Low-Level Radioactive Waste Management: Transitioning to Off-site Disposal at Los Alamos National Laboratory—11334

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ABSTRACT

Facing the closure of nearly all on-site management and disposal capability for low-level radioactive waste (LLW), Los Alamos National Laboratory (LANL) is making ready to ship the majority of LLW off-site. In order to ship off-site, waste must meet the Treatment, Storage, and Disposal Facility's (TSDF) Waste Acceptance Criteria (WAC). In preparation, LANL's waste management organization must ensure LANL waste generators characterize and package waste compliantly and waste characterization documentation is complete and accurate.

Key challenges that must be addressed to successfully make the shift to off-site disposal of LLW include improving the detail, accuracy, and quality of process knowledge (PK) and acceptable knowledge (AK) documentation, training waste generators and waste management staff on the higher standard of data quality and expectations, improved WAC compliance for off-site facilities, and enhanced quality assurance throughout the process. Certification of LANL generators will allow direct off-site shipping of LLW from their facilities.

INTRODUCTION

For more than 60 years, Los Alamos National Laboratory (LANL) has managed low-level waste on-site and disposed of most LLW in on-site disposal facilities. LANL site processes, procedures, and culture have evolved to support this model. In order to make the shift to an off-site disposal model, a dramatic shift in the current paradigm is required.

In preparation, LANL's waste management organization commissioned several independent, external reviews of LANL processes with the goal of bringing together aspects of the best waste management practices at other DOE facilities to LANL to build

a successful centralized waste management structure. With recommendations from the external assessments, the LANL waste management organization currently is in the process of transition to a sound, sustainable, certifiable, and enduring waste program. This will be accomplished with a minimum of investment by building on LANL policies, processes, and organization strengths combined with other DOE facility documentation and experience.

A compliant and cost effective waste management model relies on clear roles and responsibilities, accurate waste characterization and records, standard procedures, defined and funded budget, and predictable processes. The shift to off-site disposal raised the bar on compliance to the Waste Acceptance Criteria (WAC) for off-site facilities such as the Nevada National Security Site (NNSS, formally Nevada Test Site). Following DOE Complex best practices, waste generators will be certified by the waste management organization to generate waste at their locations. In addition, waste generator organizations will be able to effect and approve institutional policies through a LANL-wide Solid Waste Management Council.

Implementation of Institution-wide changes will require a fundamental culture change that can be facilitated through integrated planning, effective communication, phased implementation, and inclusion of all waste generators.

Figure 1. Compliant packaging and shipping of waste will allow successful direct off-site shipment of waste from LANL facilities.

OVERVIEW OF APPROACH

Implementation of cradle to grave waste management changes will necessitate closely aligned changes to multiple aspects of waste management including clarification of roles and responsibilities, reliable waste characterization and tracking tools and criteria, improved quality of characterization and shipping paperwork, and robust generator interface and program office

support. Waste generators will be certified by the solid waste management organization to generate waste at their locations. A centralized Waste Generator Services organization (LANL WGS) has been established and owns Certification Plan templates, waste management procedure templates, Certification (Qualification) criteria for waste management and certification positions, and standard characterization and packaging criteria.

LANL has many diverse waste generators—large and small mission facilities, long complex projects and short simple projects. LANL WGS has piloted the implementation of its new policies, procedures and roles and responsibilities through two generator organizations before rolling out the model at the myriad of generator facilities across the Laboratory. In addition, the largest LLW generators at LANL will be piloting the establishment of a Solid Waste Management Council in order to oversee generator certification, compliant packaging and shipping, and the progress and cost of the centralized LANL WGS organization. Multi-level communications across the Laboratory support the changes being put into place through generator certification and process changes needed for direct off-site shipping.

ORGANIZATION ROLES AND RESPONSIBILITIES

LANL has established a centralized waste generator services function to oversee and assist generators in managing their waste. The generator organization will own its own procedures for waste characterization and packaging and the responsibility to do so. The LANL WGS organization has a two-fold responsibility: the Program Office to hold institutional policies, procedures and certifications and Generator Interface function to assist facility generators throughout their waste management cycle. The Program Office functions as the centralized ownership of policies and procedures, certification standards and approval of generator certification. The Generator Interface functions to deploy waste management staff and to supply technical expertise to help generators collect characterization data, store and manage waste properly, and package and ship waste compliantly.

In the current LANL model, the final shipping authority is owned by a third entity at LANL, the Waste Disposition Project (WDP). WDP will hold the LANL institutional certifications of the off-site Treatment, Storage, and Disposal Facilities (TSDFs) and will centralize the shipping contacts and final approvals for disposal for all generators. LANL has successfully established its certification to ship to NNSS. LANL WGS will assist generators in meeting the stringent NNSS packaging and shipping criteria and LANL WDP will implement final packaging inspections and shipping schedules.

In this model, generators take on more responsibility for generating waste and, as generators, each owns their own certification plan, which, in turn, are approved by the Waste Generator Services organization. Responsibilities are outlined in the Table 1, and Figure2.

Table 1. LANL organizational responsibilities for waste management.

Waste Generator Organization
• Maintain waste characterization data • Maintain facility waste procedures

• Prepare/maintain waste certification plans • Manage packaging/interim storage • Maintain compliance • Performance assurance
Waste Generator Services
• Process owner for compliant generation & packaging • Generator Certification Authority • Qualification/certification authority for Waste Management Coordinators • Inspections of rad waste storage areas • Waste Acceptance Criteria (WAC) owner • Rad Waste Management Basis owner • Performance assurance • Process owner for characterization/determination/profiles • Technical subject matter experts for waste management issues and problems
Waste Disposition Program
• Institutional waste stream disposal authority • Disposal Site manager/operator/closure • Operator of new solid waste facility(s) • Waste Certification Official for Treatment/Storage/Disposal facilities • Waste Certification Official for NNSS LLW disposal • Inspection of packaging for NNSS disposal

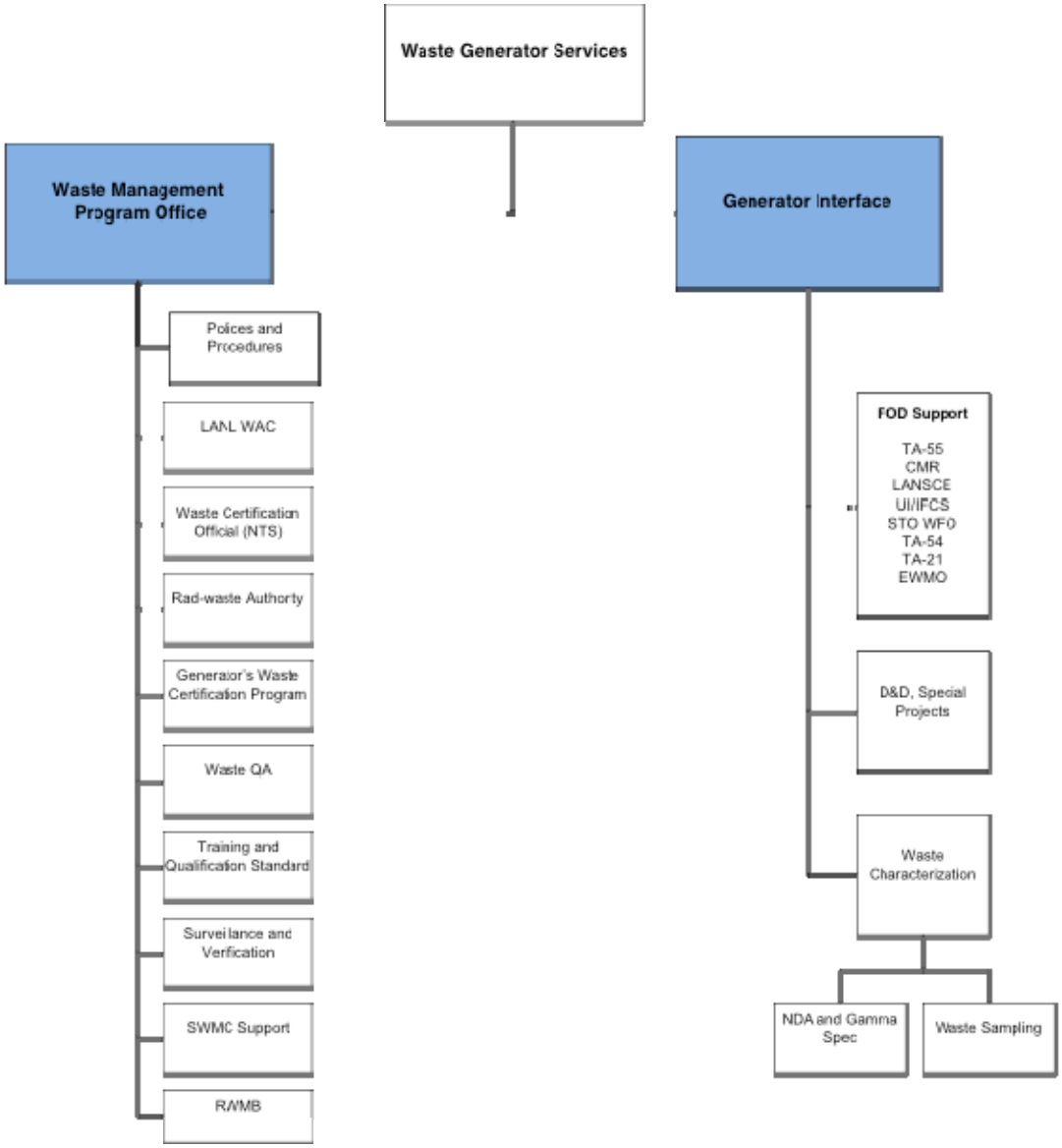

Figure 2. Functional organizational structure for LANL Waste Generator Services (LANL WGS).

Generators are represented on a high-level, institution-wide Solid Waste Management Council to be established to approve site-wide policies, procedures and metrics. A pilot of the Council, made up of the largest LLW generators at LANL, is set to review generator certifications and provide governance to waste management program as direct off-site shipping commences.

SHIFT TO INCREASED DATA QUALITY

With the preponderance of waste being disposed in on-site facilities at LANL, requirements for waste characterization and acceptance at the TSDF allowed for reanalysis and repackaging by the disposal site operation staff. Shifting to more formal and established requirements for waste profile and waste shipping documentation has required a focus on data quality review and developing staff skills to increase the quality of data taken, analyzed and documented. Increasing data quality has taken effort on several fronts: process standardization, system upgrades and staff training. The LANL WGS and WDP organizations have worked together to establish formal processes to ensure development of high quality waste data packages for off-site disposal submission. Foremost, requirements for acceptable process/knowledge documentation and processes for data analysis peer review were implemented. In conjunction with data process changes, LANL has invested in development of state-of-the-art database for waste compliance and tracking that supports waste generators and deployed waste staff manage waste from development of complete and correct waste data packages through waste packaging to accurate and timely waste disposal paperwork.

An important investment in increased data quality has been the training and development of waste management staff. Through on-going high level training topics (Table 2), and workshops dedicated to waste data quality concepts and calculations, LANL WGS has motivated staff to increase their skills while increasing their acceptance and enthusiasm for the changes to off-site shipping.

Table 2. Waste Management Continuing Training topics for LANL waste management staff.

Date	**Topic**
August 31, 2010	Nevada Test Site Waste Acceptance Review
September 28, 2010	Fundamentals of Waste Characterization – Treatment of Radiological Analytical Data for Waste Characterization
October 26, 2010	Basic Elements of Waste Characterization: Acceptable Knowledge / Process Knowledge
November 2010	Surface Contaminated Objects – A new approach to characterizing waste
December 2010	Basic Elements of Waste Characterization: Sample plans, DQOs, sample results use
January 2011	Special Nuclear Materials and requirements
February 2011	RCRA Permit – new permit overview and requirements
March 2011	Basic Elements of Waste Characterization: Waste Profiles
April 2011	Waste Management strategies for very low activity radioactive waste, DOE 5400.5 and the Authorized release Limit connection
May 2011	Radiological Characterization, dose to curie, smear to curie, and use of

	software such as microshield
June 2011	Integrated waste management case studies
July 2011	Commercial TSD overview: Clive; US Ecology, Texas; WCS; Energy Solutions Bear Creek; DSSI NSSI; Permafix
August 2011	TBD - 10 CFR 61 and Federal and State Licensing of Radioactive Materials Boot camp
September 2011	TBD - The Type a & Type B shipping packaging

CERTIFICATION OF GENERATORS

The purpose of the facility Waste Certification Plan is to demonstrate how local facility operations meet the requirements in DOE Manual 435.1, *Radioactive Waste Management* as well as are compliant with LANL waste management policies, LANL Waste Acceptance Criteria, and LANL program requirements for waste certification and direct off-site shipment. The facility Waste Certification Plan identifies the waste management processes implemented at LANL facilities and provides the basis for the facility to be certified to generate waste at LANL. A Plan will address waste stream description, waste management organization, training, waste minimization, waste characterization, waste processing and packaging, document control and records management, data management and quality assurance. Following approval of the Waste Certification Plan, the LANL WGS Certification Team will assess whether facilities are performing waste management in accordance to their plan.

PILOT PROJECTS

The major change planned for the LANL approach to solid waste management was most logically begun by initiating pilot projects at two facilities, one from each end of the spectrum—the most established program and a program just being established. The two pilots chosen were Technical Area (TA) 55 and TA-21. TA-55 is a large weapons mission facility at LANL, which generates all waste streams, including almost all of the newly generated TRU waste at LANL. The TA-55 facility is closest to the planned model and requires the least amount of effort and expense to achieve desired result. The second pilot at TA-21 was chosen because TA-21 Closure Project is funded primarily by the American Recovery & Reinvestment Act (ARRA) and must identify opportunities for cost savings; its waste volumes will be extremely large and could challenge current systems; and the project is entering a new phase of operations (i.e., Cleanup and D&D) which presents an excellent opportunity to evaluate and modify existing systems.

TA-55 has a full waste service team in place and has successfully completed its Certification Plan. The TA-55 Certification Plan describes all waste stream and waste process information for the TA-55 facility and points to its newly revised facility procedures for managing its waste. The next step for the pilot projects is for the LANL WGS to do on-site verification of implementation of a compliant waste management program. The on-site verification of the TA-55 facility to ensure their approved processes are implemented was completed mid-January 2011 and that facility has achieved certification. TA-55 has successfully shipped low-level glovebox waste to NNSS in the past six months. They are on their way to shipping directly off-site. The TA-21 project is progressing toward certification.

Beginning with an integrated design team and a formal review of waste processes at TA-21, the TA-21 organization has established roles and responsibilities for its waste services team, has established processes for waste characterization, profile development and inventory, and has completed procedures for its waste characterization, storage and handling. As a result of the establishment of these processes and documentation, TA-21 has successfully developed a Certification Plan. As with the TA-55 facility, the next step will be for the LANL WGS to do on-site verification of TA-21 to ensure their approved processes are being implemented.

Establishment of a Solid Waste Management Council will ensure governance for LANL waste management in support of transition to direct off-site shipping of LLW from facility. It is envisioned to oversee quality waste management at the generator, ensure waste costs are well managed and transparent to generators and eliminate non-compliances, orphan and waste with no path to disposal. A pilot of the Solid Waste Management Council was chosen to be established to focus on LLW and to develop the process to roll-out waste management model site-wide. Through the efforts of the LANL WGS, the pilot organization will develop direct shipping process for LLW at pilot facilities, certify facilities to ship LLW, approve certification plans by fall 2010, bring in resources to audit certification, and establish Solid Waste Management Council to oversee pilot process. Membership includes high level managers of the largest LLW generators of LANL, as well as operations and fiscal oversight functions. A charter has been drafted, which establishes the Solid Waste Management Council's responsibilities as listed in Table 3.

Table 3. Solid Waste Management Council responsibilities for waste management.

Solid Waste Management Council
• Review and approve of all site-wide standards and requirements for solid waste management as documented in the site Waste Acceptance Criteria manual, which clearly delineates waste requirements and generator responsibilities for ensuring compliant waste programs. • Review and approve of cost recharge model for waste rates • Review and approve of all site-mandated waste training Quals developed for Waste Certification Officials, Waste Service Managers, Waste Management Coordinators and Waste Management Technicians. • Share waste management best practices and lessons learned. • Monitor site waste generator metrics and performance and, where appropriate, develop site-wide corrective actions to proactively respond to adverse trends. • A waste minimization subcommittee to the SWMC shares lessons learned and best practices in waste avoidance. • Provide concurrence with Waste Management Strategies and facility avoidance.

NEXT FACILITIES FOR CERTIFICATION

LANL WGS envisions approximately nine separate facilities will be certified to generate waste and ship directly off-site. The WGS Certification Team is currently working with the next generators to develop their Certification Plans. The Weapons Facility Operations is a large and diverse set of facilities spread over a large geographical area. The Los Alamos Neutron Science Center (LANSCE), a complex of multi-disciplinary experimental facilities including an 800 MeV proton linear accelerator, generates primarily LLW. The Radiological Complex (RC-1) houses chemistry and experimental physical sciences that also generate primarily LLW. RC-1 and LANSCE operations teams are supporting LANL WGS in assessing these facilities gaps in waste management procedures and in developing a Certification Plan following the templates of the successful Plans from TA-55 and TA-21.