, submitted to the NMED in June 1996.

Ray Hahn (FWO-SWO Group Leader) provided information used to prepare the TA-54 portion of this response. Gian Bacigalupa (ESH-19 TSM) collected, from various sources, the information that was used to prepare the generator storage areas and tanks/container storage areas portion of this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 9 are identified in the text above.

Any additional waste management information regarding storage of radioactive waste at LANL that can be identified will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

10. *For each waste and waste stream identified in response to Request #1 and #2 that was disposed of at the LANL Facility, please provide a detailed description of the disposal, including the method of disposal, the location of disposal, the dates of disposal, and the volume of waste disposed of at each such location.*

For wastes managed at TA-54, Areas G and L, the location of disposal, the dates of disposal, and the volume of waste disposed at each location are presented in the database provided herein as Appendix C. The information is shown in the columns titled "Disposal Information" and "Volume." The database captures waste management information from 1970 to present; prior to 1970, this information, if available, is contained in logbooks. A list of the logbooks containing information not included in the database is presented in Appendix E, along with an example page from each logbook, as discussed in the response to Request No. 1. Entries in these logbooks were used as a source of information in Appendix 2e of the *Performance Assessment and Composite Analysis for Los Alamos National Laboratory Material Disposal Area G* (Area G PA, Report-54G-013). (The Area G PA was provided to the NMED; it is available electronically at <http://swo.lanl.gov/PA/PDF>. Appendix 2e of the Area G PA is available electronically at <http://swo.lanl.gov/PA/PDF/Appendix%202.pdf.pdf>.) Supporting disposal information is presented in "Disposal and Storage Facility Information at Area G." As indicated in Appendix J, two copies of this document are provided with this submittal. Additional supporting disposal information (i.e., pit and shaft inventories at Areas G and L) is included in the "Operable Unit 1148 Data Report," submitted in 1992. Information on early disposal at Area G can be found in *History and Environmental Setting of LASL Near-Surface Land Disposal Facilities for Radioactive Wastes (Areas A, B, C, D, E, F, G, and T)* (LA-6848-MS, 1977). Volume I of this report is available electronically at <http://lib-www.lanl.gov/la-pubs/00371730.pdf> and <http://lib-www.lanl.gov/la-pubs/00209943.pdf>. Volume II is available at <http://lib-www.lanl.gov/la-pubs/00309178.pdf>.

At Area G, disposal pits are used for the shallow land burial of LLW. The pits are unlined and managed according to DOE requirements. Ramps are provided on one end of each pit to provide access for waste transporters and heavy equipment. Pits are constructed on an as-needed basis within Area G in accordance with the location requirements identified in the Area G PA. Pit walls must be no closer than 50 ft to the mesa rim and cannot be deeper than 15 ft above the adjacent canyon floors. Pits are filled with waste to within 6.5 ft below the pit surface; the top 6.5 ft of each pit is completed with compacted backfill and restored with indigenous shallow rooting grasses. Backfill is primarily reclaimed crushed tuff that was removed from the pit during excavation. Backfill is transported and placed by a large front-end loader or bulldozer and compacted in place. Fall protection is installed around excavations deeper than 6 ft. Where vehicle traffic is possible, moveable concrete barriers are installed at pit perimeters to prevent vehicles from accidentally falling into open pits. Where vehicle traffic is not possible at pit edges, fall protection consists of barrier chains placed approximately 6 ft from the pit edge with conspicuously posted hazard and warning signs.

Shafts at Area G are used for both disposal and retrievable storage. Shafts may contain radioactive biological waste, polychlorinated biphenyls- and beryllium-contaminated waste, solid LLW, or RH TRU waste. There are approximately 260 shafts in Area G. Individual shafts or shaft groups are conspicuously posted with

provided information used to prepare the ER Project portion of this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 10 are identified in the text above.

Any additional waste management information regarding disposal of radioactive waste and mixed waste at LANL that can be identified will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

11. *For each waste and waste stream identified in response to Request #2, please state the basis for LANL's claim that the waste is exempt from regulation as a solid waste under RCRA because such waste is source, special nuclear, or by-product material as defined by the Atomic Energy Act.*

The following table lists the types of radioactive waste that have been managed as non-RCRA waste identified in the response to Request No. 2. It also indicates the basis for LANL's claim that they are exempt from regulation as solid waste under RCRA because they are source, special nuclear, and by-product material as defined by the Atomic Energy Act, 42 USC §§2011 *et seq.*:

Waste Description	Reason for AEA Exemption
Uranyl Nitrate	Source Material
Thorium Nitrate	Source Material
Pyrophoric Uranium (chips & turnings)	Source Material
Pyrophoric Thorium (chips & turnings)	Source Material
Uranium Hexafluoride	Source Material

Definitions for source, special nuclear, and by-product material are provided at Title II, Section 11 of the AEA.

All information about the radionuclide wastes and waste streams *in situ* in unexcavated LANL PRSs, including their AEA status, to the extent it is available, was provided to the EPA and the NMED in the RFA, the SWMU Report, and the OU RFI workplans, unless those data have since been supplemented by additional investigations and reported in subsequent RFI reports, voluntary corrective action reports, and/or reports of other activities at LANL PRSs. All information about the radionuclide wastes and waste streams removed from LANL PRSs, including the basis for their AEA status, to the extent it is available, is included in Appendix C of this response, or in documents previously submitted to the NMED or listed herein in Appendix D.

Ray Hahn (FWO-SWO Group Leader), Alice Barr (ESH-19 TSM), and Gian Bacigalupa (ESH-19 TSM) collected information used to prepare this response. Paul Schumann

hazard and warning signs. Location requirements for the shafts are identified in the Area G PA, and require that the shafts are set back from the edge of the mesa rim by a minimum distance of 50 ft. LLW shaft depths must be at least 10 ft above the canyon floor and waste must be kept 6.5 ft from the surface. Shafts vary in diameter from 1 to 16 ft and are up to 65 ft in depth. Most of the shafts are unlined, but some have metal liners to facilitate retrieval or to reduce the potential for environmental contamination. Active shafts typically have a steel plate or concrete cover and chain guardrails for fall protection. A concrete collar prevents run-on into active shafts and helps protect the integrity of the top of the shaft. Once filled, the shafts are sealed (capped) with concrete mounds that are placed over a minimum backfill of 6.5 ft of crushed tuff over the waste. At that time, the shafts are marked with a brass cap indicating "Buried Radioactive Wastes," and include the shaft number, radionuclides disposed of or retrievably stored, and dates of use. Active shafts and shafts with high radionuclide content are conspicuously posted with warning signs. Additional information on storage at Area G is presented in the "Los Alamos National Laboratory Technical Area 54 Part B Permit Renewal Application," submitted to the NMED in January 1999, and in the "RCRA Part B Permit Application: Technical Area 54, Area G, Pads 1, 2, and 4, Storage Domes A-D; Chemical Plating Waste Treatment Skid and Treated Liquid Storage Tanks, Technical Area 63, Hazardous Waste Treatment Facility," submitted to the NMED in September 1993.

Additional information on disposal at TA-54, Areas G and L, is presented in the "Closure and Post-Closure Plans for TA-54 Area G Landfill at Los Alamos National Laboratory," submitted to the NMED in September 1985; in the "Closure and Post-Closure Plans for TA-54 Area H and Area L Landfill at Los Alamos National Laboratory," submitted in November 1986; and in the "Closure Plan for Technical Area 54, Material Disposal Area L," submitted in March 1998.

As discussed under Request No. 1, LANL retrieved the information pertaining to radionuclide wastes or waste streams that may be present in PRSs whose corrective action is being managed by the ER Project. Data from the 299 PRSs identified in the PRS database search were reviewed to respond to this request. All available information about the disposal of radionuclide wastes and waste streams remaining *in situ* in unexcavated LANL PRSs, including methods, locations, dates, and volumes, was provided to the EPA and the NMED in the RFA, the SWMU Report, and the OU RFI workplans, unless those data have since been supplemented by additional investigations and reported in subsequent RFI reports, voluntary corrective action reports, and/or reports of other activities at LANL PRSs. All collected information about disposal of the radionuclide wastes and waste streams excavated from LANL PRSs is included in Appendix C of this response, or in documents previously submitted to the NMED or listed herein in Appendix D.

Ray Hahn (FWO-SWO Group Leader) provided information used to prepare the TA-54 portion of this response. Ray Hahn and Paul Schumann (ER Project Team Leader)

(ER Project Team Leader) provided information used to prepare the ER Project portion of this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used in preparing the response to Request No. 11 are identified in the text above. The TA-54 database captures information from TWSRs and from RSWD and CWDR forms, as discussed in the response to Request No. 1.

Any additional waste management information regarding generation, treatment, storage, disposal, recycling, and transportation of AEA exempt radioactive waste at LANL that can be identified will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter. Further discussion of the basis for the AEA exemption as source, special nuclear, or by-product material will be included, as such information is applicable.

12. *For each Site listed in Part 1 of Attachment A, please identify each waste or waste stream that is currently or has been at any time disposed of at the Site.*

The available information identifying wastes and waste streams initially disposed at the 108 LANL PRSs listed in Part 1 of Attachment A of NMED's February 12, 2001, letter, including specific determinations as to whether or not a waste met the statutory or regulatory definitions of hazardous waste at the time of initial disposal, falls into two categories:

- information contained in published documents previously provided to the EPA and the NMED, including the RFA, the SWMU Report, and the OU RFI workplans (unless those data have since been supplemented by additional investigations and reported in subsequent RFI reports, voluntary corrective action reports, and/or reports of other activities at LANL PRSs); and
- data about wastes removed from PRSs, which are included in Appendix C of this response.

These two categories of information are discussed further below.

Regarding wastes remaining *in situ* in the unexcavated PRSs among the 108 listed PRSs, all published documents containing information responsive to this request have been submitted to the NMED previously, either prior to LANL's March 1, 2001, response, or attached (as documents containing Category 1 data) to LANL's previous (March 1 and April 2, 2001) responses. Unpublished Category 2 and 3 data pertaining to these PRSs were submitted to NMED in response to Request No. 18 on March 1, March 16, and April 2, 2001, or will be submitted in the near future.

The available information identifying wastes and waste streams removed from LANL PRSs is included in Appendix C of this response, or in documents previously submitted to the NMED or listed herein in Appendix D. At the time of removal, the excavated materials became subject to current waste management definitions and regulations, just

as with any other waste generated at LANL; meanwhile, they are managed subject to the approved corrective action program.

Ray Hahn (FWO-SWO Group Leader) and Paul Schumann (ER Project Team Leader) provided information used to prepare this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 12 are identified in the text above.

Any additional wastes and waste streams that can be identified will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

13. *For each waste and waste stream identified in response to Request #12, please provide a detailed description of the radioactive, chemical, and physical properties of the waste. Include in your response a description of all radionuclides, all radioactive decay chains, and the half-lives of both the radionuclides and their daughter products.*

The information available about radioactive, physical, and chemical properties of the wastes and waste streams in the unexcavated PRSs included in the 108 LANL PRSs discussed in response to Request No. 12 was provided to the EPA and the NMED in the RFA, the SWMU Report, the OU RFI workplans, and previous submittals to this RI responding to Request No. 18. The available information about radioactive, physical, and chemical properties for the radionuclide wastes and waste streams removed from the 108 PRSs is included in Appendix C of this response.

A description of radionuclides, radioactive decay chains, and the half-lives of radionuclides and their daughter products can be found in the publication titled *Table of Radioactive Isotopes*, written by Edgardo Browne and Richard B. Firestone, edited by Virginia S. Shirley, and published by John Wiley & Son, 1986. A comprehensive commercial database on radioactive wastes is available at <http://radwaste.org>.

Ray Hahn (FWO-SWO Group Leader) and Paul Schumann (ER Project Team Leader) provided information used to prepare this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 13 are identified in the text above.

14. *For each waste and waste stream identified in response to Request #12, please state whether or not the waste is a listed hazardous waste under 40 C.F.R. pt. 261, subpt. D and indicate the specific listing or listings.*

Regarding the 108 LANL PRSs discussed in Request No. 12, the available information about whether the wastes and waste streams *in situ* in unexcavated LANL PRSs met the regulatory definitions of listed hazardous waste at the time of initial disposal was provided to the EPA and the NMED in the RFA, the SWMU Report, and OU RFI workplans, unless those data have since been supplemented by additional investigations and reported in subsequent RFI reports, voluntary corrective action reports, and/or reports of other activities at LANL PRSs. All available information about whether the wastes and waste streams removed from LANL PRSs with radionuclides met the regulatory definitions of listed hazardous wastes is included in Appendix C of this response, or in documents previously submitted to the NMED or listed herein in Appendix D.

Ray Hahn (FWO-SWO Group Leader) and Paul Schumann (ER Project Team Leader) provided information used to prepare this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 14 are identified in the text above.

Any additional information regarding listed hazardous wastes and waste streams that can be identified will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

15. *For each waste and waste stream identified in response to Request #12, please state whether or not the waste meets any of the characteristics of a hazardous waste under 40 C.F.R. pt. 261, subpt. C:*
 - a. *Ignitability under 40 C.F.R. § 261.21;*
 - b. *Corrosivity under 40 C.F.R. § 261.22;*
 - c. *Reactivity under 40 C.F.R. § 261.23;*
 - d. *Toxicity under 40 C.F.R. § 261.24.*

Regarding the 108 LANL PRSs discussed in Request No. 12, the available information about whether the wastes and waste streams *in situ* in unexcavated LANL PRSs met the regulatory definitions of characteristic hazardous waste at the time of initial disposal was provided to the EPA and the NMED in the RFA, the SWMU Report, and OU RFI workplans, unless those data have since been supplemented by additional investigations and reported in subsequent RFI reports, voluntary corrective action reports, and/or reports of other activities at LANL PRSs. All available information about whether the wastes and waste streams excavated from LANL PRSs with radionuclides met the regulatory definitions of characteristic hazardous waste is included in Appendix

C of this response, or in documents previously submitted to the NMED or listed herein in Appendix D.

Ray Hahn (FWO-SWO Group Leader) and Paul Schumann (ER Project Team Leader) provided information used to prepare this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 15 are identified in the text above.

Any additional information regarding characteristic hazardous wastes and waste streams that can be identified will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

16. *For each waste and waste stream identified in response to Request #12, please state whether or not the waste contains any hazardous constituents listed under 40 C.F.R. pt. 261, Appendix VIII and name the specific constituent or constituents.*

Regarding the 108 LANL PRSs discussed in Request No.12, the available information about whether the wastes and waste streams *in situ* in unexcavated LANL PRSs contained Appendix VIII hazardous constituents at the time of initial disposal was provided to the EPA and the NMED in the RFA, the SWMU Report, and OU RFI workplans, unless those data have since been supplemented by additional investigations and reported in subsequent RFI reports, voluntary corrective action reports, and/or reports of other activities at LANL PRSs. For waste removed from the PRSs with radionuclides, the data available in the TA-54 database (Appendix C) do not contain complete information regarding hazardous constituents identified in 20.4.1 NMAC, Subpart II, Part 261, Appendix VIII, as stated in the response to Request No. 5 above.

Ray Hahn (FWO-SWO Group Leader) and Paul Schumann (ER Project Team Leader) provided information used to prepare this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 16 are identified in the text above.

Any additional information regarding whether or not the wastes or waste streams contain any hazardous constituents listed in 20.4.1 NMAC, Subpart II, Part 261, Appendix VIII, that can be identified will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

17. *For each waste and waste steam identified in response to Request #12, please provide a detailed description of the disposal, including the method of disposal,*

the location of disposal, the dates of disposal, and the volume of waste disposed of at each such location.

Regarding the 108 LANL PRSs discussed in Request No. 12, the available information about the initial disposal of the wastes and waste streams *in situ* in unexcavated LANL PRSs, including methods, locations, dates, and volumes, was provided to the EPA and the NMED in the RFA, the SWMU Report, and OU RFI workplans, unless those data have since been supplemented by additional investigations and reported in subsequent RFI reports, voluntary corrective action reports, and/or reports of other activities at LANL PRSs. All available information about on-site or off-site disposal of the wastes and waste streams excavated from LANL PRSs with radionuclides is included in Appendix C of this response, or in documents previously submitted to the NMED or listed herein in Appendix D.

Ray Hahn (FWO-SWO Group Leader) and Paul Schumann (ER Project Team Leader) provided information used to prepare this response. Their address is P.O. Box 1663, Los Alamos, NM 87545.

Documents providing information used to prepare the response to Request No. 17 are identified in the text above.

Any additional information regarding a detailed description, method, location, date and volume of waste disposal that can be identified will be provided in a supplement to this response, as provided by Instruction No. 5 on page 3 of NMED's February 12, 2001, letter.

20. *For each Request #1 through #19, inclusive, identify each and every person who provided information that was used to prepare the response. Identify each such person by name, title or job description, employer, and current or last known address.*

Numerous sources of information (including database retrievals, logbooks, waste characterization documentation, and site characterization reports) were used to prepare this response. This retrieval effort involved a large number of personnel who provided information within their work responsibilities and were otherwise not involved in the direct preparation of this response. Some of the data presented and reports referenced were prepared or authored by personnel no longer employed at LANL. In the interest of brevity, a responsible individual (or individuals) who collected data and prepared the response has been identified for the appropriate portion of the response for each numbered request. If necessary, these individuals can provide further details regarding the preparation of this response. Title or job description, employer, and current or last known addresses for these individuals are also provided in each numbered request, in accordance with Instruction No. 7 of the RI.

21. *For each Request #1 through #19, inclusive, identify each and every document that provided information that was used to prepare your response. Identify each such document by type of document, title or description, author, and date.*

Each and every document that provided information used to prepare responses are identified in the corresponding responses to each numbered request, in accordance with Instruction No. 7 of the RI. The document type, title or description, author, and document date are also provided in each numbered request, per Instruction No. 7.

ATTACHMENT A**PART 1**

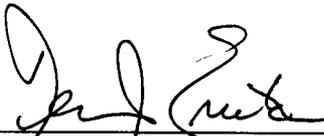
PRS Name	TA	SWMU Number
MDA-A	21	21-014
MDA-B	21	21-015
MDA-C	50	50-009
MDA-D	33	33-003(a)-99
MDA-E	33	33-001(a)-99
MDA-F	6	6-007(a)-99
MDA-K	33	33-002(a)-99
MDA-M	9	9-013
MDA-N	15	15-007(a)
MDA-P	16	16-018
MDA-Q	8	8-006(a)
MDA-R	16	16-019
MDA-S	11	11-009
MDA-T	21	21-016(a)-99
MDA-U	21	21-017(a)-99
MDA-V	21	21-018(a)-99
MDA-W	35	35-001
MDA-X	35	35-002
MDA-Y	39	39-001(b)
MDA-Z	15	15-007(b)
MDA-AA	36	36-001
MDA-AB	49	49-001(a-g)
90's Line	16	16-008(a)
Firing Sites	39	39-004(a-e), 39-008
Firing Sites	15	15-004(f); 15-006(a, c, d); 15-008(a)
Townsite PRS's	0, 1	0-010(b), 1-001(a-w), 1-002, 1-003(a-e)
Outfall	21	21-011(k)
Surface Impoundments	35	35-003(d, r), 35-010(a-e)
Outfalls	46	46-004(g, h, m, q, s, u, v, x, y, z, a2, b2, c2)
Bayo Canyon Sites	10	10-003(a-o), 10-007
Fish Ladder	16	16-003(o)

CERTIFICATION

Submittal of Potential Release Site Maps

**Response to Request for Information
Pursuant to the New Mexico Hazardous Waste Act
and the Resource Conservation and Recovery Act
Los Alamos National Laboratory
EPA ID No. 0890010515**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



Dennis J. Erickson
Division Director for Environment, Safety, and
Health Division
Los Alamos National Laboratory
Operator

April 16, 2001

Date Signed



David A. Gurulé, P.E.
Area Manager, Los Alamos Area Office
U.S. Department of Energy
Albuquerque Operations
Owner/Operator

4/16/01

Date Signed