

## **Implementation of Lessons Learned-17406**

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### **ABSTRACT**

Following a negative occurrence or event, putting corrective actions into place to address an organization's systemic and administrative weaknesses is paramount to that organization's future success. At Los Alamos National Laboratory (LANL, or the Laboratory), recent experiences emphasize this critical point. On February 14, 2014, transuranic (TRU) waste management at DOE facilities changed significantly when a drum of mixed hazardous and TRU (MTRU) waste from LANL breached after its disposal at the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. Shortly following the LANL-WIPP event, several internal and external investigations and analyses were conducted by LANL, the U.S. Department of Energy (DOE) and others, including the DOE Inspector General and an Office of Environmental Management Accident Investigation Board (AIB), to determine the cause of the LANL drum breach at WIPP.

Internal investigations led LANL to self-disclose non-compliances including treatment without a permit and improper waste characterization to the New Mexico Environment Department (NMED), leading to a Settlement Agreement in January 2016. The Settlement Agreement, together with the other investigations, led LANL to identify and implement many corrective actions related to its waste management practices. The Laboratory recognized the need to revisit implementation of some fundamental concepts, and noted the following "Lessons Learned":

- Communicating requirements more clearly,
- Using technical expertise more effectively, and
- Improving implementation of policies and procedures.

This paper presents the actions LANL has taken to prevent recurrence and demonstrate the Laboratory's commitment to compliant waste management requirements. They have focused on promoting a better understanding of the regulatory requirements in order to address the key root causes and the resulting Lessons Learned, as follows:

- Ensure that all levels of a Project Team understand the regulatory requirements related to performing the work;

- Engage RCRA subject matter experts in planning (for both initial project plans and subsequent modifications to plans);
- Validate that Project Teams' plans and procedures will be effective in meeting regulatory requirements; and
- Verify implementation.

We believe the corrective actions taken since the drum event at WIPP will fundamentally improve our way of doing business throughout the Laboratory.

## **INTRODUCTION**

A Lesson Learned is defined as “knowledge gained by experience... that has a significant impact on...Operations...and is applicable in that it identifies specific design, process or decision that reduces or eliminates the potential for...mishap.” (Secchi, 1999). This paper looks at some of the changes being implemented at LANL to address the root causes of the drum breach event at WIPP, as identified by the AIB (DOE, 2015) and others, and some of the challenges LANL has encountered in implementing the Lessons Learned.

The non-compliances self-disclosed to the NMED after the LANL-WIPP event, including treatment without a permit and improper waste characterization, resulted in a compliance order for violations of the Resource Conservation and Recovery Act (RCRA). The compliance order was resolved by a Settlement Agreement in January 2016 which, together with the findings from the other internal and external investigations and studies, led LANL to identify and implement many corrective actions related to its waste management practices. Internal efforts to deploy this array of corrective actions have been extensive. It is intended that they will transform processes to fundamentally improve the characterization and management of hazardous and radioactive wastes.

LANL's institutional waste management and environmental compliance organizations, which are housed in the Associate Directorate for Environment, Safety and Health (ADESH), have focused their efforts on promoting a better understanding of the regulatory requirements in order to address the key root causes and the resulting Lessons Learned. Since the LANL-WIPP event, the ADESH teams have been working actively with the hundreds of individual waste generators throughout the Laboratory in two key areas: (1) improving workers' understanding of how to characterize their waste – especially if there are changes to the waste after it is generated; and (2) improving workers' understanding of how to recognize when a proposed activity (for example, a repackaging process) is considered treatment of waste – which may require a permit or trigger other regulatory requirements.

LANL's corrective actions since the LANL-WIPP event included:

- Programs to communicate regulatory requirements, including extensive revisions and updates to Lab-wide waste management and compliance guidance;
- Expanded and improved training;
- Initiatives to review and revise waste processing, treatment, transportation and storage procedures with a more direct check-back to the regulatory requirements;
- Emphasis on better project planning through Integrated Project Teams (IPTs), and ensuring that regulatory Subject Matter Experts (SMEs) participate;
- Engagement of RCRA SMEs in reviewing procedures for all projects or activities involving waste; and
- Re-instatement of an internal Compliance Technical Assistance Program to support waste generators and facility operator.

Increases in the level of worker understanding are measured in three ways: (1) Training attendance, (2) Level of subject matter expert engagement in project planning, and (3) Findings and observations from internal walk-downs and self-assessments.

As the Laboratory moves forward, its Lessons Learned are reflected in the ongoing efforts and initiatives to ensure that workers and managers at all levels understand the regulatory requirements associated with activities that involve generating or managing waste. Many changes were initiated at LANL, while others originated from waste-receiving facilities such as WIPP. Their goal, however, is the same: to ensure each worker is empowered to maintain a questioning attitude and enabled to pause work to ensure safety and compliance. The objective is to ensure that each worker understands the task and the anticipated conditions thoroughly enough to recognize an abnormal condition or event.

## **DISCUSSION**

The Lessons Learned taught us that successful implementation is dependent upon thorough understanding of the requirements and adequate planning.

Implementation of corrections, mitigations and changes to solve the key Lessons Learned was accomplished through the following activities.

### **Communicate the Requirements Clearly and Often**

Institutional policy guidance and a strong set of detailed “Tools” became central to communicating necessary requirements for waste management tasks. Waste handling activities at the Laboratory must be performed in compliance with a formal set of requirements. Certain activities may constitute RCRA treatment, which would require a permit. The goal is to provide workers a more complete understanding of the RCRA requirements so they may better recognize potential RCRA treatment

activities. It is imperative that waste generators and their support staff clearly understand the regulatory requirements that apply to their planned activities. To strengthen workers' awareness, the Laboratory revised and updated its primary environmental policy for Waste Management, P409 (LANL, 2015). News regarding policy updates was communicated to the LANL workforce through various venues, including live briefings, training sessions, and postings to web-based internal newsletters and web pages.

### **Engage Subject Matter Experts**

Effective implementation is dependent upon solid planning. Managers and planners across the Laboratory utilize a variety of tools/methods to plan their projects and engage SMEs in task development and review. However, in several of the causal analysis investigations prior to the LANL drum event, managers and planners had not effectively engaged RCRA SMEs in the review of their procedures and work planning documents. Doing so beforehand might have helped avoid waste incompatibilities and noncompliances with the RCRA permit.

Integrated Project Teams (IPTs) are required by institutional policy, and the decision to convene a team is made by the project responsible line manager (RLM). The Laboratory has significantly increased the application of IPTs for project planning and program re-starts over the last 2 years. ADESH environmental safety and health staff have been actively engaged in the IPTs. A good example of formalization of the institutional Integrated Work Management policy and applied use of IPTs can be found in the LANL Associate Directorate of Environmental Management's guidance, EP-AP-10007 (LANL, 2016).

An additional venue to aid communication and resolution of complex waste issues is a newly-created Waste Characterization and Processing Review Board. ADESH convened the Board as a mechanism to bring SMEs from various disciplines together to review and engage in technical discussions, to propose solutions, and/or to develop guidance or policy to improve operations or mitigate future recurrences. The Board is a mechanism used to disseminate information on institutional changes or improvements in waste management.

### **Ensure that Procedures and Documents Accurately Reflect the Work Being Performed**

One of the Lessons Learned is that the best plans, if not field-verified, can be improperly performed and lead to unintended results. To address this, LANL has shaped the Compliance Technical Assistance Program (CTAP).

LANL has operated various versions of an internal RCRA self-assessment program over the years. The LANL drum breach incident at WIPP demonstrated the need for guidance, self-assessment and technical oversight. CTAP is designed to provide waste management assistance, oversight and compliance assurance for hazardous

and mixed waste management. CTAP staff provide in-the-field guidance and education on waste management requirements and best practices for generator/treatment sites. The CTAP program staff work with waste-generating organizations and on-site storage and treatment facilities to ensure compliance.

## **CONCLUSIONS**

A key principle of Human Performance Improvement is that events can be avoided through an understanding of the reasons mistakes occur and application of Lessons Learned from past events. Seeking to understand the reasons events occur — not only for major occurrences, like the LANL-WIPP event, but for small “everyday” human errors as well — can help strengthen controls and make future performance of a facility or organization better.

Implementation of change requires a sober, objective, and thorough look at the root causes of a problem. Root causes in the LANL drum breach incident were identified by the investigation teams as “failure to understand and effectively implement the LANL RCRA Permit;” and “[in-]adequately developed and implemented repackaging and treatment procedures that [had not] incorporated suitable hazard controls and a rigorous review and approval process.”

The Laboratory understands the significance of these findings and has implemented changes to address and prevent recurrence of the issues that led to the LANL drum breach. Project Team’s incomplete understanding of the requirements, insufficient work procedures, and minimal work oversight or process verification each contributed to the LANL-WIPP event. Each of these was preventable. The knowledge LANL gained by this experience has led to the development of stronger processes to communicate the requirements more clearly, engagement of appropriate SMEs in the development and revision of process plans, and improvements in field verification. In summary, actions initiated to embody the Lessons Learned were:

1. Communicate the requirements clearly and often,
2. Engage subject matter experts, and
3. Ensure that procedures and documents accurately guide the work performed.

## **REFERENCES**

DOE, 2015. *Accident Investigation Report - Phase 2 Radiological Release Event at the Waste Isolation Pilot Plant, February 14, 2014*. U.S. Department of Energy, Office of Environmental Management, April 2015. Available at <http://energy.gov/em/downloads/accident-investigation-report-radiological-release>.

WM2017 Conference, March 5 – 9, 2017, Phoenix, Arizona, USA

LANL, 2015. *LANL Waste Management*. Los Alamos National Laboratory Associate Directorate for Environment, Safety and Health, Waste Management Division Policy P409, Rev. 5, July 30, 2015. Copy available upon request.

LANL, 2016. *Technical Procedure Development*. Los Alamos National Laboratory Associate Directorate for Environmental Management, EP-AP-10007, Rev. 1, August 8, 2016. Available at <http://permalink.lanl.gov/object/tr?what=info:lanl-repo/epr/ADEP-EP-AP-10007>.

Secchi, P. (Ed.) (1999). *Proceedings of Alerts and Lessons Learned: An Effective way to prevent failures and problems* (Technical Report WPP-167). Noordwijk, The Netherlands: ESTEC.