Los Alamos National Security, LLC
Los Alamos National Laboratory
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Onsite Review
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Introduction

The Department of Energy's (DOE) Office of Worker Safety and Health Assistance (AU-12) Voluntary Protection Program (VPP) team (Team), within the Office of Environment, Health, Safety and Security (AU), performed a DOE-VPP Annual Merit review of the Los Alamos National Laboratory (LANL) from April 8-17, 2014.

Since beginning its participation in DOE-VPP as a Merit participant in 2010, LANL has made great strides in improving safety. The 2013 review identified that LANL had substantially improved worker safety and health programs, encouraged additional employee involvement, provided resources, and demonstrated management commitment to excellence in safety and health. Innovations at LANL that addressed the leading causes of injuries, such as the slip simulator, widespread efforts to improve walking surfaces, and encouragement to workers to ask questions and pause or stop work if necessary, were resulting in significant improvements and preventing injuries. Worker Safety and Security Teams (WSST) were active, energized, and pursuing continued and sustainable improvement. In three tenets: Management Leadership, Employee Involvement, and Safety Training, LANL met the expectations for a DOE-VPP Star participant, but needed additional improvement in the Worksite Analysis, and Hazard Prevention and Control tenets. Specifically, while LANL had maintained continued improvement in the Worksite Analysis tenet, it needed to continue working toward a sustainable and effective industrial hygiene (IH) exposure assessment process across all Directorates for all applicable hazards. In the Hazard Prevention and Control tenet, LANL needed to build on its successes in other tenets and encourage greater employee involvement in complex issues at the higher hazard facilities related to conduct of operations, work planning and control, criticality safety, radiological controls, and worker perceptions related to a safety conscious work environment (SCWE) in order to achieve DOE-VPP Star status.

This review focused on the four specific opportunities for improvement identified during the June 2013 Annual Merit review that LANL needed to address in order to demonstrate the level of performance expected of a DOE-VPP Star site. Because of the narrow focus of this review, the Team is preparing this report as an addendum to the June 2013 report. This report presents the Team's observations and conclusions relative to the four specific opportunities for improvement that LANL needed to address and provides some additional observations where appropriate. The Team identified some new opportunities for improvement that LANL should consider as it pursues continuous improvement and excellence, but these do not constitute major programmatic failures or noncompliance with requirements. Finally, this report provides the basis for the Team's recommendation that Los Alamos National Security, LLC (LANS), the operating contractor for LANL, be elevated to Star status in DOE-VPP.

Results

2013 Opportunity for Improvement: LANL needs to continue working toward a sustainable and effective IH exposure assessment process across all Directorates for all applicable hazards.

In response to this opportunity for improvement, the LANL Associate Director (AD) for Environment, Safety, and Health (ADESH) analyzed LANL's Integrated Work Management (IWM) and Exposure Assessment (EA) programs and developed a responsive strategic plan. The internal review considered the feedback from the former Office of Health, Safety and Security's reports, letters and notices, facility centered assessments, internal assessments of IWM, occurrence reports, Process and Facility Improvement Tracking

System (PFITS) data, injury illness cases, and lessons learned. The review considered the interdependence and integration of IWM and EA programs, the results of a 2013 Deputy Associate Director (DAD) committee review of toxic material exposure events that occurred in 2011 and 2012, input from the 2013 VPP review, an SCWE assessment, and a Lean Six Sigma project that was in progress to improve hazard analysis. The ADESH review determined that while LANL has implemented the IWM and EA programs, LANL needed to continue to improve both processes to address existing vulnerabilities. ADESH identified weaknesses in the integration of the EA program into the IWM work control process, and recommended a process-specific strategic improvement plan for the EA process.

Two divisions – Materials, Science and Technology (MST), and Materials, Physics, and Applications (MPA) – have been using a Work Management System (WMS) tool for the past 10 years. WMS is a software tool that provides a central repository for those activities, associated hazards, and activity hazard grading. The tool was modified to: (1) indicate when an activity is likely to require an exposure assessment; (2) provide an indication on the status of exposure assessments; and (3) provide activity and location-specific links to completed chemical, biological, and physical exposure assessment results. The WMS tool maintains an inventory of activities in a building or room, documents the hazard grading (low, medium, high) for each activity, and provides a platform for workers to perform a hazard screening. The tool notifies, informs, and ensures a subject matter expert (SME) is engaged in work planning and provides access to summary information from the exposure assessment for each activity. Based on the experience of the MST and MPA divisions, and the ADESH and DAD reviews, LANL decided to adopt the modified WMS tool for all LANL work performed under procedure P300, *Integrated Work Management Procedure*.

The WMS tool contains a preliminary hazard screening (PHS) that begins with a 39-point questionnaire with expanded detailed questions under each initial screening question to support additional hazard analysis following PHS. The worker and person in charge (PIC) perform the initial PHS screening to identify any hazard and associated controls required by regulation. Based on that screening, the Responsible Line Manager (RLM) or designee assigns an activity hazard grading. In most cases the RLM designee is the PIC. A responsible SME reviews the PHS results to determine if additional analysis or exposure assessments are required and to evaluate the activity hazard grading determination.

As part of the implementation strategy, LANL is training personnel on the WMS tool. The Team participated in the WMS training class and identified a potential vulnerability in the process. The current process might allow authorization of a low hazard activity before an SME reviews and agrees with the activity hazard grading determined by the RLM or designee. Additionally, if the SME believes the activity hazard grading is incorrect and recommends a different hazard grading, the SME works with the RLM or designee to come to an agreement. Then the RLM or designee reenters the WMS system and updates the activity hazard grading based on the agreement. If there is a differing professional opinion, there is no formal method for the SME to document his/her activity hazard grading recommendation or to resolve differences. LANL should consider putting a process in place to resolve differences between the RLM/designee and an SME on the activity hazard grading of low hazard work activities prior to approving the activity. For moderate and high hazard work activities, SMEs are involved in the work planning process and have the opportunity to provide recommendations prior to work being approved and authorized.

Opportunity for Improvement: LANL should ensure the work planning process can formally resolve differing professional opinions between the RLM/designee and an SME on the activity hazard grading before authorizing low hazard work.

The WMS tool was designed to support efficient review, analysis, and approval of laboratory and research activities hazards grading determination levels. Because the work planning, hazard analysis, and approval needs for maintenance work differ significantly (due to the volume of maintenance activities compared to research work performed each year) from research activities, the Maintenance and Site Services Division (MSS) implements the intent of P300, *Integrated Work Management Procedure,* through the processes described in administrative procedures (AP) 1 through 5. LANL is in the process of reviewing options to effectively incorporate the elements of the WMS tool and the PHS process (currently applied to research and experimental activities) in order to improve the ability of MSS to evaluate and determine activity hazard grading for maintenance activities. LANL expects these changes to ensure the appropriate involvement of SMEs in evaluating moderate to high hazard work planning activities and to integrate the exposure assessment process with those maintenance activities.

Part of the DAD committee analysis included 13 significant events in fiscal year 2013. Six of the 13 events evaluated involved chemical exposures to MSS employees. Based on that analysis, MSS established chemical EA as its highest priority in implementing the DAD committee and ADESH recommendations and made the linking of chemical exposure hazards to work activities its initial primary concern.

The MSS safety group evaluated chemical exposure potential using similar exposure groups (SEG) defined by craft-specific disciplines, such as insulators, masons, roofers, pipefitters, etc. The MSS IH group evaluated each SEG activity for potential chemical exposures related to its occupational hazards. As of this assessment, the IH group has completed 15 of the 21 SEG evaluations.

MSS developed the potential hazardous chemical exposures list from the chemical inventory database (ChemLog) as it related to the activities of each SEG. The MSS IH evaluated each chemical, identified the potential hazard of each chemical, then summarized and documented the hazard risk category (low, medium, or high) in the Material Safety Data Sheet (MSDS) online database. As of this review, 85 percent of the chemicals reflected in the ChemLog database related to the MSS SEGs have been hazard risk-rated, summarized, and documented in the MSDS online database. MSS evaluates chemicals that are rated as medium to high risk for quantitative exposure assessment and sampling. MSS now requires work planners to review any chemicals and the associated hazards involved in work activities performed by MSS personnel as described in the MSDS online database.

The only remaining challenge was to develop a process to successfully link and communicate the chemical hazard risk rating documented in the MSDS online database to the specific, day-to-day MSS work activities so that deployed IH personnel will be aware of potential hazard exposure sampling opportunities, and be able to schedule sampling when the work occurs. A discussion between safety personnel, IH, and work planners identified the plan-of-the-day (POD) as the most effective way to link exposure assessments to work tasks. The MSS Work Control Manager identified that work planners can use P6, the planning and scheduling software for MSS, to include IH sampling as a subtask to the IH or safety personnel when chemical or physical hazards require an exposure assessment. The schedulers could then prepare a special

POD and/or plan-of-the-week report that included the subtask information and provide those reports to all deployed IH and safety personnel on a daily/weekly basis. Those reports would communicate to all deployed safety personnel the upcoming work activities that may require exposure assessment and allow appropriate sample planning.

MSS Work Control intends to pursue a paperless system for work control packages by June 2015. MSS Work Control has already evaluated electronic tablets and the associated software for the conversion. The Team believes that the adoption of the paperless electronic tablet work package system will greatly improve the ability to facilitate an effective method of communicating hazards to all necessary safety and IH personnel with regard to exposure assessment sampling and fully supports the implementation of this effort.

In the interim, MSS should revise its work planning procedures and instructions to include the EA subtask so deployed IH and safety personnel can complete exposure assessments for MSS work activities until MSS completes the conversion to the paperless work package system.

Opportunity for Improvement: MSS should revise its work planning procedures and instructions to include the EA subtask so deployed IH and safety personnel can complete exposure assessments for MSS work activities.

The 2013 VPP review identified specific deficiencies in the EA process at the Technical Area (TA)-53 facility. In response to those deficiencies, the Environment, Safety and Health (ESH) group leader for TA-53 developed an exposure assessment improvement plan to use until the Laboratory-wide WMS process is in place. The plan's objective is to provide short-term direction toward improving the EA process at TA-53. The plan involves reviewing current and upcoming documented activities and identifying deficiencies regarding exposure assessments. The review includes matching activities to exposure assessments performed. TA-53 grouped and prioritized the list of activities without an associated exposure assessment based on potential hazards and expected start dates, and completed the higher priorities first. ESH reviewed 127 activities (Integrated Work Documents (IWD), found 47 deficient exposure assessments, and has completed 28 exposure assessments since initiating the EA improvement plan.

The Team observed a significant improvement in the involvement of IH and safety personnel in work activities. For example, the TA-53 ESH group has increased exposure sampling for hazards, such as noise and carbon monoxide emissions. More importantly, the IH and safety personnel were actively engaged in all aspects of the work activities from work package preparation to the monitoring of work execution. Worker interviews reflected the increased presence of the IH staff. The increased presence of the IH and safety personnel was a direct result of the heightened significance the improvement plan placed upon these activities.

LANL is effectively implementing a sustainable EA process, and progress is sufficient to demonstrate the performance expected of a DOE-VPP Star participant.

2013 Opportunity for Improvement: LANL needs to ensure that production pressures to comply with negotiated agreements do not lead to errors by workers.

In 2013, production pressure was primarily evident on waste handlers in the 3706 Campaign. This campaign arose from a negotiated agreement with the State of New Mexico to remove 3,706 cubic yards of transuranic and low-level waste that was stored above ground and exposed

to risks associated with wildfires. Since the 2013 assessment, LANL has completed repackaging all the waste and shipped most of the waste offsite. The remaining waste is staged for shipping. A fire and radiological release at the Waste Isolation Pilot Plant (WIPP) in February 2014 resulted in a halt of all shipments to WIPP. LANL is working with WIPP, DOE, the State of New Mexico, and other authorities to identify interim storage locations for the staged waste.

LANL continues to work toward its waste management and environmental program milestones, but those targets are not as aggressive as the 3706 Campaign. Consequently, the Associate Directorate for Environmental Programs (ADEP) no longer has 24-hour shifts, personnel are not assigned to a permanent backshift, and workers are able to work at a more deliberate pace without concerns over schedule pressure. ADEP workers did not express any concerns about pressures to continue working if they had safety questions or concerns, and felt comfortable stopping or pausing work. All personnel clearly understood the LANL expectation to comply with procedures or stop work. Managers are creating a safe environment for workers to report noncompliance with procedures. ADEP holds weekly safety meetings that reinforce workers' trust for raising issues. Other managers contacted during this assessment expressed their belief that safety initiatives by LANL to encourage workers to stop and ask questions were enabling LANL to perform its mission, rather than detracting from the mission. LANL has effectively addressed the perceived schedule pressures on workers and established an environment where workers are encouraged to stop or pause work when questions arise.

2013 Opportunity for Improvement: LANL needs to continue walking down procedures with a team of "hands-on" workers and SMEs to ensure procedures are workable, remove ambiguous language, clarify assumptions, and resolve the outstanding conduct of operations issues.

Shortly after completing the 2013 DOE-VPP Merit review, the Laboratory Director ordered a pause in all program activities at TA-55. Although the work at TA-55 has not yet resumed, the pause is providing an opportunity for workers to revise or validate over 300 procedures. Teams of technicians, engineers, operators, SMEs, supervisors, and managers are working cooperatively to review procedures, including walkdowns, capture lessons learned in training manuals, agree on definitions, verify compliance with safety basis documents, and ensure verbatim procedure compliance. Workers are reviewing procedures during prejob briefings to continually validate their usability and ensure correct instructions. TA-55 managers and employees are working together to continuously evaluate and improve processes at the facility. For higher hazard procedures and validation, workers use reader/worker routines. This requires one worker to read the steps for another worker to perform. These efforts are systematically validating that the procedures are correct and usable (most cases) or identifying needed improvements.

Most workers understand that procedure compliance is an expectation and are developing a sense of pride and ownership of the procedures. For example, the 2014 Team observed workers stop a job because the procedure for bagging-out a drum was not correct for the activity. The procedure did not effectively address a situation where the waste was already in the drum prior to placing the drum in the bagout port. Normally the drum is in the bagout port and then waste is loaded into the drum. A worker raised the question during the prejob briefing and the work stopped until the procedure addressed the deficiency. During a discussion with some of the workers involved with the scenario discussed above, they confided their frustration about the time required to complete procedure changes, but clearly understood the need to ensure procedural accuracy.

Since the Plutonium Facility (PF-4) in TA-55 is a Category 2 Nuclear Facility, there is an expectation for rigor in DOE nuclear operations. The facility is making outstanding progress towards improving its conduct of operations program and instilling the rigor expected of a DOE nuclear facility. It continues to improve procedural accuracy, compliance with written instructions, and operational improvements. Although following the requirements, some workers expressed frustration with this level of rigor, believing their experience and skill were sufficient. During an interview with nonfissile workers, they expressed their opinion that they did not need current reader/worker routines to ensure safe and compliant activities. They indicated that their experience and skill sets were sufficient to accomplish mission objectives safely and effectively without the need for detailed operating procedures. The AD for Plutonium Science and Manufacturing (ADPSM) should specifically engage these workers to ensure they understand the need for detailed operating procedures and remind them of historical releases (see Type A Accident Investigation Report of the March 16, 2000, Plutonium-238 Multiple Intake Event at the Plutonium Facility, Los Alamos National Laboratory), and uptakes that resulted from overreliance on worker skill in place of detailed procedures.

Opportunity for Improvement: The ADPSM should specifically engage nonfissile workers to ensure they understand the need for detailed operating procedures and remind them of historical releases and uptakes that resulted from overreliance on worker skill in place of detailed procedures.

The Team observed similar worker involvement in procedure use and validation at other areas of LANL although not as disciplined as TA-55. For example, the Team observed operations personnel at the Los Alamos Neutron Science Center (LANSCE) developing and validating startup test procedures for new high-power radio frequency power supplies for the linear accelerator. Procedures were available for other routine operations at TA-53. Workers at TA-54 performed waste handling and packaging activities in accordance with procedures with radiological control technicians and waste handling supervisors carefully tracking procedural compliance.

In another area of TA-55, workers and managers developed a training tool to orient new employees to the workspaces and types of work activities. This guide includes pictures, nomenclature, acronyms, and explanations to help new workers adjust to the workspace job requirements. It captures the experience and knowledge of more experienced workers who helped develop the guide with their years of performing the tasks necessary to accomplish the mission. The tool provides basic information on subject areas, such as bagouts, sample removal, working in hoods, trolley operations, and glove changes.

Overall, LANL is successfully engaging workers and SMEs to address longstanding procedural issues, and progress is sufficient to demonstrate the performance expected of a DOE-VPP Star participant.

2013 Opportunity for Improvement: LANL needs to seek broader worker involvement in work planning, use WSSTs to help address conduct of operations issues, and allow workers to have a much larger role in defining corrective actions to issues.

The Team also recommended in a separate opportunity for improvement that TA-55 managers should consider curtailing programmatic work in PF-4 during monthly WSST meetings to encourage greater participation by technical staff. This opportunity for improvement showed the

greatest improvement since the 2013 assessment. The programmatic pause at TA-55 in June 2013 has also allowed much greater WSST participation. The TA-55 WSST is actively contributing to improvements at the facility. Managers are empowering and supporting the team members to identify issues, develop solutions, and implement corrective actions that improve the safety culture at TA-55. Workers are enthusiastic about their contributions to the improvements and demonstrate ownership of their product. The TA-55 WSST created the following five subcommittees to focus on specific areas: (1) Communication and Planning; (2) VPP; (3) Glovebox Working Group; (4) Learning Team; and (5) Security. The Team attended the Glovebox Working Group meeting. The worker participation and interaction was outstanding. Manager presence and support was very evident. The meeting was informative and employees volunteered to support and assist in initiatives for glovebox improvements and workspaces.

During this assessment, the Team attended the TA-55 WSST monthly meeting. The Team observed significant management presence at the meeting. During the meeting, its support and contributions provided an obvious commitment to the success of WSST. The agenda included a discussion about injury avoidance by employing the use of cut-resistant gloves when cutting sheet metal. The WSST chairperson presented Safety Star Awards to employees who contributed to facility safety efforts. The ESH Manager presented a discussion on Chemical exposure assessments. Workers in the low-level waste process gave a presentation on how they used a lifting device, which was stored and not normally used, to assist them in removing and replacing lids on wasteboxes. The membership received an update on WSST items that had been corrected and progress on other issues. The Learning Team subcommittee gave a presentation on a process to improve incident investigations. The Communications and Planning subcommittee provided a discussion on upcoming events and requested input for publications. The Glovebox Safety subcommittee gave a presentation on current activities relating to expired gloves and lead time on reordering new gloves. The meeting ended with a round table discussion with questions and comments from employees and managers.

The WSST provided the Team with attendance records for 2013 and 2014. For example, in 2013, the first monthly WSST meeting had 32 attendees with 25 technical staff and 7 managers attending. In 2014, the first monthly meeting had 60 technical staff attending along with 40 managers. ADPSM attendance at WSST meetings shows a three-fold increase since 2013. Discussions with the TA-55 WSST chairperson indicate a very positive employee interest in involvement with WSST initiatives and improvements at the facility. The chairperson also said that manager attendance and support at WSST meetings has significantly increased, thereby empowering the workers to expand their involvement and ownership. The chairperson stated that because so many employees volunteer to provide presentations at the safety meetings, it is difficult to accommodate them all in the allotted time. More significantly, ADPSM's overall effort to involve workers in the resumption activities has had an energizing effect on the workforce. Workers and managers now look forward to WSST meetings and believe the WSST is a positive influence on TA-55.

One of the ways ADPSM is supporting worker and manager involvement is by scheduling one day each quarter for all workers to focus on housekeeping, removing unused or unneeded equipment, performing safety inspections, and attending a WSST meeting. With no programmatic work on that day, more workers are able to attend the WSST meeting. In addition to the regularly scheduled WSST walkdowns that use a checklist to allow employees to identify issues before they become a problem, managers encourage employees to identify and communicate to their supervisors, the WSST point of contact, or to the ESH organization any

safety concern or opportunity for improvement they may encounter. For example, one of the engineers and a machinist worked together to develop a glovebox tool to reduce sharp hazards in the glovebox, reduce machining time, and reduce exposure to radioactive material. The Team interviewed the machinist who said that in his opinion, now the engineers and machinists work closer together to solve issues.

The Team observed several examples of worker involvement that contributed to equipment improvements at TA-55. The TA-55 warehouse procured a hydraulic jack platform to assist in raising or lowering material from/to their storage shelves eliminating the need for workers to lift the material. The Team observed another example of excellent improvements in the TA-55 cold shop to use installed equipment and improve process flow. The cold shop moved older machinery to allow use of an overhead hoist.

TA-55 benefits from a staff ergonomist that is actively working with employees to minimize repetitive motion injuries by evaluating work activities to reduce stress or strains to the worker. One of the ergonomic improvements developed to reduce injuries in the gloveboxes was a trolley to eliminate awkward arm positions while transferring items from one area to another. Workers in the cold shop collaborated with the staff ergonomist to design and manufacture the trolleys from a combination of commercial items and shop-manufactured items.

The AD for Experimental Physical Sciences (ADEPS), the responsible area director for TA-53, showed the Team physical improvements at TA-53 that resulted directly from worker suggestions. For example, LANL was installing new, high energy radio frequency power supplies for LANSCE. Workers contributed significantly to the design of the power supplies and the working platforms around the power supplies. Managers at TA-53 consistently demonstrated their commitment to ensuring workers had the necessary processes and resources to accomplish work without compromising safety.

The Team attended the TA-53 WSST meeting. The meeting began with the chairperson introducing several ESH professionals who gave discussions on lockout/tagout locks, hardhat use and their inspection, hazards associated with soldering activities, and the use of faceshields versus safety glasses. Another presentation discussed the trends of TA-53's Total Recordable Case (TRC) and Days Away, Restricted or Transferred (DART) injuries and a review of its first-aid cases. Finally, the meeting focused on the TA-53 safety improvement plan with a majority of workers voting to accept the following two goals: (1) providing timely feedback and closure of issues related to employee requests and suggestions; and (2) using peer walkarounds (solution teams). The group was engaged in the meeting, which generated participation and questions from the 27 attendees. The attendance records of the past 6 months for this meeting averages about 20 people that represent the TA population of 400, plus another 100 people temporarily assigned to TA-53 (researchers, students, other support).

Several challenges exist for the TA-53 WSST. Engineering Sciences, EPS, and ESH are colocated at TA-53, but the AD for each group conducts its WSST at another part of LANL. In a few organizations, workers attending their AD's WSST may not feel compelled to attend another WSST. The Team noted the TA-53 WSST co-chair's absence, and other members stated that the co-chair attends only half the meetings. During this assessment, the TA-55 WSST highlighted its accomplishments in turning around a nonparticipating WSST to one where there is standing room only when they meet. The TA-53 and TA-55 WSSTs should work closely together to help the TA-53 WSST gain worker participation and enthusiasm.

Opportunity for Improvement: The TA-53 and TA-55 WSSTs should work closely together to help the TA-53 WSST gain worker participation and enthusiasm.

The Team also observed an Institutional WSST (IWSST) meeting. The IWSST is the parent committee for all the WSSTs. During the meeting, workers and managers interacted as equals, and managers expressed genuine interest in worker ideas and suggestions. The IWSST received presentations on two specific laboratory-wide issues: (1) the integration of the MSDS online and ChemLog databases; and (2) effective reward and recognition programs. In both cases, the presenters specifically asked the IWSST for ideas, feedback, and improvements, demonstrating that LANL is seeking meaningful worker involvement in addressing difficult issues.

LANL's efforts to broaden worker involvement in work planning, use WSSTs to help address conduct of operations issues, and allow workers to have a much larger role in defining corrective actions to issues are demonstrative of the performance expected of a DOE-VPP Star participant.

Other Observations

LANL continues transformation of the ADESH organization to a combination of deployed ESH staff and a central organization. Under that model, the central organization is responsible for the processes and procedures and provides a flexible center of expertise in the variety of safety and health disciplines. The deployed ESH personnel implement and execute the processes and procedures and can draw on the central expertise if necessary. Deployed ESH managers now have ESH staff directly assigned to them. Although the ESH managers report directly up through the ADESH organization, they are responsible to the area managers within the other directorates to support and enable mission execution. As such, the area managers view the deployed ESH staff as a resource, not a hindrance. ADESH continues to refine the processes and is working to ensure deployed resources reflect the hazards and risks of the work, not just the size of the program budget.

Prior to and during the 2013 assessment, the criticality safety program at TA-55 became a significant issue. LANL had corrective action plans in place to rebuild the criticality safety staff, but those plans did not address the cultural issues that led to the exodus of expertise. Since 2013, LANL has taken actions that address those issues. As of this assessment, LANL has 12 people fully qualified as criticality safety analysts (CSA), 5 more people are task-qualified and approaching full qualification, and LANL expects those 5 to complete qualification before full resumption of work at TA-55. As a highly trained and limited field, they command higher salaries at other locations. CSAs are in high demand within commercial and academic nuclear programs, and LANL recognized there would be problems retaining people once they qualify. CSAs often do not view the work at TA-55 as being as challenging as other locations, reducing the incentive for personnel to remain at LANL. Managers are aware of this situation and look for additional ways to retain qualified staff. For example, LANL now provides incentives for new CSAs that include increased pay once they complete full qualification, annual retention bonuses each year for up to 4 years, and committed support to participate in professional development and research activities. CSAs are now a separate division from the safety basis group with a manager that is also a CSA. LANL also formed a Criticality Safety Board with additional expertise to oversee and review the criticality safety program.

TA-55 is also working to reduce the complexity of its criticality safety program. For example, rather than trying to maintain over 300 specific criticality limits associated with individual

gloveboxes or processes, the new program will have 6 schemes that will apply to nearly all work. This will make it easier for workers to perform in different areas of TA-55. LANL integrated the CSAs into the resumption activities, reviewing procedures and working with other personnel to ensure limits are clear, unambiguous, and understood by all personnel. TA-55 will also implement an on-call CSA and a safety basis analyst that will be in an office at PF-4. That duty will rotate on a daily basis, but their primary responsibility will be to support any questions or procedural changes that arise. This will help shorten the time between identification of a needed procedure change and implementation without compromising safety.

Although not as dramatic a change as TA-55, ADEP has also improved WSST participation. The 2013 Team identified that permanent backshift workers did not have easy access to WSST meetings or activities. Since 2013, ADEP completed the work that required shift work, and workers are no longer assigned to a permanent backshift. WSST members brief workers assigned to other shifts on discussions from the WSST meetings and give those workers an opportunity to express any safety issues or concerns.

The 2013 Team identified conflicts between postings on hoods and operations in those hoods, and recommended that ADPSM analyze the effects of chemical hazards on the engineered systems used for radiological hazards. In response, ADPSM asked the WSST to evaluate signs and postings within PF-4. The WSST completed that evaluation and another review is planned in the near future. Additionally, ADPSM is evaluating whether the use of small quantities of chemicals in recirculating hoods could compromise the integrity of the hood.

The Team identified that ADPSM could further improve signs and postings in TA-55. Many signs indicate an all or nothing approach in many workspaces. For example, *hearing protection required* is a common sign in the workspaces even when no noise hazard is present. There are generic hazard signs on doorways that indicate hazards, such as carcinogens or flammables are present. When the Team asked room occupants about the hazards, some were unaware of their location. One sign indicated that corrosives were located in the room and that appropriate gloves were required to handle the material. Occupants of the room had varying understanding of what was appropriate. The WSST chairperson agreed that the WSST should review caution and warning signs and committed to discussing the approach with the WSST members.

The Team observed from records of WSST safety walkdowns that they did not normally include SMEs, such as IH, industrial safety, fire protection, or radiological engineers. The Team suggested to ADPSM that including SMEs may enhance the effectiveness of the walkdowns and provide a new perspective to participants. ADPSM instituted the change the following day.

The 2013 Team recommended that LANL should revise procedure P300, *Integrated Work Management Procedure*, to reflect using hazard analysis to improve its graded approach to hazard controls, and ensure the basis and assumptions behind a low hazard determination are captured for future reference during similar work, or if changes occur during the course of work. The overall effort to implement IWM, including the PHS, effectively addresses this recommendation. As previously discussed, MSS is reviewing options to implement the intent of procedure P300, *Integrated Work Management Procedure*, and the IWM process through a series of administrative procedures. Across the DOE complex, sites have recognized that work control processes for research/science, and maintenance/construction activities encompass differing approaches for hazard identification and control. The Team believes if LANL allowed MSS maintenance/construction to defer from the IWD requirement specified in P300, *Integrated Work*

Management Procedure, that MSS work control could significantly improve its ability to better focus on all aspects of work control, specifically regarding low hazard work. The current IWD approach focuses on upper level hazard analysis that limits the effectiveness of properly evaluating lower hazards often encountered in maintenance work. ADESH has initiated discussions with other DOE-VPP participants to identify other effective work control process options.

The 2013 Team recommended that MSS should find more effective methods to encourage and stimulate worker feedback on all jobs and effectively communicate post-job comments and the resulting corrective actions to the crafts who originated the comments. In response, the MSS work control group has developed the MSS lessons-learned software. The software incorporates lessons learned from site and offsite events. In addition, the software provides search functions so that workers and planners can search postjob comments by component, industrial safety, maintenance issues systems and structures, or location. The communication of any corrective actions related to crafts postjob comments is performed by the PIC. This expectation is now included in the improved PIC training.

The 2013 team recommended that LANL should expand and document the current housekeeping inspection program to meet DOE-VPP expectations for monthly general hazard assessments that cover the whole worksite quarterly. LANL performs numerous assessments and inspections throughout the year that appear to meet the expectations of the VPP requirement. However, LANL could benefit from analyzing the number of evaluations currently performed, consolidating those assessments that duplicate efforts, and creating a matrix that clearly shows how the assessments and expectations cover the whole worksite quarterly. In addition, LANL should use this opportunity to provide additional focus on facility safety issues through the assessment process.

Opportunity for Improvement: LANL should analyze the number of evaluations currently performed, consolidate those assessments that duplicate efforts, create a matrix that clearly shows how the assessments and expectations cover the whole worksite quarterly, and provide additional focus on facility safety issues through the assessment process.

In addition to the other opportunities for improvement, the Team noted several significant improvements. For example, the storage and warehousing of materials (nonnuclear) at TA-55 has been centralized and consolidated. Material inventories are established, minimum and maximum levels are established for critical spares, access to warehouses is better controlled, and general housekeeping has improved significantly. LANL purchased improved material handling equipment, such as a hydraulic lift platform, to assist in raising and lowering material from its storage location and to reduce lifting hazards.

The Team observed another improvement in PF-4 that workers identified. Some glovebox lines have higher radiation areas due to the nature of materials in the gloveboxes. In those areas, workers have painted striping on the floor to designate areas where workers should or should not stand to reduce radiation doses.

LANL has also implemented a model Health and Wellness program tied to the health and benefits plan. The goal of the program is to integrate workplace health protection and health promotion to develop more effective interventions to sustain and improve worker health. This comprehensive program includes a commercial vendor to provide employees the tools to take an

active role in their health and well-being by incentivizing physical health and safety education classes and health screenings that translate into rewards toward health care deductibles or cash in a Health Savings Account. The vendor's book of business for participation is 45 percent in the first year, with a 2-3 percent increase in participation annually. LANL results thus far include: 64 percent of the eligible workforce enrolled in the first year; over 2,500 individuals completed a Health Risk Assessment; and 3.9 billion steps taken by the workforce (employees are exceeding the Centers for Disease Control and Prevention recommendation of taking an average of 7,102 steps/day). In addition to this program, LANL has a main fitness center and 14 satellite exercise sites to provide convenient access for employees to engage in health enhancement opportunities.

LANL maintains an active community outreach and support program. LANL encourages employees to be active in the community and supports numerous charitable efforts. LANL has also actively supported other DOE-VPP assessments by providing personnel to assist the Team. LANL effectively used these opportunities to learn strategies that are more effective and to implement further improvements. LANL continues to support regional and national Voluntary Protection Programs Participants' Association conferences through participation, allowing employees to attend, and providing presentations.

Conclusions

Since beginning its quest for DOE-VPP Star recognition, LANL's accident and injury rates have dropped dramatically with a 66 percent decrease in the TRC rate (from 3.43 cases per 200,000 work hours in June 2006, to 1.17 cases per 200,000 work hours in February 2014). Similarly, the DART case rate has dropped from 1.36 cases per 200,000 work hours to 0.43, and both rates continue a downward trend.

LANL demonstrates significant improvement in its worksite analysis processes and implementation of hazard controls. The revisions to work planning, linking exposure assessments to the MSDS online database and the ChemLog tracking system, and ensuring exposure assessments are reviewed prior to authorizing work will provide a robust system to ensure hazards are appropriately analyzed and effective controls implemented prior to authorizing work.

Managers are appropriately minimizing the potential effect of production pressures in the environmental programs and efforts to ship waste offsite. External events beyond the control of LANL, while affecting LANL's ability to meet external commitments, do not translate into pressure on the workers. Managers continue to support workers' ability to pause or stop work to address safety concerns. The Laboratory Director's decision to pause programmatic work at TA-55 until LANL could address difficult safety problems (criticality safety, conduct of operations) sent a powerful message to the workforce regarding the importance of safety in accomplishing missions.

LANL's decision to use teams at TA-55 to validate or revise procedures, comply with procedures, and ensure sustainable improvements for the long term are proving effective at encouraging workers to participate. Workers at TA-55 demonstrated a strong sense of ownership and pride that was not evident in previous DOE-VPP assessments. TA-53 shows progress, although not as dramatic as TA-55. By working together with other WSSTs, TA-53 should soon show similar improvements like other areas at LANL.

LANL has effectively demonstrated its long-term commitment to safety and health as a necessary prerequisite to effectively performing hazardous scientific work. The dramatic improvements in safety and health performance, worker participation, hazard analysis, hazard prevention and control, and continued effective safety and health training warrant the Team's recommendation that LANS, the operating contractor for LANL, continue to participate in DOE-VPP and be elevated to Star status.

Appendix A

Onsite VPP Audit Team Roster

Management

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Acting Associate Under Secretary for
Environment, Health, Safety and Security

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