

Site Visit Report
Facility Centered Assessment of the Los Alamos National Laboratory
Radioactive Liquid Waste Treatment Facility – June 2010

This site visit report documents the results of the Office of Health, Safety and Security's (HSS) review of the Facility Centered Assessment (FCA) of the Los Alamos National Laboratory (LANL) Radioactive Liquid Waste Treatment Facility (RLW). This review, conducted June 9-25, 2010, was sponsored by the U.S. Department of Energy (DOE) Los Alamos Site Office (LASO) and LANL, and conducted jointly by HSS, LASO, and LANL staff. The Office of Environment, Safety and Health Evaluations was the overall lead organization for evaluation of the FCA process with the participation of the LASO Facility Representative assigned to RLW.

The scope of the review was to: (1) evaluate the depth and breadth of the RLW FCA as a mechanism to provide input to LASO and LANL about the effectiveness of the LANL contractor assurance system, and (2) follow up on prior HSS inspection results from 2007 that are directly related to the scope of the FCA. The HSS review of and participation in the FCA was consistent with LASO Work Instruction (WI) 00 04, Revision 3, *Assessment Shadowing Activity Reporting*, and both LASO and HSS participated as "shadow assessors." The overall scope of the FCA was coordinated between LASO, LANL, and HSS and documented in the LANL Facility Centered Assessment RLW Assessment Plan, dated May 18, 2010.

BACKGROUND

In 2007, as part of a LANL-wide integrated safety management inspection, HSS evaluated Environmental Management and Waste Operations (EMWO) activities through work activity observations, interviews, and document reviews for a variety of hazardous, low-level radioactive, and transuranic (TRU) waste management operations at RLW; the Waste Characterization, Reduction, and Repackaging Facility; the Radioassay and Nondestructive Testing Facility; and a number of G-Area waste storage and processing domes. Several findings applicable to RLW were presented in the inspection report (issued in January 2008). The four specific findings applicable to RLW – HSS Findings C-9 through C-12 – addressed deficiencies in implementation of conduct-of-operations and integrated work management (IWM) requirements, inadequacies in maintaining facility conditions and operations within institutional requirements and environmental permit application commitments, insufficient rigor in enforcing safety requirements associated with material condition and waste/chemical storage, and improper implementation of certain radiation protection requirements.

LANL developed a comprehensive corrective action plan to address all findings from the HSS inspection on March 24, 2008, and entered the actions into the issues and corrective action management (ICAM) system. Operational responsibility for RLW was transferred from EMWO to Stockpile and Manufacturing Services (SMS) on February 6, 2009; therefore, a few elements of the open corrective actions specific to RLW at the time of the transfer were reassigned as new ICAM items.

This HSS review included a review of LANL evidence files that documented line management's actions to close selected HSS 2007 Findings associated with RLW. In some cases, HSS also analyzed the LANL management review board review and approval of the closed actions. HSS used its review of the FCA process to determine the effectiveness of the actions taken to address those findings. HSS took into consideration the results of the FCA's performance-based work observations, interviews, and record reviews (i.e., assessments, problem identification systems, etc.) in accordance with the RLW FCA Assessment Plan to draw conclusions about the effectiveness of actions taken to prevent recurrence.

RESULTS

Conduct of the FCA

The LANL FCA process was an effective, consolidated assessment mechanism for providing the Associate Director for SMS with an evaluation of the overall performance and compliance status of RLW. The FCA was well staffed with senior LANL and external specialists over a broad set of functional areas. Having representation from LANL institutional organizations provided an effective mechanism to identify institutional weaknesses that may contribute to performance concerns at the facility. The plan was comprehensive and contained the appropriate criteria, review, and approach documents (CRADs) to address each functional area. At the request of LANL, the National Nuclear Security Administration (NNSA) Chief, Defense Nuclear Safety reviewed the FCA CRADs for consistency with NNSA CRADs. Planning activities were generally effective, with concise expectations concerning assessment tools and products and adequate time allotted for planning before the assessment. Assessment activities were also effective, appropriately balancing work observations, document reviews, and interviews. Team members accurately characterized the status of their functional areas on the assessment forms, with appropriate characterization of findings and observations, as well as inclusion of observed noteworthy practices. The FCA team leadership was effective in keeping the team focused and significantly contributed to the success of the assessment. The participation of HSS and LASO as shadow assessors provided an effective mechanism for management oversight of the contractor.

The LANL FCA process is evolving with each assessment to better meet the needs of all affected parties, and HSS noted some items for improvement that should be considered for future assessments. Since several FCAs have now been performed, the FCA process would benefit from a better institutional description and procedure for conducting FCAs. Evaluation of existing FCA CRADs against the NNSA work planning and control guidance was a positive step taken for this FCA to further strengthen aspects of future FCA work management evaluations, but efforts to further tailor the scope of FCA CRADs would be beneficial (i.e., by limiting the number of criteria assigned to individual assessors' to those most critical for the specific facility.). Use of independent assessors, including the HSS team members, significantly contributed to the assessment. However, planning and resources issues, particularly issues with computer support and office space, significantly hampered performance of the review. Further, both FCA and HSS team members had difficulty in obtaining documents during the planning phase; some documents requested during the planning phase were not made available until the second week of the assessment. The consolidation of assessments through the FCA process (instead of several separate assessments by the various organizations) is beneficial in minimizing impact to the facilities over time, but if the process is to be optimally effective, the facility must expend the extra effort during FCAs to ensure an efficient assessment, including prompt responses to document requests and other actions needed to facilitate the assessment process.

A more detailed evaluation of the conduct of the FCA was provided separately to LASO and LANL as feedback to further improve the FCA process. The evaluation was provided in accordance with LASO *WI Assessment Shadowing Activity Reporting*, Forms A and B.

Follow-up on Selected HSS 2007 Inspection Findings

On March 24, 2008, LANL issued a comprehensive corrective action plan that addresses all findings from the HSS inspection. The following paragraphs summarize HSS input to the FCA with regard to closure of each of the findings applicable to RLW. Detailed observations and conclusions from the HSS team's review of the selected 2007 findings were integrated into the results of the RLW FCA.

HSS 2007 Finding C-9: EWMO facilities have not ensured that all activity-level hazards are properly identified, analyzed, and controlled and that conduct-of-operations expectations are met, as required by implementing management procedure IMP-300.4, *Integrated Work Management for Work Activities*, and the LANL Conduct of Operations Manual.

The HSS team members reviewed actions taken to address HSS Finding C-9 as they specifically related to RLW. Sufficient evidence exists that demonstrates specified actions to address concerns related to RLW have been taken and the actions support closure. In addition, continued effective implementation of the IWM process and conduct of operations at RLW was evident to the FCA team. Although specific FCA findings addressing some IWM implementation problems were identified (such as failure to walk down jobs prior to work release), the overall results of this FCA (including the HSS team member shadow assessors) did not find any significant IWM or conduct-of-operations non-compliances or concerns that would call into question the effectiveness of actions taken to address this HSS finding.

HSS 2007 Finding C-10: RLW has not implemented a process to ensure that facility conditions and operations remain within institutional requirements and environmental permit application commitments, as required by LANL institutional procedures and DOE Policy 450.4, *Safety Management System Policy*.

Based on its review of LANL identified evidence files and the results of the performance-based work observations, interviews, and record reviews, performed in accordance with the RLW FCA Assessment Plan, the HSS members determined that there was sufficient support to conclude that the probability of recurrence of the concerns addressed by Action items 1 and 2 was significantly reduced and closure of these items was warranted.

However, while acknowledging that the current SMS organization did not assume responsibility for RLW operations and maintenance until February 2009, progress in completing other actions to repair the Radioactive Liquid Waste Collection System (RLWCS) secondary containment system and leak detection capability have not been timely or sufficient in scope to prevent recurrence of the material condition and system performance concerns identified in 2007. Further, the 2009 plans to improve RLWCS vault sealing and alarm repairs was not aggressively implemented, the scope of the plans for vault sealing does not address all potential ground water intrusion routes, the schedule for vault sealing implementation lacks evidence of management priority, and plans to address concerns about the material condition (corrosion) of the primary piping and plug valves identified in a 2004 engineering study have not been formalized, funded, or reassessed. As a result: (1) only the piping penetration sleeves of one RLWCS vault has been sealed using a prototype process whose efficacy remains to be determined; (2) ground water intrusion continues in multiple vaults and may prevent timely identification of radioactive liquid releases to the secondary confinement envelope; (3) the ability of the secondary confinement envelope to prevent discharge to the environment is questionable, given the observed ability of groundwater to enter the vaults; and, (4) multiple vault alarms are inoperable, again potentially delaying timely identification of radioactive liquid leaks. Therefore, there is insufficient support for closing C-10 Action items 3, 4, 5 and 6 for HSS Finding C-10.

HSS team members also evaluated the LANL's effectiveness evaluation report, approved by the management review board, which assessed the adequacy of closure for the six LANL action items associated with HSS Finding C-10. The team agreed with the report's conclusions that action item 1 was adequately closed and that the closure of action items 4, 5, and 6 was inadequate. However, the HSS team members disagreed with the effectiveness evaluation's conservative conclusion that the closure of action item 2 was inadequate, based on the additional results of the FCA team's performance observations and review of a far more extensive evidence files than that cited in the effectiveness evaluation report. Further, HSS FCA team members disagreed with the effectiveness evaluation's conclusion that de-

watering the vaults one time demonstrated adequate closure of action item 3, because it did not consider the extent of condition or prevention of recurrence of the frequent need for de-watering.

The performance-based incentives for resolution of RLW infrastructure material condition concerns do not reflect a management priority that is commensurate with the risk to the missions of LANL liquid waste generators, such as TA-55, and the potential for development of unmonitored radioactive liquid releases to the environment. The RLWCS secondary containment envelope and leakage detection alarm system material condition concerns have been reported in multiple documents, including the 2004 Applied Research and Engineering Sciences Engineering Study, the 2005 RLW Vulnerability Study, and the 2007 HSS Inspection Report. However, the only established FY2010 performance based incentives were to meet existing FY2009 goals of sealing 3 RLWCS vaults and repairing 8 RLWCS leakage detection alarms. No additional incentives were established to promote acceleration of those repairs. At the current rate of planned vault sealing, it will take 22 years to complete the repairs.

In summary, the HSS team members generally agreed with LANL's effectiveness evaluation report and management review board conclusions that progress had been made in closing HSS Finding C-10 and that only two of six action items were adequately closed. However, the HSS team members disagreed with their conclusions on the effectiveness of closure of action items 2 and 3 and recommends that LANL consider reevaluating the closure of these action items.

HSS 2007 Finding C-11: RLW has not ensured sufficient rigor in enforcing safety requirements associated with material condition and waste/chemical storage, as required by LANL institutional procedures and DOE Policy 450.4, *Safety Management System Policy*.

HSS team members determined that appropriate actions were taken to address some of the specific material condition deficiencies cited in the HSS 2007 inspection and no similar deficiencies were identified during this FCA. However, there is sufficient evidence that most improvements in material conditions associated with the establishment of the prioritized project plan to disposition RLW material condition concerns have not yet been fully resolved and/or completed. Lack of sufficient funds, along with management's focus on other RLW issues, in part because of the priority being placed on restart of TRU operations, contributed to limited progress in addressing other needed material condition improvements. Of particular concern is the limited progress made in addressing the deficiencies with the RLWCS leak detection system and vault sealing, as discussed above in HSS Finding C-10. Therefore, HSS team members determined that there is insufficient support for closing C-11 Action items 3, 4, and 5 for HSS Finding C-11. However, the high-level recognition of RLW challenges and the first-hand knowledge of LANL senior managers have increased since the transition of RLW to the Associate Director for SMS. In addition, the RLW Corrective Maintenance Implementation Plan is a positive step toward providing a needed mechanism to focus management attention and communicate progress in addressing significant RLW material condition challenges. Although progress is being made, the current line management team at RLW has not yet had time to fully demonstrate sustained progress in addressing existing material condition deficiencies.

HSS 2007 Finding C-12: EWMO has not ensured proper implementation of certain radiation protection requirements in the areas of procedure review and approval, radiological personal protective equipment (PPE), radiological postings, and contamination control as necessary to ensure adequate radiological safety, as required by LANL Implementing Support Document ISD 121-1 and DOE Policy 450.4, *Safety Management System Policy*.

HSS team members reviewed actions taken to address HSS Finding C-12, including actions specifically related to RLW, as well as actions taken to determine the extent of condition. Sufficient evidence exists that demonstrates specified actions to address local concerns related to RLW have been taken and support

closure, and appropriate actions were identified and taken to evaluate extent of condition at RLW and other Technical Areas and facilities. Overall results from this FCA did not find any significant similar radiological protection non-compliance concerns that would call into question the effectiveness of the actions taken. The FCA identified one instance of ineffective flowdown of the RLW Operations Manager's expectations for radiation protection requirements for personal protective equipment in radiological controlled areas; however, this instance did not result in a compliance issue, and it was corrected during the FCA.

CONCLUSIONS

The LANL FCA process was an effective, consolidated inspection mechanism for providing the Associate Director for SMS an evaluation of the overall performance and compliance status of RLW. Assessment activities were performed at the appropriate breadth and depth and with the right balance of work observations, document reviews, and interviews. The FCA team leadership significantly contributed to the success of the assessment. The participation of LASO and HSS as shadow assessors provided an effective mechanism for line management oversight of the contractor. A more detailed evaluation of the conduct of the FCA was provided separately to LASO and LANL as feedback for improvement for the FCA.

Sufficient evidence exists that demonstrates most specified actions taken to address findings from the 2007 inspection specifically related to RLW were adequate and support closure. However, actions addressing the material condition of the facility and the associated RLWCS have not yet been sufficiently resolved because of insufficient funds, along with management's focus on restart of TRU operations. Of particular concern is the limited progress made in addressing deficiencies in the RLWCS leakage containment envelope and leakage detection alarms discussed under HSS Finding C-10.

The high-level recognition of RLW challenges and the first-hand knowledge of LANL senior managers have increased since the transition of RLW to the Associate Director for SMS. In addition, the RLW Corrective Maintenance Implementation Plan is a positive step toward providing a needed mechanism to focus management attention and communicate progress in addressing significant RLW material condition challenges. Furthermore, RLW has made positive progress in strengthening safe conduct of operations since the 2007 inspection under the leadership of Associate Director for SMS and the new RLW Operations Manager. However, the current line management team at RLW has not yet had time to demonstrate sustained progress in fully addressing existing material deficiencies potentially affecting safety or the environment. Therefore, there is not sufficient support for closing most of the actions related to HSS Findings C-10 and C-11.

The performance based incentives for resolution of RLW infrastructure material condition concerns do not reflect a management priority that is commensurate with the risk to the LANL missions or to the environment. The DOE Office of Environmental Management (EM) at both the headquarters and site office level has effectively used performance-based incentives to promote accelerated cleanup at many EM sites. Such incentive mechanisms should also be considered for RLW. Specifically, LASO and LANL management should work together to re-evaluate current performance-based incentives to include both essential and "stretch" monetary rewards to accelerate and focus efforts that aggressively address material condition concerns at RLW.

HSS participation with LASO in evaluating the FCA process promotes efficiency and effectiveness. With this process, HSS was able to independently observe the effectiveness of LANL and LASO processes and maintain operational awareness and gain a detailed understanding of specific issues at the LANL site. In addition, the process was effective in supporting the LANL assessment as well as LASO oversight efforts while minimizing the impact on site operations and resources. HSS will also continue to monitor

progress in addressing LANL's actions to complete closure of HSS Findings C-10 and C-11 at LANL's RLW, primarily through the HSS site lead program.