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## **Solid Waste Management: Bringing Best Practices to Los Alamos National Laboratory**

[Los Alamos National Laboratory release number LA-UR 09-7418]

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### **ABSTRACT**

The reality of regulatory fines for non-compliant wastes requires that waste generators at Los Alamos National Laboratory (LANL) characterize, store and package their wastes compliantly. Additionally, with the introduction of a new recharge cost model for waste at LANL, waste generators increasingly expect the LANL solid waste management organizations to improve their efficiencies in providing waste support. Therefore, a new model for managing solid waste at LANL is needed to instill more ownership for waste in waste generators and more efficiency in waste processes managed by the LANL solid waste management organizations.

### **INTRODUCTION**

Recognizing the need to change the current paradigm dramatically, the LANL waste management organization under the Environmental Programs directorate (ADEP) commissioned several independent, external reviews of LANL processes. The goal was to bring together aspects of the best waste management practices at other DOE facilities and build a successful solid waste management structure for LANL. With recommendations from the external assessments, a plan was developed to transition from the current business structure to a sound, sustainable, certifiable waste program. It is possible for this to be accomplished with a minimum of financial investment by building on existing LANL policies, processes, and organizational strengths in combination with the DOE Savannah River Site and DOE Idaho National Laboratory documentation and waste management experiences.

A compliant and cost effective solid waste management model relies on clear roles and responsibilities, accurate waste characterization and records, and predictable, stable processes. Following the Savannah River waste management model, waste generators in the new LANL model will be certified by the solid waste management organization to generate waste at their locations. In addition, waste generator organizations will be able to affect institutional policies through a LANL-wide Solid Waste Management Council. The LANL solid waste management organizations will own and maintain Certification Plan templates, waste management procedure

templates, Certification (Qualification) criteria for waste management and certification positions, standard characterization and packaging criteria, and several support functions. Following the Idaho waste management model, LANL solid waste management organizations will centralize brokering for waste disposition subcontracts. We plan to test the implementation of the new policies, procedures and roles and responsibilities through pilots run at two generator organizations before rolling out the model at the myriad generator facilities across the Laboratory site.



Figure 1. On-site waste Treatment, Storage and Disposal facility, TA-54, at LANL.

## **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 waste tracking tools and criteria, centralized waste disposition options, consistent cost and management policies, and robust generator certification and services support. The Savannah River waste management model suggests certifying waste generators to generate waste at their locations. Creation of a LANL-wide Solid Waste Management Council provides addition interaction with waste generator organizations at a management level. The LANL solid waste management organization, ADEP, will own the institutional standards and operational requirements for waste management site-wide along with centralized services and data management of waste records. Following the Idaho waste management model, ADEP will centralize also brokering for waste disposition subcontracts.

LANL has many diverse waste generators—large and small mission facilities, long complex projects and short small projects. ADEP will test the implementation of its new policies,

procedures and roles and responsibilities through pilots run at two generator organizations before rolling out the model at the myriad generator facilities across the Laboratory. Implementation of Institution-wide changes will require fundamental culture change that can be facilitated through integrated planning, effective communication, phased implementation, and inclusion of all waste generators.

**STRENGTHS, WEAKNESSES, OPPORTUNITIES, THREATS ANALYSIS**

To begin planning for the large sweep of changes required for implementation of a new waste management model at LANL, ADEP undertook a “Strength, Weaknesses, Opportunities, and Threats” analysis of our proposed new structure as a way to build on existing strengths and to plan for expected obstacles. Results of the analysis are presented in Table 1.

Table 1. Results of Strengths, Weaknesses, Opportunities, Threats analysis.

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>▶ Enables offsite shipment of waste</li> <li>▶ Aligns ADEP to facilitate implementing appropriate roles by generators</li> <li>▶ Standardizes policies, procedures and waste management practices site wide</li> <li>▶ Minimizes generation of non-certifiable waste and no-path-forward waste</li> <li>▶ Reduces amount of time waste resides at facilities prior to disposition</li> <li>▶ Improved efficiency in managing waste for disposal</li> <li>▶ Potential economies of scale and reduction of required repackaging</li> <li>▶ Reduces laboratory’s environmental and compliance risk and liability</li> <li>▶ Aligns the cost for disposal with programmatic funding</li> <li>▶ Phased pilots and implementation schedules</li> <li>▶ Minimizes on-site disposal of problematic waste streams</li> <li>▶ Minimizes need for increased waste disposal footprint</li> </ul>
<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>▶ Additional cost to implement changes</li> <li>▶ Generators bear additional responsibility</li> <li>▶ Increases required generator training</li> <li>▶ Changes will require duplicate efforts and costs during implementation in early phases</li> <li>▶ Generators will assume additional scope and staff to implement and maintain generator-owned waste management programs</li> <li>▶ Could erode the current staff deployment model by moving waste management staff into generator organizations (depending on results of pilots)</li> <li>▶ Impacts database development and implementation</li> <li>▶ Increases numbers of customers accessing databases</li> </ul>
<p><b>Opportunities Provided</b></p> <ul style="list-style-type: none"> <li>▶ Improved alignment with other DOE sites</li> <li>▶ Simplifies LASO oversight</li> <li>▶ Reduces NMED / RCRA compliance issues</li> <li>▶ Opens additional pathways for waste disposal</li> </ul>

- ▶ Distributes certification at multiple offsite Treatment, Storage and Disposal facilities and reduces downtime on site

#### **Threats to Address**

- ▶ Potential closure or suspension of operations at external site could impede shipping
- ▶ Issues of timing of Nevada Test Site certification and reorganization of waste management practices/policies
- ▶ Funders specify using funds for programs without adequate waste management funding
- ▶ Increasing Department of Transportation (DOT) compliance risks by increasing shipments
- ▶ Increasing safety risks during transportation as shipments increase
- ▶ Requires DOT approval for rad shipments
- ▶ Tribal concerns about waste transportation across pueblo lands
- ▶ Disposal of waste in other states increases risk from other state regulations
- ▶ Increases audits of internal waste management practices

#### **ACTIONS MOVING FORWARD**

Following external assessment recommendations, a project plan with critical sub-projects was developed. Proposed improvements are based on processes in place at Idaho National Laboratory and Savannah River Site as well as currently successful aspects of the LANL program. The following actions were developed and, with appropriate management involvement, teams of existing staff assembled to plan and implement each.

- Plan goals and requirements for pilots
- Convene Solid Waste Management Council
- Develop roles, responsibilities, accountabilities and authorities for waste management staff
- Design pilot
- Address funding and organization structure
- Develop institutional procedures
- Develop site specific certification plans and templates
- Stand up Waste Generator Services group
- Develop training plan and qualifications for waste management staff
- Develop communication plan

#### **ORGANIZATION ROLES AND RESPONSIBILITIES**

The new model for waste management at LANL includes ownership of waste characterization and packaging by the generator organization and centralization of waste management program processes and procedures within ADEP. Roles and responsibilities, certification requirements, training qualifications, and final approvals for waste disposition are all the role of the ADEP organization, with clear division of responsibilities between three groups. Generators also take on more responsibility for generating waste and, as generators, each owns their own certification plan approved by the ADEP Waste Generator Services organization. Following the Savannah River Site model, a fourth group will be established in ADEP to centralize all waste management for the multiple environmental restoration and Decontamination and Decommissioning projects in ADEP. Responsibilities are outlined in the Table 2, and Figure2.

Table 2. LANL organizational responsibilities for waste management.

<p>Waste Generator Organization</p> <ul style="list-style-type: none"> <li>• Maintain waste characterization data</li> <li>• Maintain facility waste procedures</li> <li>• Prepare/maintain waste certification plans</li> <li>• Manage packaging/interim storage</li> <li>• Maintain compliance</li> <li>• Performance assurance</li> </ul>
<p>ADEP</p>
<p>Waste Generator Services Group</p> <ul style="list-style-type: none"> <li>• Process owner for compliant generation &amp; packaging</li> <li>• Generator Certification Authority</li> <li>• Qualification/certification authority for Waste Management Coordinators</li> <li>• Point of Contact for Generator Services</li> <li>• Maintains certification to Treatment/Storage/Disposal facilities</li> <li>• Offsite Certification Official</li> </ul>
<p>Waste Acceptance Group</p> <ul style="list-style-type: none"> <li>• Waste Acceptance Criteria (WAC) Owner</li> <li>• Process owner for characterization/determination/profiles</li> <li>• Waste tracking database administrator and operator</li> <li>• Subject Matter Expert for Technical Services</li> </ul>
<p>ADEP Services Group</p> <ul style="list-style-type: none"> <li>• Centralize waste management for ADEP environmental and D&amp;D projects</li> <li>• Plan and coordinate waste generation, packaging, storage and shipment</li> <li>• Manage deployment of waste management resources from other ADEP waste organizations to environmental and D&amp;D projects</li> </ul>
<p>Waste Disposition Program</p> <ul style="list-style-type: none"> <li>• Disposal Process Owner (TRU, LLW, MLLW, HC)</li> <li>• Disposal Site Manager/Operator</li> <li>• Overall Waste Management Authority</li> </ul>

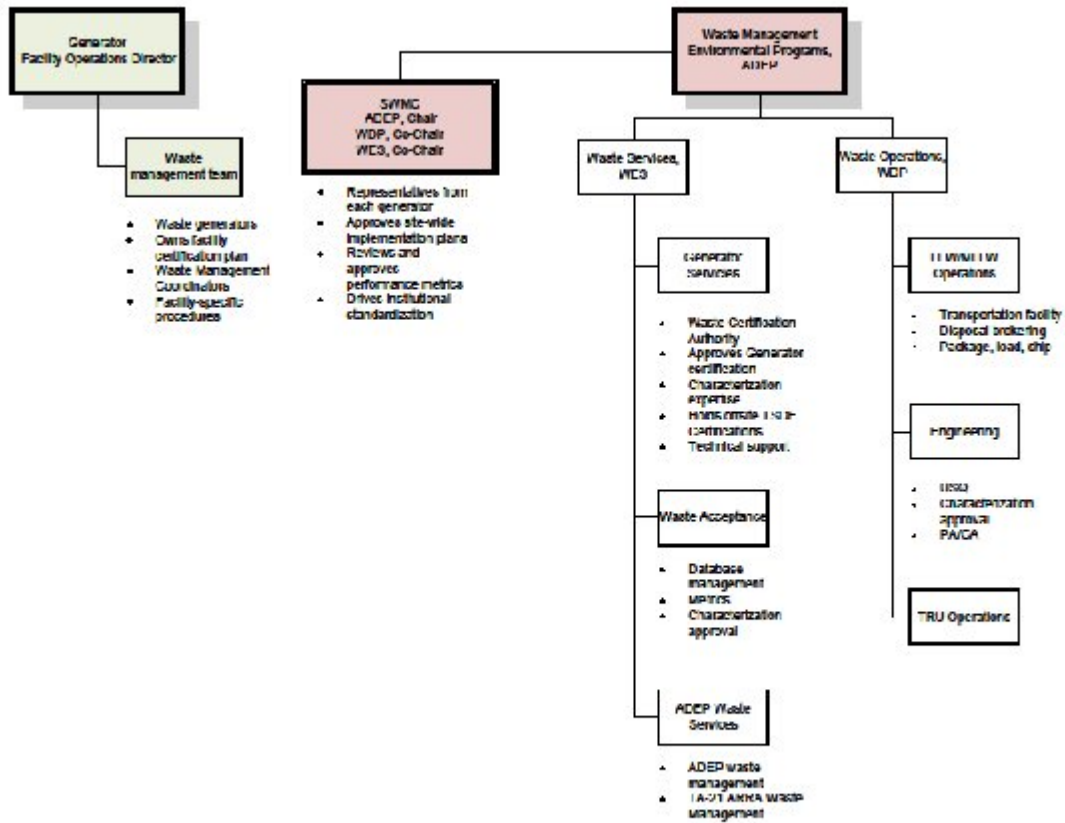


Figure 2. Organizational structure for model LANL waste management program, including Generator organizations, centralized responsibilities in ADEP, and formation of Solid Waste Management Council.

Also from the Savannah River Site model, a high-level, institution-wide Solid Waste Management Council (SWMC) will be set up to approve site-wide policies, procedures and metrics. All generator organizations at LANL are represented on the Council. Implementation of the Council has received high level management support at LANL but is scheduled to be initiated upon completion of the pilot projects.

### 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. TA-55 was chosen for a pilot because it currently has a full service waste management

organization, deployed from ADEP, which operates formal procedures and processes under Conduct of Operations. The TA-55 facility is closest to the planned model and requires the least amount of effort and expense to achieve a 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 in the near term. 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.

Because TA-55 has a waste service team in place, the focus for the TA-55 pilot began with the development of a Certification Plan that will describe all waste stream and waste process information for the TA-55 facility. A Certification Plan, and the process for approval of the plan, will become the model for all waste facilities at LANL.

Due to its accelerated schedule and limited waste management resources, the TA-21 pilot has been started with an integrated design team and a formal review of waste processes at TA-21, from cradle to grave.

### Scope of TA-21 Pilot

The goal of the TA-21 pilot was to draft the principles of a long-term vision for an enduring waste management program for LANL. Its objective was to define the current process for managing waste at TA-21, identify sub-process improvements needed immediately to meet the needs of the accelerated program, and develop a plan to adapt the TA-21 processes and procedures for each LANL waste generator. The scope of the pilot at TA-21 included the following.

- Generate pilot plan and evaluation criteria
- Develop process for selecting piloting organizations
- Draft uniform procedures
- Draft of certification plan prototypes by waste stream
- Define roles, responsibilities, authorities and accountability
- Define training needs and qualifications
- Define structure models

### TA-21 Design Team Accomplishments to Date

The design team for the TA-21 pilot included personnel from across LANL who play a current role in the management of waste, as well as the TA-21 waste management team. Design team members included waste managers and waste management coordinators; representatives of environmental compliance, pollution prevention, packaging & transportation and radiation protection organizations; and waste characterization, storage, and shipping experts.



In addition to mapping the current process (example in the Figure at right), the design session identified nine key areas for process improvement and prioritized areas based on developed criteria. The nine areas initially identified are listed below.

1. Obtain approval of Authorized Release Limits from DOE and State.
2. Establish clear and consistent guidance for when and what type of sampling is required to support Acceptable Knowledge.
3. Establish a process for prioritizing and allocating resources to complete 435.1 exemptions in a timely manner.
4. Develop a Waste Tracking Database that meets the needs of the D&D Project (waste generator) as well as the institution.
5. Establish a process to ensure timely review and feedback by environmental compliance Subject Matter Experts in the waste acceptance process.
6. Establish a sampling and analysis process that allows samples to be collected and analytical data returned in time to characterize waste on a 90 day clock without expedited laboratory analysis.
7. Develop technical guidance and incentives for segregation of D&D waste.
8. Establish procedural requirements for determining final waste packaging prior to actual packaging.
9. Increase flexibility of Certification Program for D&D/remediation waste (bulk waste).

A tenth item was added to this list as activity progressed, focused on integrating the LANL waste characterization process with a subcontractor level, site-specific waste characterization process.

Participant feedback in the sub-process activities has indicated that the pilot team sessions have been successful to date. Team work has generated commitment to complete process analysis and move to the next step of developing and piloting identified process improvements. Once implemented, these process improvements will evolve into an improved waste management operation for newly generated waste at TA-21 that, in turn, is expected to generate the model for improvement opportunities institution-wide.