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Evaluating Off-Site Disposal of Low-Level Waste at LANL – 9498

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ABSTRACT

Los Alamos National Laboratory generates a wide range of waste types, including solid low-level radioactive waste (LLW), in conducting its national security mission and other science and technology activities. Although most of LANL's LLW has been disposed on-site, limitations on expansion, stakeholder concerns, and the potential for significant volumes from environmental remediation and decontamination and demolition (D&D) have led LANL to evaluate the feasibility of increasing off-site disposal. It appears that most of the LLW generated at LANL would meet the Waste Acceptance Criteria at the Nevada Test Site or the available commercial LLW disposal site. Some waste is considered to be problematic to transport to off-site disposal even though it could meet the off-site Waste Acceptance Criteria. Cost estimates for off-site disposal are being evaluated for comparison to estimated costs under the current plans for continued on-site disposal.

INTRODUCTION

Los Alamos National Laboratory conducts extensive science and technology activities that involve radioactive materials such as plutonium, tritium, and uranium, and LANL also operates a large linear accelerator. Wastes from these activities may be contaminated with radioactive materials, and materials are activated in the linear accelerator. These wastes are characterized to determine both hazardous chemical and radioactive constituents, and are managed according to applicable environmental regulatory and Department of Energy (DOE) requirements. Solid wastes with only radioactive constituents (no chemical constituents that make the waste a hazardous waste under the Resource Conservation and Recovery Act or RCRA) and that do not meet criteria for other radioactive waste categories (transuranic waste, high-level waste, spent nuclear fuel, or by-product material) are considered to be low-level radioactive waste or LLW. LANL does not presently generate high-level waste or spent nuclear fuel.

LANL has historically disposed of LLW on the LANL site in Material Disposal Areas or MDAs. Since 1957, LLW has been disposed at MDA G at Technical Area 54 (TA-54), which is shown in Figure 1. This 63 acre site will reach capacity in the near future, and LLW disposal must be moved to a new location. Much of MDA G is also subject to a



Figure 1. Aerial Photograph of MDA G.

Consent Order with the New Mexico Environment Department, with a scheduled date for closure and remediation of December 2015. The Record of Decision from the 1999 LANL Site-Wide Environmental Impact Statement (SWEIS) states that LANL will continue primarily to dispose of its LLW on-site and will move LLW disposal to an area called Zone 4 after the current disposal area (MDA G) is filled. Zone 4 is located on the same mesa top at TA-54 and just west of MDA G, as shown in Figure 2. The Record of Decision from the DOE Waste Management Programmatic EIS documents DOE's decision that on-site LLW disposal is an option for LANL and that LANL has access to off-site LLW disposal at NTS. The 2008 LANL SWEIS treats the decision to move LLW disposal to Zone 4 as part of the "no-action alternative" but also includes analysis of the impacts of shipping LLW off-site for disposal.

The Record of Decision to primarily dispose of LLW on-site at LANL is consistent with provisions within DOE 435.1-1, *Radioactive Waste Management Manual*, which states:

DOE radioactive waste shall be treated, stored, and in the case of low-level waste, disposed of at the site where the waste is generated, if practical; or at another DOE facility. If DOE capabilities are not practical or cost-effective, exemptions

may be approved to allow use of non-DOE facilities for the storage, treatment, or disposal of DOE radioactive waste.

Disposal of LLW at TA-54 is authorized by DOE through a Disposal Authorization Statement that is based on a Performance Assessment and Composite Analysis that evaluates the potential for migration of contamination and compares migration to performance objectives (DOE radiation standards for protection of the public). LANL has developed an update to the Performance Assessment on which the current Disposal Authorization is based. The revised Performance Assessment has been reviewed by the DOE Low Level Waste Facility Federal Review Group and a new Disposal Authorization Statement is in the process of being approved by DOE and the National Nuclear Security Administration.



Figure 2. Location of the proposed Zone 4 expansion area relative to MDA G.

Stakeholders and government entities have expressed opposition to continued on-site disposal of LLW at LANL. San Ildefonso Pueblo is opposed to continued use of TA-54 for disposal because of concerns for environmental contamination arising from waste disposal, and also because TA-54 is located just south across a narrow canyon from

Pueblo property that the Pueblo considers a sacred area. Activities that are audible or visible from the Pueblo land in this area may interfere with the Pueblo's religious activities.

In response to these concerns, LANL is evaluating whether there are other options for managing LLW that would minimize impacts on the environment at LANL and would be responsive to concerns expressed by San Ildefonso Pueblo and stakeholders.

WASTE CHARACTERISTICS

Low-level waste generated at LANL includes debris such as paper, plastic, used equipment, debris from firing sites (explosive testing that may involve materials such as uranium), personal protective clothing, activated metals, empty drums from repackaging of transuranic waste, soils, and debris from demolition of buildings or other structures. There are approximately 100 separate LLW waste streams at LANL.

LANL generated and disposed of approximately 3,000 m³ of LLW in the fiscal year that ended on September 30, 2008. Waste volumes are projected to increase over the next several years with remediation of MDA B (which will consist of removal of all of the buried waste) and D&D of facilities used in the past for plutonium and tritium processing. Figure 3 presents LLW volumes projected for the next 6 years for operational waste generated by Defense Programs and Non-Defense Programs, legacy waste disposition (LWDP), and environmental remediation and D&D (EM/ER).

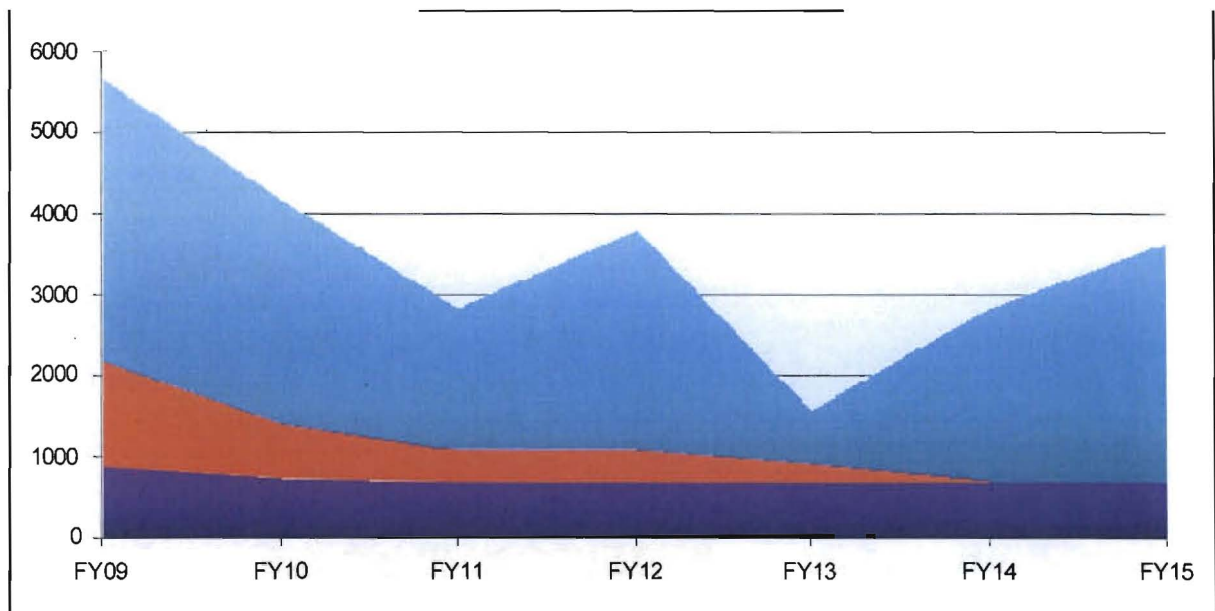


Figure 3. Projections of LLW generation (m³) at LANL; Fiscal Years 2009 through 2015.

All waste generated at LANL goes through a waste acceptance process in which generator information, waste assay, and other characterization information is reviewed to determine whether the waste meets the appropriate waste acceptance criteria. Waste containers containing LLW are received, inspected, surveyed to ensure there is no external contamination, and processed to disposal. LLW processing typically includes disposal only, but LLW with significant volume reduction potential is compacted before disposal in a 200-ton compactor with an 8:1 compaction capability in order to increase disposal efficiency and extend the life of current disposal capacity. This compactor is located at MDA G. Approximately 500 m³ of LLW was compacted in the last fiscal year.

CURRENT DISPOSAL PRACTICES

LLW is disposed at MDA G in unlined pits that are typically 180 to 250 m in length, 45 m in width, and 18 m deep. Higher activity LLW is disposed in shafts that are drilled into the ground and are about 18 m deep, and some 1 to 3 m in diameter. Figure 4 shows a photograph of an active LLW disposal pit at MDA G. Most waste that is disposed is contained within metal boxes, but some low-activity LLW soils are disposed directly without being placed into containers.



Figure 4. Active waste disposal pit at MDA G.

Small volumes of LLW have been shipped by LANL in the past for disposal at the Nevada Test Site and a commercial LLW disposal facility located in Utah.

FEASIBILITY OF OFF-SITE DISPOSAL

Wastes expected to be generated at LANL have been evaluated against the Waste Acceptance Criteria of existing off-site DOE and commercial disposal facilities. Most of the LLW expected to be generated at LANL could be disposed at the Nevada Test Site, and about 80% by volume of the wastes could be disposed as Class A LLW at the existing commercial LLW disposal site located in Utah. The Waste Acceptance Plan for a facility that has applied for a license to dispose of Class A, B, and C LLW and mixed LLW with the Texas Commission on Environmental Quality was also reviewed and found to be very similar to the requirements in the Waste Acceptance Criteria of the existing facilities.

However, a small quantity by volume of the waste expected to be generated at LANL does not currently have a transportation path to either off-site disposal facility. These wastes include high-activity tritium waste, activated waste, and waste that is oversize relative to approved transportation containers that are currently available at LANL. These wastes must continue to be disposed on-site at LANL, unless a transportation path for off-site shipment of these wastes is developed. Shipping casks for high-activity tritium waste are commercially available and will be evaluated to determine if they are suitable for specific tritium waste streams generated at LANL.

LANL is currently pursuing approvals from the Nevada Test Site for certification authority to ship LLW from LANL to the Nevada Test Site. Current plans are to schedule an audit by the Radioactive Waste Acceptance Program in the spring of 2009.

A determination has not been completed as to the extent that off-site shipments of LLW are supported under a Record of Decision under the 2008 LANL SWEIS or other DOE decision documentation under the National Environmental Policy Act (NEPA).

COSTS OF OFF-SITE DISPOSAL RELATIVE TO ON-SITE DISPOSAL

Cost estimates for transportation and disposal fees at both the Nevada Test Site and the available commercial disposal site are straight-forward and readily available. Estimating costs internal to LANL for increased off-site disposal are more difficult because LANL has little experience in off-site disposal. LANL is still in the process of determining resources and facilities necessary to support a potential off-site disposal strategy, so that a detailed estimate of the costs can be developed. This will then be compared to the projected costs for resources and facilities planned for on-site disposal.

PLANNED APPROACH

The volume of LLW that is suitable for off-site disposal will be determined after LANL and DOE are more confident that the operational issues, costs, and risks have been

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adequately evaluated and are completely understood. Regulatory issues, such as NEPA determinations and DOE approval of exemption requests for shipment of LLW to a commercial disposal facility, must also be addressed.