Los Alamos National Security, LLC/ Los Alamos National Laboratory Los Alamos, New Mexico

Report from the Department of Energy
Voluntary Protection Program
Onsite Review
April 19-29, 2010

U.S. Department of Energy
Office of Health, Safety and Security
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Foreword

The Department of Energy (DOE) recognizes that true excellence can be encouraged and guided but not standardized. For this reason, on January 26, 1994, the Department initiated the DOE Voluntary Protection Program (VPP) to encourage and recognize excellence in occupational safety and health protection. This program closely parallels the Occupational Safety and Health Administration (OSHA) VPP. Since its creation by OSHA in 1982 and DOE in 1994, VPP has demonstrated that cooperative action among Government, industry, and labor can achieve excellence in worker safety and health. The Office of Health, Safety and Security (HSS) assumed responsibility for DOE-VPP in October 2006. Assessments are now more performance based and are enhancing the viability of the program. Furthermore, HSS is expanding complex-wide contractor participation and coordinating DOE-VPP efforts with other department functions and initiatives, such as Enforcement, Oversight, and the Integrated Safety Management System.

DOE-VPP outlines areas where DOE contractors and subcontractors can surpass compliance with DOE orders and OSHA standards. The program encourages a "stretch for excellence" through systematic approaches, which emphasize creative solutions through cooperative efforts by managers, employees, and DOE.

Requirements for DOE-VPP participation are based on comprehensive management systems with employees actively involved in assessing, preventing, and controlling the potential health and safety hazards at their sites. DOE-VPP is designed to apply to all contractors in the DOE complex and encompasses production facilities, laboratories, and various subcontractors and support organizations.

DOE contractors are not required to apply for participation in DOE-VPP. In keeping with OSHA and DOE-VPP philosophy, *participation is strictly voluntary*. Additionally, any participant may withdraw from the program at any time. DOE-VPP consists of three programs with names and functions similar to those in OSHA's VPP: Star, Merit, and Demonstration. The Star program is the core of DOE-VPP. This program is aimed at truly outstanding protectors of employee safety and health. The Merit program is a steppingstone for participants that have good safety and health programs, but need time and DOE guidance to achieve true Star status. The Demonstration program, expected to be used rarely, allows DOE to recognize achievements in unusual situations about which DOE needs to learn more before determining approval requirements for the Merit or Star program.

By approving an applicant for participation in DOE-VPP, DOE recognizes that the applicant exceeds the basic elements of ongoing, systematic protection of employees at the site. The symbols of this recognition provided by DOE are certificates of approval and the right to use flags showing the program in which the site is participating. The participant may also choose to use the DOE-VPP logo on letterhead or on award items for employee incentive programs.

This report summarizes the results from the evaluation of Los Alamos National Security, LLC, at the Los Alamos National Laboratory, Los Alamos, New Mexico, during the period of April 19-29, 2010, and provides the Chief Health, Safety and Security Officer with the necessary information to make the final decision regarding its participation in DOE-VPP.

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS

AD	Associate Director
ADPMSS	[Associate Directorate] Project Management and Site Services
ADEPS	[Associate Directorate] Experimental Physical Sciences
B&W Pantex	Babcock and Wilcox Technical Services Pantex, LLC
BBS	Behavior-Based Safety
BLS	Bureau of Labor Statistics
CFR	Code of Federal Regulations
DART	Days Away, Restricted or Transferred
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
EDS	Employee Development System
ES&H	Environmental, Safety and Health
FOD	Facility Operations Directors
HPI	Human Performance Improvement
HSS	Office of Health, Safety and Security
HRP	Human Reliability Program
IH	Industrial Hygiene
ISM	Integrated Safety Management
ISMS	Integrated Safety Management System
IWD	Integrated Work Document
IWM	Integrated Work Management
JHA	Job Hazard Analysis
KSL	KSL Services Joint Venture
LAAP	Los Alamos Awards Program
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LASO	Los Alamos Site Office
MOV	Management Observation and Verification
MSDS	Material Safety Data Sheet
MSS	Maintenance and Site Services Division
NAICS	North American Industry Classification System
NNSA	National Nuclear Security Administration
OJT	On-the-Job Training
OSHA	Occupational Safety and Health Administration
PAD	Principal Associate Director
PIC	Person-in-Charge
PPE	Personal Protective Equipment
RCT	Radiation Control Technician
SMART	Specific, Measurable, Achievable, Relevant, and Timeframed
SME	Subject Matter Experts
TA	Technical Area
Team	Office of Health, Safety and Security DOE-VPP Team
TRC	Total Recordable Case
VPP	Voluntary Protection Program
WSST	Worker Safety and Security Team

EXECUTIVE SUMMARY

Los Alamos National Security, LLC (LANS), is a partnership between the University of California, the Babcock and Wilcox Company, Bechtel National, Inc., and URS. On December 21, 2005, LANS was awarded the contract to manage and operate the Los Alamos National Laboratory (LANL). Transition to the new contract was effective in June 2006. As part of its proposal, LANS established attaining Department of Energy (DOE) Voluntary Protection Program (VPP) Star Status as a goal. In September 2009, LANS submitted its DOE-VPP application, and the required onsite assessment was scheduled for April 19-29, 2010. This report documents the DOE-VPP Team's (Team) recommendation to the Chief Health, Safety and Security Officer regarding that application.

Senior managers at LANL are clearly committed to achieving DOE-VPP Star status and are willing to provide workers with the tools and resources needed. That commitment has not yet been fully accepted at all levels of the organization. LANS managers need to continue to reinforce their commitment through more effective communication across all levels at the Laboratory, as well as continuing to increase manager visibility and presence in work areas.

Employee involvement and participation in the LANS safety program have not yet reached the level of consistency and maturity expected of a DOE-VPP Star participant. There are some groups that have taken a much more active role than others. Considerable leadership focus is targeted at improving worker involvement. Worker Safety and Security Teams, the primary vehicle for direct employee involvement, have been established across the Laboratory and provide an excellent opportunity for the employees and the managers to work collaboratively to identify and resolve safety issues. Since the initiation of the new contract, LANS has put in place a number of system improvements leading to improved safety and safety statistics. The next step up in safety improvement, however, involves the significantly more challenging task of motivating a diverse group of employees from researchers to crafts to internalize safety at every step of the process by adopting an uncompromising desire to want to "do it right, every time, all the time," and being mindful about everyday, "at-risk" behaviors.

LANS has multiple tools available for personnel to identify and analyze hazards. For the moderate and high hazard activities, hazards are effectively identified, but analyses are not consistently documented that justify the selected controls. The structure of the Integrated Work Management (IWM) process bypasses any systematic hazard analysis for work assumed to be low hazard. Worksite inspections for safety and health hazards are conducted in some cases, but not with the frequency and structure expected of a DOE-VPP Star participant. In order to achieve Star status, LANS needs to ensure a systematic, efficient approach is applied to analyze all hazards, including periodic worksite inspections that involve more than just deployed safety and health staff. Further, LANS needs to complete the additional exposure assessments identified after its initial baseline exposure assessments were completed and achieve a sustainable process for ongoing exposure assessments. LANS should also continue with current efforts to improve and streamline the IWM process, including the implementation of peer reviews for scientific work.

While the hierarchy of controls to mitigate hazards is present at LANS, identification and implementation of controls lack sufficient rigor in some areas. To meet the requirements of the Hazard Prevention and Control tenet, LANS needs to continue its efforts to improve the IWM

processes to ensure proper and consistent identification and implementation of controls based upon an accurate identification and detailed analysis of the hazards associated with that work.

LANS' safety and health training and the associated qualification programs are generally effective and ensure that employees are appropriately trained to recognize hazards of work and the work environment and to protect themselves and its coworkers. An investigation of a shock event that occurred in March 2009 identified some problems with electrical worker training and LANS' needs to ensure corrective actions from that investigation are effective. LANS also needs to ensure worker qualifications and training is adequately verified prior to performing work and to ensure notices of upcoming training are adequately communicated to workers and supervisors. LANS substantially meets the requirements of the Safety and Health Training tenet of DOE-VPP.

Safety performance statistics (Total Recordable Case and Days Away, Restricted or Transferred rates) do not yet meet the expectations for DOE-VPP Star status. Those data are trending down with the exception of two directorates. The Team fully expects that if LANS effectively addresses the opportunities for improvement identified in this report, it will continue to improve and should be able to achieve DOE-VPP Star status within 3 to 5 years. As such, the Team is recommending that LANS be admitted to DOE-VPP at the Merit level.

TABLE 1

OPPORTUNITIES FOR IMPROVEMENT

Opportunity for Improvement	Page
LANS should consider performing a comprehensive staffing needs analysis for subject matter experts in safety and health disciplines in order to optimize deployment of personnel.	**6**
LANS managers should work more closely with WSSTs to develop SMART goals within the safety improvement plan.	**7**
Senior Managers should reinforce their expectations regarding recognition of employees for positive safety-related actions, good catches, and other proactive, beneficial safety performance improvements and ensure mechanisms for such recognition are timely.	**8**
Division and Group Leaders need to ensure information regarding resource prioritization is communicated and understood by their workers, and ensure workers' concern about that prioritization is factored into decisionmaking.	**8**
LANS should find more effective methods to communicate decisions regarding resource prioritization to the workforce when worker concerns cannot be quickly addressed.	**8**
LANS needs to perform an annual VPP Self-Assessment for CY 2010 in accordance with the DOE-VPP documents. That assessment should include evaluation of its progress toward Star status by evaluating the Opportunities for Improvement identified in this report, as well as identifying new opportunities for improvement and safety goals for 2011.	**9**
LANS should consider creating a common tracking database, or expanding use of one of the existing issues databases, for issues raised by WSSTs to foster better communication of results to WSST members, better communication between WSSTs, as well as integration of common issues raised by more than one WSST.	**12**
LANS should consider expanding BBS and HPI initiatives throughout the Laboratory as a means to achieve the next significant improvement in safety performance.	**13**
LANS should consider implementing a program to identify and recognize effective safety messages, such as a safety message of the week, month, or year recognition.	**14**
LANS should expand use of BBS and "Gotcha" program as a means to increase visibility of WSST members and raise worker awareness of their personal choices related to safety behaviors.	**14**
LANS should consider implementing an institutional workplace safety and health inspection program that involves management, workers, and safety and health professionals and provides workers with time and tools (checklists,	**15**

training, and inspection guidance) to participate in routine workplace safety inspections and accident or incident investigations.	
LANS should ensure that: workers are provided greater opportunity to be involved in the work planning and control processes, a broader cross-section of the workforce is included on walkdowns and job hazard analyses, and workers are involved in selection of controls to help promote safe, effective, and efficient performance of all work.	**15**
LANS should consider revising its process flow in IWM to ensure all hazards are analyzed and subsequent controls and rigor of work planning is based on that analysis.	**17**
LANS should assure that hazard analysis is documented in a fashion that validates the rationale for control selection.	**18**
LANS should complete the additional exposure assessments as soon as practical and implement a sustainable exposure assessment process.	**19**
LANS should continue looking for additional leading indicators, such as the B&W Pantex Work Environment Forecast, as well as capturing, tracking, and correlating the type of work being performed when accidents, injuries, or near-misses occur as a means of focusing safety improvement efforts where the most benefit can be expected.	**19**
Managers should involve the worker in the completion of Form 1793 to gain engagement and ownership and to better communicate job physical demands, emotional demands, cognitive or sensory demands, environmental demands, and potential workplace hazards.	**23**
LANS should consider requiring managers to update Form 1793 on a periodic basis with an automated notification process to ensure job demands are adequately understood by both workers and supervisors.	**23**
LANS should ensure the current version of Form 1793 is readily available for managers, supervisors, and workers and that only the most current version of the form is accepted by Occupational Medical staff.	**24**
LANS should reevaluate its expectations for PPE postings for site-wide adherence and issue those expectations at the institutional level for FOD implementation.	**25**
LANS should take intermediate steps to address the training notification gap for assuring appropriate training qualifications for deployed workers until the transition to the Plateau database is completed.	**29**
LANS should identify tailoring approaches to training that are more compatible with workers' background and experience.	**29**
LANS should identify more effective methods to ensure learning objectives have been satisfied for all training courses.	**30**

I. INTRODUCTION

Created in 1943 during the Manhattan Project, Los Alamos National Laboratory (LANL) was selected as the site to design and build the world's first nuclear weapons. Chosen for its isolation, limited access, and the ability to use the surrounding canyons for explosive tests, the site was an ideal location for this work. Since its inception, LANL had been managed by the University of California under contract to the U.S. Army, the Atomic Energy Commission, the Energy Research and Development Agency, the Department of Energy (DOE), and finally the National Nuclear Security Administration (NNSA). In order to gain greater efficiency in the operation of LANL, as well as address longstanding safety and security issues, NNSA opened competition for the LANL contract in 2003. Los Alamos National Security, LLC (LANS), a partnership, including the University of California, the Babcock and Wilcox Company, Bechtel National, Inc., and URS, was awarded the contract to manage and operate LANL and completed transition in June 2006.

The primary mission of LANL is to develop and apply science and technology to ensure the safety, security, and reliability of the U.S. nuclear deterrent; reduce global threats; and solve other emerging national security challenges. For more than 60 years, LANL has served as a research center in the world of science, technology, and engineering and has made achievements that focus on safety, security, environmental stewardship, nuclear deterrence, threat reduction, operations, communications, and community involvement. Specialized capabilities at LANL provide our Nation with a reliable nuclear deterrence. Some of the capabilities include reliability and performance of LANL weapons systems, and achieving NNSA's complex transformation for the Nation's nuclear weapons stockpile. Other capabilities include anticipating, countering and defeating global threats, and developing a secure energy future.

LANS is organized in a matrix structure. Four Principal Associate Directors (PAD) are assigned for Science Technology and Engineering, Weapons Programs, Global Security, and Operations and Business. These PADs are responsible for the primary missions of the Laboratory. Each PAD has a number of Associate Directors (AD). These Directorates are further organized into Divisions and finally into groups. The PADs and ADs come from a variety of backgrounds that include longtime experience at National Laboratories; other facility operations; maintenance and construction, both nuclear and nonnuclear; and environmental stewardship (including waste management and environmental restoration). Initially, maintenance at LANL was performed by a LANS subcontract to KSL Services Joint Venture (KSL), a joint venture between Kellogg Brown and Root Inc., Shaw Infrastructure Inc., and Los Alamos Technical Associates Inc., who had been responsible for maintenance at LANL for many years. In December 2008, LANS decided to bring the maintenance effort in-house and subsequently hired most KSL workers directly.

As part of its winning proposal, LANS identified its commitment to achieving Star status in the DOE Voluntary Protection Program (VPP). Since it assumed management of LANL, LANS has actively pursued that commitment. In September 2009, LANS submitted its application for participation in DOE-VPP to the Los Alamos Site Office (LASO). LASO concurred with the application and forwarded the application to the Office of Health, Safety and Security (HSS) in October 2009. The application was reviewed by HSS and an onsite assessment was scheduled for April 19-29, 2010, in accordance with DOE-VPP procedures.

LANL is the largest of the National Laboratories. Including subcontractors, there are approximately 14,000 people working at the Laboratory on a daily basis. The personnel are a mix of PhDs, postdoctoral students, graduate and undergraduate students, technicians, engineers, crafts people, laborers, administrators, and support personnel. The site's maintenance and craft support is unionized with 13 separate unions, each of which signed a joint commitment letter endorsing its support for VPP at LANL.

Hazards at LANL run the gamut from routine everyday hazards to operating Category II nuclear facilities. As such, workers can be exposed to standard industrial hazards, beryllium, nanoparticles, toxic and hazardous chemicals, radioactive materials, high-voltage electricity, confined spaces, explosives, high-energy particle beams, lasers, and a host of other hazards. Given the nature of research and development work at LANL, it is also very possible for workers to be exposed to hazards that are not yet recognized and fully understood.

LANL is spread over approximately 40 square miles and is divided into multiple technical areas (TA). TAs are grouped and managed by location and function. LANL is bordered by the Santa Fe National Forest, Bandelier National Monument, the San Ildefonso Pueblo, and the towns of White Rock and Los Alamos.

Per DOE-VPP procedures, an onsite assessment is required to determine if the applicant has met the requirements for participation in DOE-VPP, and, if so, at what level. In accordance with that procedure, HSS formed a team of 14 people, consisting of DOE Federal employees from DOE Headquarters, as well as two personnel from other DOE site offices, and volunteer personnel from other DOE-VPP participating contractors. The HSS DOE-VPP Team (Team) visited LANL from April 19-29, 2010. During that assessment, the Team visited many LANL facilities; conducted interviews with most of the senior Laboratory Managers, including the Laboratory Director and each of the 12 ADs; observed many work activities, including research, maintenance, and operations; reviewed many policies and procedures and other documents; observed Worker Safety and Security Team (WSST) meetings, and had contact with several hundred other Laboratory personnel. This report documents the results of the Team's activities and provides the Team's recommendation to the Chief Health, Safety and Security Officer regarding LANS' participation in DOE-VPP.

II. INJURY INCIDENCE/LOST WORKDAYS CASE RATE

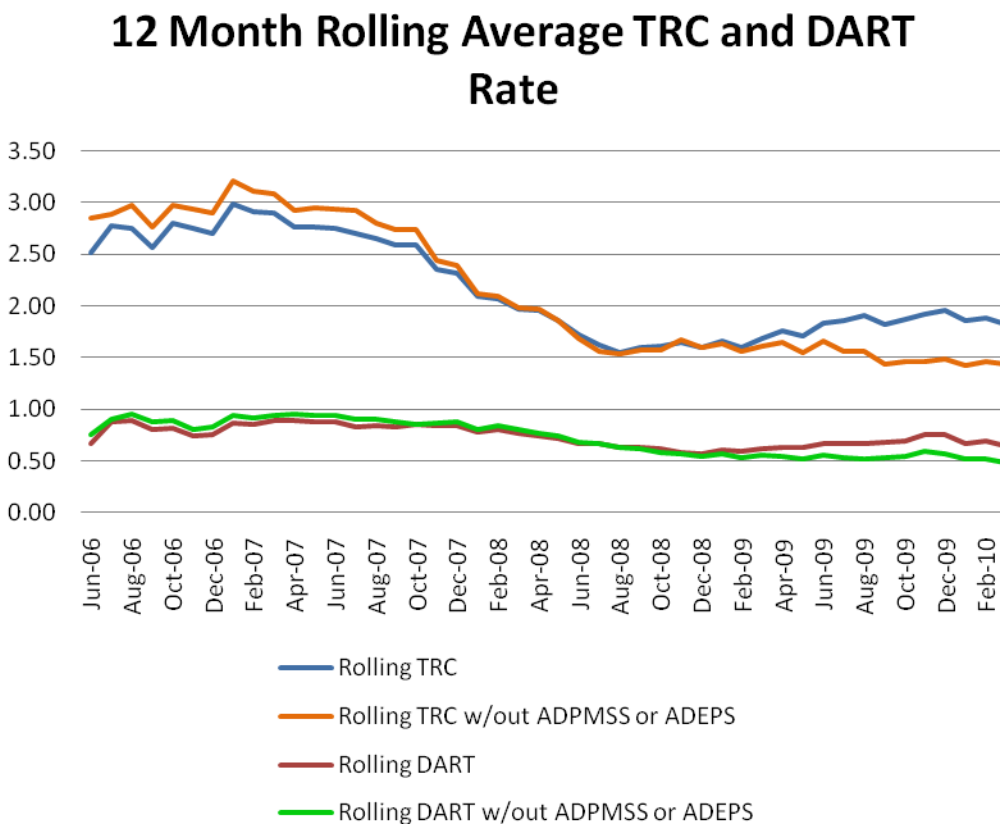
Injury Incidence/Lost Workdays Case Rate (LANS)					
Calendar Year	Hours Worked	Total Recordable Cases (TRC)	TRC Incidence Rate	DART* Cases	DART* Case Rate
2007	16,534,797	187	2.26	68	0.82
2008	15,824,172	123	1.55	44	0.56
2009	17,215,940	169	1.96	65	0.76
3-Year Total	49,574,909	479	1.93	177	0.71
Bureau of Labor Statistics (BLS-2008) average for NAICS** Code # 5417 Scientific research and development services			1.2		.5
Injury Incidence/Lost Workdays Case Rate (LANS Subcontractors and Vendors)					
Calendar Year	Hours Worked	TRC	TRC Incidence Rate	DART* Cases	DART* Case Rate
2007	3,832,750	41	2.14	22	1.15
2008	3,674,480	55	2.99	20	1.09
2009	1,906,280	26	2.73	15	1.57
3-Year Total	9,413,510	122	2.59	57	1.21
Bureau of Labor Statistics (BLS-2008) average for NAICS** Code 5417 Scientific research and development services			1.2		.5

* Days Away, Restricted or Transferred
** North American Industry Classification System

TRC Incidence Rate, including subcontractors: 1.92
DART Case Rate, including subcontractors: 0.75

LANS accident and injury statistics are significantly higher than the average for its comparison industry. For new applicants where the 3-year average rates are above the comparison industry average, the contractor needs to demonstrate that they will be able to bring the average down to the industry average in 5 years or less. LANS uses a 12-month rolling average TRC/DART rate indicator to provide a more detailed picture of the trend.

When viewed as a 12-month rolling average, significant improvement can be seen in TRC and DART rates from the beginning of the LANS contract through August 2008. After that, performance was either flat or degrading with what appears to be an improving trend developing in early 2010.



Breaking down the data by Associate Directorate identified that much of the initial improvement in TRC and DART rate statistics was attributable to the Associate Director for Business Services. That Directorate saw a decrease in TRC from 6 to 2 between June 2006 and August 2008. Other Directorates also saw improvement, but not as dramatic. In calendar year 2009, both the [Associate Directorate] Project Management and Site Services (ADPMSS) and the [Associate Directorate] Experimental Physical Sciences (ADEPS) directorates began exhibiting an increase in TRC. The other Directorates continued through the entire time period with decreasing or steady rates. In order to achieve Star level performance, LANS should continue to show improvements in all Directorates, but especially focus on ADPMSS and ADEPS.

III. MANAGEMENT LEADERSHIP

Management leadership is a key element of obtaining and sustaining an effective safety culture. The contractor must demonstrate senior-level management commitment to occupational safety and health in general and to meeting the requirements of DOE-VPP. Management systems for comprehensive planning must address health and safety requirements and initiatives. As with any other management system, authority and responsibility for employee health and safety must be integrated with the management system of the organization and must involve employees at all levels of the organization. Elements of that management system must include: (1) clearly communicated policies and goals; (2) clear definition and appropriate assignment of responsibility and authority; (3) adequate resources; (4) accountability for both managers and workers; and (5) finally, managers must be visible, accessible, and credible to employees.

Observations and interviews by the Team with managers clearly demonstrated the commitment of Laboratory's senior management team to improve safety at the Laboratory. Managers interviewed by the Team clearly recognize the relationship between safety and the ability to perform the essential science mission in support of national security. That commitment begins with the Laboratory Director, who clearly understands the need for strong worker and manager involvement and cooperation, and his well-publicized view that safety is part of the job, not an overlay.

Many senior operations managers at LANS have firsthand experience at other VPP sites and bring with them a firm understanding of VPP and its positive effect on the safety culture. However, most importantly is their recognition of the unique challenges they face at LANL and their willingness and commitment to find ways to overcome these challenges.

Managers' presence in the workplace is an evolving process at LANL. Most managers interviewed believe that manager visibility in the workplace is a positive influence. However, a number of managers have not yet firmly included routine presence in the workplace in their schedules. Those managers that purposely schedule a few hours a week are seeing positive results in motivating their employees and believe that their presence is helping them to effectively address employee-identified issues. During interviews and observations, first-line supervisors indicated that the biggest change from past practices has been that they are expected to spend more time in the field to listen and respond to employees' feedback and suggestions. As a result, mid-level managers and first-line supervisors are working to be more visible and actively engaged. Some craft workers reported to the Team that their immediate managers are more visible in the field and attending meetings with the workers. However, workers are not always aware of the higher-level managers visiting worksites.

A key tool for increasing manager presence in the workplace is the Management Observation and Verification (MOV) process. A self-assessment performed in 2009 found that 91 percent of managers were performing MOVs, and that 78 percent of managers were performing MOVs at least monthly. Even though these statistics point to a broad use of the program, significant additional gains are feasible if managers' presence at the worksite and their availability to the workforce is transformed into a routine event rather than an occasional occurrence. To achieve such a goal, LANS should formally announce its expectations for all managers to perform MOVs more frequently (e.g., weekly). Also when performing MOVs, managers must ensure that observations are used both to identify issues, as well as recognize improvements, and

achievements. Raising corporate expectations for manager presence at the workplace, as well as making that presence a positive experience for the employees, is an excellent means for improving communications and accelerating employees' acceptance of the managers' commitments.

LANS is divided into program directorates that carry out the research and development missions, and operations directorates that operate and maintain the Laboratory infrastructure and systems. Each major facility or group of facilities has an assigned Facility Operations Director (FOD) that supports the program directorate, but reports to the Operations Director. By design, LANS is a highly matrixed and fairly complex organization. The structure is intended to ensure that Laboratory programs have access to the necessary expertise in a timely manner. The complexity of the organization, however, is causing confusion for some employees regarding responsibilities, authorities, and priorities for resource allocation. Employees interviewed repeatedly stated that the organization, and at times its resource allocation priorities, was difficult to understand. For example, industrial hygienists interviewed believe the model for distributing resources at times prevents them from optimizing personnel assignments to ensure corporate industrial hygiene commitments, such as exposure assessments, are completed in a timely manner. Conversely, some researchers interviewed believe that deployed subject matter experts (SME) are not sufficiently responsive to their needs and took excessive amounts of time to review integrated work documents. LANS should consider performing a comprehensive staffing needs analysis for SMEs in safety and health disciplines in order to optimize deployment of personnel. Such an analysis may reveal critical personnel shortfalls that are contributing to work planning and control problems identified by LANS, LASO, HSS, and the Defense Nuclear Facilities Safety Board (DNFSB) and may provide an opportunity to strengthen management leadership in this area.

Opportunity for Improvement: LANS should consider performing a comprehensive staffing needs analysis for subject matter experts in safety and health disciplines in order to optimize deployment of personnel.

For the past 2 years, LANS has developed safety improvement plans at several levels of the organization. Many of these plans contain goals that appropriately address workers empowerment issues and it is evident that workers, through the WSSTs are helping to develop these goals. Most importantly, the Team saw some examples of positive goals—goals that are relevant and measurable.

Corporately, LANS has established three major 2010 Safety and Security Goals. However, these goals do not represent specific actions that are concrete and measurable. For example, the first safety goal for 2010 is to "Reduce the number and consequences of Accidents." Actions to attain that goal are:

1. Prevent accidents;
2. Learn from accidents; and
3. Promote safe behaviors.

These actions and goal are nonspecific, difficult to measure, and it is not clear when the goal is reached. In developing goals for safety improvement, the Team suggests the use of the "SMART" paradigm; i.e., goals that are specific, measurable, achievable, relevant, and

timeframed. For example, within the "SMART" paradigm the statement of the first corporate goal could address the reduction of TRC and DART below the 2008 industry average as published by the Bureau of Labor Statistics by:

1. Training all (or some percentage of) workers to use error-prevention tools, such as Human Performance Improvement (HPI), which will increase barriers to consequences.
2. Investigating all accidents and share lessons learned with the workforce during safety meetings.
3. Promoting safe behaviors by training all employees and reinforcing the various ways they can impact the safe performance of work (e.g., behavior-based observations, use of HPI tools, worksite inspections, incident investigations).

In general, corporate goals would be more meaningful to the workforce if they included a list of actions and schedules that are clearly coupled to the attainment of envisioned results. Also, the actions identified should include participation and responsibilities for employees, thereby promoting ownership in the process. As it exists today, many workers believe the corporate goals are the responsibility of others (i.e., they believe actions are limited to managers and safety personnel). WSSTs should be closely involved in the development of these safety improvement plans. By seeking and insisting on their active contribution to the safety improvement plans, the WSSTs will have a much stronger sense of ownership, as well as a sense of achievement when goals are accomplished. Managers and WSST members should closely track progress toward those goals and ensure achievement of the goals is publicized, rewarded, and celebrated as appropriate.

Opportunity for Improvement: LANS managers should work more closely with WSSTs to develop SMART goals within the safety improvement plan.

Overall Laboratory employees are held accountable for their safety performance. Opportunities exist to identify more ways to positively reward and recognize workers that go above and beyond expectations. Managers need to consistently and frequently communicate and followthrough on expectations regarding employee recognition. Some mechanisms to recognize employees have been identified and used (e.g. trinkets, spot awards, parking places), but these are inconsistent across organizational boundaries, and it is not evident that managers are recognizing actions that employees perceive warrant recognition. The Team was informed of multiple instances where employees made relevant safety suggestions to their immediate manager, but no recognition was given. Discussions with managers identified that the use of some award mechanisms is cumbersome and, because of budget allocations and administrative requirements, lower level managers believe it is nearly impossible to provide immediate recognition to employees, difficult to recognize distributed employees, and not possible to recognize non-LANS employees (e.g., subcontractors) for a positive safety-related action, a good catch, or otherwise. Noncash awards are often more effective than cash awards, and LANS should look for those opportunities. LANS managers should continue to work closely with WSSTs to identify creative methods to recognize and reward individuals and teams that demonstrate excellence in safety performance. Those methods should also consider nonmonetary awards that reinforce individual respect and achievement, and have meaning to the individual/group receiving the recognition.

Opportunity for Improvement: Senior managers should reinforce their expectations regarding recognition of employees for positive safety-related actions, good catches, and other proactive, beneficial safety performance improvements and ensure mechanisms for such recognition are timely.

Senior managers recognize the limitation of resources and are actively involved in working to optimize the use and assignment of resources to accomplish the LANS mission in a safe and secure manner. In general, resources are assigned based on priorities and appropriately address safety issues. The size and complexity of the organization often prevents the basis of those decisions for resource assignment from being apparent to those affected.

Managers have made special efforts in the past 2 years to review and prioritize concerns raised by employees and WSSTs. Where possible, they have used discretionary funding to correct issues, or requested additional funding if necessary. As would be expected, they are not always successful in obtaining additional resources immediately. As a predictable result, some employees are not satisfied with the timing and prioritization of concerns that are important to them. The institutional WSST is trying to find effective methods to better communicate priorities and reassure workers that issues are not being dropped. Managers, particularly at the Group and Division level, need to ensure workers receive timely feedback on issues that are not receiving immediate attention in order to help them understand the broader scheme of issue resolution and prioritization. For example, nearly 2 years ago, the Heavy Vehicle Repair Shop exhaust extraction ventilation system was tested and determined to be out of specification. Actions were taken to evaluate having the system "re-engineered and replaced." However, the system upgrade was dropped when KSL staff were hired directly by LANS, but the workers in the shop believed the upgrade was still planned. As a result, they did not raise a health and safety issue regarding exhaust emission exposure issues until March of this year when they learned the upgrade was not planned, and LANS managers were unaware of the condition. If a process for communicating and tracking safety concerns and issues had been in place, this issue may not have been neglected for so long.

Opportunity for Improvement: Division and Group Leaders need to ensure information regarding resource prioritization is communicated and understood by their workers, and ensure workers' concern about that prioritization is factored into decisionmaking.

Opportunity for Improvement: LANS should find more effective methods to communicate decisions regarding resource prioritization to the workforce when worker concerns cannot be quickly addressed.

Safety and health is considered in all aspects of operations at LANL. The Integrated Work Management (IWM) process uses the guiding principles and core functions of the Integrated Safety Management System to help ensure that work is performed safely and securely. As discussed later in this report, there are some weaknesses in IWM process that LANS is addressing. At the writing of this report, IWM process was being reviewed and revised by the Laboratory to better improve early identification of safety issues, and promote additional, more effective peer review of research work. For longer term improvements, capital improvement projects are in progress across the Laboratory in order to eliminate older, more hazardous

facilities, and when completed provide more modern, more effective, and safer Laboratory facilities.

LANS has implemented a rigorous process for ensuring subcontractors understand and meet the requirements of title10, Code of Federal Regulations, part 851 (10 C.F.R. 851). A standard set of requirements, appendix F, is included in all subcontracts. The subcontractor technical representative, the designated purchasing officer, applicable SMEs, and the Laboratory customer all work together to determine applicable provisions based on the scope of work. The subcontractors performing moderate and high-hazard work must develop a site-specific safety and health plan. LANS has many subcontractors that are used on a repeat basis, allowing LANS to take advantage of previous experience with a subcontractor. Subcontractor employees interviewed by the team performing decontamination, deactivation, and demolition activities in TA-21 clearly recognized hazards inherent in their work and confidently questioned unclear aspects of their assigned tasks. Workers clearly demonstrated they were looking out for themselves and others as they worked.

LANS has not yet demonstrated the process for an integrated self-assessment targeted at the 5 tenets of DOE-VPP. This process is a critical consideration for Star level performance and must be functioning for at least 12 months to achieve Star recognition. LANS conducts extensive self-assessment efforts and effectively uses those assessments to identify corrective actions. In order to achieve Star status, LANS must work to achieve a greater degree of integration of these assessments annually into a comprehensive self-assessment organized around the tenets of VPP.

Opportunity for Improvement: LANS needs to perform an annual VPP self-assessment for CY 2010 in accordance with the DOE-VPP program documents. That assessment should include evaluation of its progress toward Star status by evaluating the Opportunities for Improvement identified in this report, as well as identifying new opportunities for improvement and safety goals for 2011.

One of the major challenges for Laboratory managers is to convince the workforce, including many longtime Laboratory employees, the changes are not temporary, but intended to create sustained improvement in effectiveness and efficiency of the Laboratory. Based on the Team's observations of work performance and interactions with Laboratory managers and workforce, many personnel still are not involved in the current effort to achieve VPP Star status. This will be discussed in greater detail in the Employee Involvement Section, but individual managers' beliefs and attitudes strongly influence these personnel.

Communication challenges at all levels of the organization was a recurring theme noted by Team members. The Team saw examples across the entire spectrum of communications. Some directorates and divisions are communicating regularly through weekly return-to-work meetings, newsletters, manager presence, and WSSTs. Other directorates, divisions, and groups are less effective, tending to rely more on individual conversations and e-mails. Ineffective communication contributed to several of the challenges observed by the Team. For example, deployed personnel may not be aware of expiring training and qualification because notices are not being forwarded to their functional supervisors (see Safety and Health Training). Programmatic issues, such as difficulty implementing IWM process, are partly due to ineffective communication of requirements, communication that tools are available to assist with Integrated

Work Document (IWD) preparation, or ineffective communication between researchers and SMEs that delays review and approval of IWDs. The complexity of the LANS organizational infrastructure requires significant effort to ensure clear communication of institutional and activity-specific expectations and requirements, both up and down and across all organizations and levels. Although communications were generally effective, it was evident to the Team that there are opportunities to enhance the institution's progress toward Star status by improving communication throughout the organization. In addition, LANS should realize greater worker involvement and belief in the VPP effort through managers' support and encouragement of peer-to-peer communication across organizational lines. These communications will help every employee understand, and eventually accept, LANS' commitment to achieving VPP Star status as their own personal challenge.

Conclusion

Senior managers at LANL are clearly committed to achieving DOE-VPP Star status and are willing to provide workers with the tools and resources needed. While senior management is proactive, its commitment has not yet been fully shared at all levels of the organization. LANS managers need to continue to reinforce their commitment through more effective communication across all levels at the Laboratory, as well as continuing to increase manager visibility and presence in work areas. Addressing the opportunities for improvement identified in this section should lead to significant improvements towards qualification at the Star level.

IV. EMPLOYEE INVOLVEMENT

Employees at all levels must continue to be involved in the structure and operation of the safety and health program and in decisions that affect employee health and safety. Employee involvement is a major pillar of a strong safety culture. Employee participation is in addition to the individual right to notify appropriate managers of hazardous conditions and practices. Managers and employees must work together to establish an environment of trust where employees understand that their participation adds value, is crucial, and welcome. Managers must be proactive in recognizing, encouraging, facilitating, and rewarding workers for their participation and contributions. Both employees and managers must communicate effectively and collaboratively participate in open forums to discuss continuing improvements, recognize and resolve issues, and learn from their experiences.

In its eighth Integrated Safety Management (ISM) Guiding Principle, LANS recognizes that "trust, open communication, and worker involvement are critical to support the desired Laboratory culture." To achieve this desired culture, especially as it relates to worker involvement, LANS has devoted significant effort to the HPI initiative and VPP. Seeking formal recognition from DOE is a positive step and demonstrates strong management commitment as discussed in the previous section. In addition to the VPP and HPI programs, a number of other related, but separate, activities comprise the worker involvement processes. The major mechanism for direct worker involvement at LANS is through the worker participation in safety and security committees, workers' concerns, and finally a number of worker recognition programs.

LANS has identified WSSTs as a primary means of fostering employee involvement. Beginning with an institutional WSST, WSST structure follows the Laboratory organization, reaching down to the divisional and group level. With this approach, there are approximately 100 WSSTs across the Laboratory. Although there is significant variability in how WSSTs function, a majority of WSST meetings observed by the Team were conducted effectively. WSSTs currently spend much of their effort identifying and correcting specific safety issues. Many employees interviewed by the Team indicated that they have seen some success in correcting the issues raised at the WSST meetings, and as a result, they are encouraged and feel more comfortable in raising concerns. These observations were confirmed during Team interviews and walkdowns where a number of employees indicated that they are now more willing to raise concerns about their work and safety of their coworkers than they were before the contract change in 2006.

An essential aspect of worker involvement is the right and willingness of workers to stop, or pause, work when there is a question about their ability to perform the work safely. Nearly all workers interviewed by the Team were aware of their right to stop work, but a small minority of workers remains concerned that raising safety issues may have negative repercussions. The Team did not identify any specific cases of potential retribution against workers for raising safety issues. In one case, exactly the opposite was true. In that case, a Radiation Control Technician (RCT) observed personnel performing work in a hood that had not been authorized on the facility Plan-of-the-Day. The personnel argued with the RCT, but the RCT successfully stopped the work. Further investigation determined the hood had not been tested and was not ready to support work. The RCT was given an award by the Associate Director for Facility Operations for his actions.

This case also highlights another challenge that LANS faces in fostering greater employee involvement – the cultural differences between highly educated research staff and highly experienced support staff. As illustrated in the previous case, these cultural differences can lead to differing opinions about how to perform a particular task safely. In these cases, researchers and SMEs must learn to consistently seek and value each others' expertise and experience and work together to find creative solutions to unique problems.

An area of some variability observed in WSST activities is the tracking of safety issues to closure and communication of the results to WSST members. The Team believes that LANS might gain additional benefit from a more standardized and consistent approach to this issue. For example, through a Laboratory-wide WSST issue database, WSSTs would be able to check on the status of concerns they have raised and to see if other WSSTs were identifying similar or identical issues at other locations or organizations.

Opportunity for Improvement: LANS should consider creating a common tracking database, or expanding use of one of the existing issues databases, for issues raised by WSSTs to foster better communication of results to WSST members, better communication between WSSTs, as well as integration of common issues raised by more than one WSST.

Based on observations, the Team believes that the broader employee involvement being pursued by the Laboratory through the establishment and operations of WSSTs has the potential to provide significant gains in the coming months and years. This view is also supported by an examination of available safety and health statistics provided to the Team. It appears that between 2006 and 2008, LANS had successfully addressed a number of safety improvements by setting appropriate expectations, and implementing effective policies, procedures, and safety rules. However, performance reached a plateau in 2008 and has been level over the past 12-18 months. It is the Team's view that the next step in safety improvement is related to behavioral and cultural elements, and as a result is more difficult to achieve. Specifically achieving progress in the next step will require proactive LANS efforts to convince and move a large segment of Laboratory employees to work on "changing their minds" about safety; and adopting an uncompromising desire to "do it right, every time, all the time," and being mindful about everyday "at-risk" behaviors.

In focusing on everyday "at-risk" behaviors, there is a possibility that workers may begin to trivialize safety improvement efforts. LANS must continually reinforce workers' attitudes and mindset that using handrails, crosswalks, traffic signs, and other fundamental behaviors reflect the inner commitment to safety. Changing workers' perceptions about these behaviors changes their individual fundamental commitment to safety; and when that commitment is carried forward into the workplace, it will result in desired safety improvements. An indicator when an effective interdependent safety culture has been achieved is that workers can confidently point out "at-risk" behaviors by other employees they do not personally know without the fear of being ridiculed or rebuked. Interviews indicate that this safety culture has not yet been established in many areas at LANL. While Team observations did identify several "pockets of excellence" with regard to employees adopting this new safety culture, additional efforts will be necessary to ensure site-wide participation. Behavior-Based Safety (BBS) programs are specifically designed to assist in developing this culture by instructing and encouraging employees to observe each other and intervene when at-risk behaviors are observed. Without this employee-to-employee interaction, the BBS concept of "Silence is Consent" reinforces undesirable behaviors and slows

achievement of safety excellence. The "Gotcha" initiative, discussed later, is a good example of encouraging employee-to-employee interactions.

Some directorates at the Laboratory have made significant strides in this area through implementation of BBS programs and HPI initiatives. Other directorates have not yet made similar progress and are waiting for assurance that these efforts will be fruitful and worth the investment. LANS has a nationally recognized expert on HPI already on its staff. LANS should use this resource to a greater benefit by expanding use of BBS and HPI throughout the Laboratory.

Opportunity for Improvement: LANS should consider expanding BBS and HPI initiatives throughout the Laboratory as a means to achieve the next significant improvement in safety performance.

In many cases, workers performing advanced research are not taking advantage of opportunities they are given to help define and revise work processes that improve safety, but improve work performance. This may be due to several influences, such as a belief that their ideas will not be considered, that processes and procedures are "set in stone" and cannot be revised, or simply "it's always been done that way." This organizational inertia must be overcome, and workers must be encouraged and recognized for their contributions towards achieving systematic improvements. These improvements could come from many sources and activities, such as walkdowns and input to individual work packages, effective peer reviews of research proposals or methods, as well as improvements to the IWM process and safety expectations.

The Team believes that LANS employees should be given the opportunity to self-identify where their resistance to change may be impeding progress towards a better safety culture. For example, personnel that believe IWM process is too cumbersome may simply have not had access to appropriate information, or have not had the opportunity and the experience to implement the process in an actual work environment. For instance, in developing a project plan to improve IWM process, a team of Deputy Associate Directors identified the need for a "toolbox" to assist workers in using IWM process. The Deputy Associate Directors and many other personnel at the Laboratory were surprised to learn that a toolbox was already available and had been for several months.

LANS has established an informal expectation that all meetings should begin with a short safety message. Many meetings observed by the Team did not include a safety message. This technique has proven effective at other VPP sites as a means of demonstrating the personal value of safety. LANS has developed some tools, such as short safety videos, that are excellent for these messages. However, as discussed previously, these messages can become stale and repetitive over time and lose their effectiveness. It is often challenging to find new ways to deliver safety messages. History has demonstrated that safety messages delivered in ways that evoke an emotional response, use multiple sensory paths, and require participation from the audience have a greater lasting effect on workers. Managers should look for opportunities to acknowledge when an effective safety message is presented, and reinforce the benefits of this practice. As a means of promoting and encouraging effective, creative safety messages, LANS should consider implementing a program to identify and recognize safety messages, such as a safety message of the week, month, or year recognition. Recognition should be provided for individuals or groups that develop safety messages that are particularly relevant, interesting, and

creatively presented as a means of preventing safety messages from becoming stale or trivial. Personnel could be nominated by their peers, supervisors, managers, or anyone observing a particularly effective safety message. To stimulate the nomination process, the persons nominating a winning entry should also be recognized. The winner would receive some reward, but also be invited to present their safety message at other areas across the Laboratory. This process could eventually lead to an extensive library of internally generated safety messages that can then be shared across the Laboratory, as well as with other DOE-VPP participants.

Opportunity for Improvement: LANS should consider implementing a program to identify and recognize effective safety messages, such as a safety message of the week, month, or year recognition.

LANS has begun the use of a program referred to as "Gotcha" that is intended to recognize and reward employees caught in the act of being safe. There are several approaches being used and include allowing the employee to select one of a variety of items (candy bar, pin, etc). The employee's name and "Z number" are recorded on a sheet. That person then must catch three additional employees in a safe act and record their names and Z numbers. Once they have completed the form, it is submitted to their WSST and included in a prize drawing. The Team had an opportunity to observe this process. Most employees contacted by the WSST members performing the observation were surprised, but generally accepting of the observations. A few personnel clearly avoided the activity or any conversation with WSST members. LANS should be able to gain significant improvements by expanding use of "Gotcha" and other programs that provide direct contact with employees and stimulate conversations between employees about safe and at-risk behaviors.

Opportunity for Improvement: LANS should expand use of BBS and "Gotcha" program as a means to increase visibility of WSST members and raise worker awareness of their personal choices related to safety behaviors.

As discussed later under Worksite Analysis, regular workplace inspections by employees other than safety and health personnel can be an effective tool to raise worker awareness and stimulate employee involvement in continuous improvement. During this assessment, such inspections by workers were not evident or broadly identified by workers. Workplace inspections are not being conducted with the intent and frequency expected of VPP Star participants. MOVS, Safety and Security Walkthroughs, and 10 C.F.R. 851 inspections are being performed, but they are not consistently targeted on specific safety and health conditions of the workplace and equipment. The "851 Inspections" are required every year for high-hazard facilities and every 3 years for low-hazard facilities per LANS procedures and are not performed frequently enough to ensure that the workplace is free from unnecessary hazards. For example, large quantities of combustibles (cardboard) were observed being stored in many buildings and laboratories, and they were not recognized as an unnecessary hazard. In addition, safety and health inspections for work areas and shops were not effective in many locations. Examples of missing guards on equipment, unsecured gas cylinders, electrical panels blocked by materials were observed. In one observation, a glovebox utilized for water blasting plastic parts had been installed in a break room four feet from where food was prepared and consumed by workers. By encouraging workers to participate in regular workplace inspections and providing basic tools to conduct

those inspections, LANS should see increased employee ownership in the safety program and significant improvements in workplace safety.

Opportunity for Improvement: LANS should consider implementing an institutional workplace safety and health inspection program that involves management, workers, and safety and health professionals and provides workers with time and tools (checklists, training, and inspection guidance) to participate in routine workplace safety inspections and accident or incident investigations.

LANS can recognize further benefit by expanding workers' involvement in the safety and work control processes. While the IWM process documents discuss worker involvement, that involvement is often limited. LANS should ensure that workers are provided greater opportunity to be involved in the work planning and control processes, a broader cross-section of the workforce is included on walkdowns and job hazard analyses, and involved in the selection of controls to help promote safe, effective, and efficient performance of all work.

Opportunity for Improvement: LANS should ensure that workers are provided greater opportunity to be involved in the work planning and control processes, a broader cross-section of the workforce is included on walkdowns and job hazard analyses, and involved in selection of controls to help promote safe, effective, and efficient performance of all work.

Conclusion

Employee involvement and participation in the LANS safety program has not yet reached the level of consistency and maturity expected of a DOE-VPP Star participant. Some groups have taken a much more active role than others have. Considerable leadership focus is targeted at improving worker involvement. WSSTs, the primary vehicle for direct employee involvement, have been established across the Laboratory and provide an excellent opportunity for the employees and the managers to work collaboratively to identify and resolve safety issues. Since the initiation of the new contract, LANS has put in place a number of system improvements leading to improved safety and safety statistics. The next step up in safety improvement however, involves the significantly more challenging task of motivating a diverse group of employees from researchers to crafts to internalize safety at every step of the process by adopting an uncompromising desire to want to "do it right, every time, all the time," and being mindful about everyday "at-risk" behaviors. Ongoing LANS initiatives to implement BBS and HPI approaches may be especially useful in achieving this change.

V. WORKSITE ANALYSIS

Management of health and safety programs must begin with a thorough understanding of all hazards that might be encountered during the course of work and the ability to recognize and correct new hazards. There must be a systematic approach to identifying and analyzing all hazards encountered during the course of work, and the results of the analysis must be used in subsequent work planning efforts. Effective safety programs also integrate feedback from workers regarding additional hazards that are encountered and include a system to ensure that new or newly recognized hazards are properly addressed. Successful worksite analysis also involves implementing preventive and/or mitigating measures during work planning to anticipate and minimize the impact of such hazards.

The core of the LANS work planning and control process is the IWM process. This process produces an IWD, which is intended to be a worker-friendly document that describes the work activity, identifies the hazards, and links them to specific controls. IWD may be a subset of a larger work package. The development and review of IWD is defined in the IWM procedure (P-300). The procedure is designed to incorporate the five core functions of ISM and Integrated Safeguards and Security Management. IWD includes:

Part One – Activity-Specific Information
This section contains the actual work instruction, hazards, and precautions that are required to perform the task safely.

Part Two – Work Area Information
This section is completed by FOD or representative to ensure that point of contact information, facility entry/coordination requirements, and work area hazards and controls are identified within the IWD.

Part Three – Validation and Release Information
Section three requires the Person-In-Charge (PIC) to perform a walkdown of the task with the workers, perform a prejob brief, and secure work release from FOD or Operations Manager. The workers are also required to sign this section indicating that they understand the scope, hazards, and controls associated with the job.

Part Four – Postjob Review
The postjob review is required for moderate and high-hazard or complex activities.

The P-300 procedure was written as an implementing procedure and recognized four major categories of work at LANL: maintenance, operations, research and development, and subcontractors. In addition, it identifies accepted procedures and guidance used within these categories to support implementation of P-300. For example, Maintenance and Site Services Division (MSS) has developed a suite of procedures designed to implement P-300 in a construction or maintenance environment (i.e., AP-WORK-001 through AP-WORK-006). These administrative procedures provide the guidance to LANL organizations for requesting maintenance, services, and modifications from the maintenance groups deployed to FODs. The Facility Service Request is the catalyst for work to be planned and conducted. The system is maintained on the LANL Intranet, and work requests may be submitted by any personnel.

DOE's expectation for VPP participants at the Star level is that all hazards are analyzed. This includes high and moderate hazards, as well as low hazard activities. As identified by the Office of Independent Oversight in 2007 and again by DNFSB in 2009, activity hazard analysis is inconsistent at LANL. One significant reason is the process flow for IWM defined in P-300. Per the LANS VPP application, this process contains a graded approach (low, moderate, high) based on the hazards associated with the work. The hazards associated with the work area are also considered when making a determination of hazard level. For low hazard activities or those associated with everyday living, "*formal hazard identification and analysis process and an IWD are not required*" (emphasis added). Figure A-1 of P-300 clearly indicates that the responsible personnel planning the job can make a determination that the work only involves "everyday hazards" which then bypasses any additional hazard analysis or work planning processes. If the work is not determined to involve everyday hazards, the person in charge grades the hazard based on their personal knowledge or assumptions, rather than analysis of the hazards. Subsequent work planning is based on this determination. This graded approach to hazard analysis allows unverified assumptions regarding the hazards associated with work to exist and limits systematic inclusion of lessons learned associated with routine, low hazard work.

As an alternative, LANS should consider adopting a model wherein all hazards, even routine, everyday hazards, are analyzed and documented at least once to establish a common understanding of the hazards. Those analyses should be made available for review when that type work is being performed. That analysis should clearly identify and justify the expected controls to be used. The PIC should then be required to review that analysis prior to authorizing work to ensure the work being performed falls within the scope of that analysis, and that workers are aware of, and capable of, implementing identified controls. By using the hazard analysis to define the control selection instead of an individual's assumption, LANS should be able to implement a greater degree of consistency in work planning and control and adequately address repeated findings and issues related to work planning and control.

Opportunity for Improvement: LANS should consider revising its process flow in IWM to ensure all hazards are analyzed and subsequent controls and rigor of work planning is based on that analysis.

Per P-300, if a job is identified as moderate or high-hazard, additional hazard analysis is required. The form of that analysis can vary, and some tools are provided that the PIC can select. One of those tools is a Job Hazard Analysis (JHA) form. This form follows the core functions of ISM. The Team reviewed several IWDs and JHAs at different facilities that did not adequately document analysis of the hazard to allow validation that the selected controls were adequate. In some cases, the hazard identification column of the form did document analysis of the hazard, but this was not consistent across the Laboratory. For the most part, controls were simply selected based on identification of the hazard. No written hazard analysis could be found to validate the assignment of work characterized as "low hazard" or "expedited." Discussions with LANS employees indicated there might be historical archived documentation that captured the analysis for designation of low hazard activities, but that information was not available for workers' review. LANS should clarify and reinforce expectations that hazard analyses should be documented to preserve the rationale for control selection, provide a basis to evaluate changes to the work scope, institutionalize the knowledge of the workforce, and empower the workforce with the knowledge to recognize changes from the analyzed conditions.

Opportunity for Improvement: LANS should assure that hazard analysis is documented in a fashion that validates the rationale for control selection.

LANS has been working over the past 4 years to establish an IWM process that is acceptable and valuable to all Laboratory personnel. These efforts have had some success. Personnel are using the process, but they have not yet accepted it as adding value. Researchers interviewed indicated that, fundamentally, they believe the IWM process is good, but they believe there are barriers that significantly increase the time to create and implement an IWD. The length of time to prepare and then receive approval of an IWD was a frequent complaint. Most researchers believed it should not take more than a week to get an IWD approved and probably not more than a few hours to prepare. Team members were told that typical preparation time was a day or more and the amount of time to get signatures was at least 1 month, sometimes several months, although no specific cases were provided to the Team to validate the assertion. LANS currently is engaged in an initiative related to research and development safety improvements for moderate hazard and higher activities. This initiative is focused on gaps that may exist in the implementation of P-300 in the research and development environment.

A key improvement that LANS has already identified is a peer review process for research and development work. P-300 currently makes peer review an option for approval of research work. Due to recent concerns raised by DNFSB and LASO, LANS is revising IWM to make peer reviews a requirement for research work. These peer reviews will be in addition to SME reviews for environment, safety and health. LANS expects these peer reviews to focus on more technical aspects of the research work and will help address concerns and issues that may have been missed by the principal investigator. This process mirrors similar reviews that are normally conducted in university programs and should receive greater acceptance within the research community.

An opportunity exists to optimize the IWM process through this initiative to ensure documents are reviewed in a timely manner by appropriate personnel, as well as ensure all personnel understand the need for these reviews. LANS should also use this improvement process to address low hazard activities that are typically left to worker expertise. For example, during daily Laboratory activities some hazards become accepted as part of the routine and are subsequently overlooked. These may include, but are not limited, to such things as location of gas bottles, obstructions to egress, equipment in fume hoods, storage and quantities of chemicals, electrical connections, wiring and tripping hazards, and general housekeeping (see previous opportunities for improvement).

One of the requirements of 10 C.F.R. 851 and an expectation of VPP is to establish baseline exposure information. This effort becomes the foundation from which to evaluate hazards in the workplace and manage activities. In 2007, the Office of Independent Oversight identified the lack of that baseline exposure assessment as a contributing factor to several findings. In its corrective action plan, LANS initially identified approximately 3,700 exposure assessments that needed to be completed as part of its 10 C.F.R. 851 implementation. Those 3,700 exposure assessments have been completed and, subsequently, LANS has identified additional exposure assessments that need to be completed. LANS continues to reevaluate completed exposure assessments and initiate new exposure assessments as new activities are identified as part of a sustainable program. LANS is also conducting exposure assessments in parallel with IWD development. Updated guidance is being developed to perform exposure monitoring and

sampling. In the meantime, industrial hygiene (IH) exposure sampling and monitoring are being accomplished through the deployed Industrial Hygienist using professional judgment and knowledge of regulatory requirements. Continued effort to conduct exposure assessments and demonstrated progress toward having an effective and sustained exposure assessment process are essential to satisfying VPP criteria.

Opportunity for Improvement: LANS should complete the additional exposure assessments as soon as practical and implement a sustainable exposure assessment process.

LANS has instituted a comprehensive and powerful tool to track and trend metrics by organization across LANL. This tool was identified by the Office of Independent Oversight in 2007 as an important improvement initiative that "when fully developed, should provide LANL management at all levels with current and reliable lagging and leading indicators of performance for numerous areas important to the management of LANL, including achievement of goals and contract measures, and compliance with regulations and requirements." Over the past 2 years, this tool has matured significantly. Within the tool are embedded mechanisms to track injury, illness, performance, budgets, and numerous other items. There are also the typical lagging indicators that most organizations across the complex use such as schedule, TRC, DART, radiological contaminations, etc.

During a recent VPP assessment of Babcock and Wilcox Technical Services Pantex, LLC (B&W Pantex), HSS observed the use of a Work Environment Forecast. This tool looked at several sources of historical data, including weather, holidays, community activities, day-of-the-week, employee leave usage, BBS observation data, accident/injury statistics and causes, and other disparate data sources. These data are correlated and used as a basis to predict where and when safety issues might arise and what safety focus may have the greatest effect. LANS should consider working with B&W Pantex to develop a similar tool for use at LANL.

LANS has a process to evaluate accidents and incidents when they occur. The process usually employs a manager to evaluate the circumstances, sometimes convening a factfinding group to develop a time line, a critique (or for serious events, a formal review of the circumstances), and developing corrective actions to remedy the situation with follow-on review for effectiveness. If a worker requires medical evaluation of an injury, they are referred to the Occupational Medical facility (see Hazard Prevention and Control). A piece of information regarding accidents and injuries that is not consistently captured is the type of work that was being done when the accident occurred (e.g., low, medium, or high-hazard). LANS should consider specifically capturing this information to help focus resources in areas where most of the injuries occur.

Opportunity for Improvement: LANS should continue looking for additional leading indicators, such as the B&W Pantex Work Environment Forecast, as well as capturing, tracking, and correlating the type of work being performed when accidents, injuries, or near-misses occur as a means of focusing safety improvement efforts where the most benefit can be expected.

The LANS Industrial Hygiene and Safety Manual contains a process for conducting routine general hazard compliance verifications. This process has not been consistently implemented across the Laboratory, but all Directorates are working toward full compliance. As discussed

earlier under the Employee Involvement section, these inspections rely primarily on deployed IH and safety personnel, and workers are not generally involved in these routine inspections. In those areas where the inspections are being routinely performed, there is a greater awareness by workers of IH requirements.

Conclusion

LANS has multiple tools available for personnel to identify and analyze hazards. For the moderate and high-hazard activities, hazards are effectively identified, but analyses are not consistently documented that justify the selected controls. The structure of IWM process bypasses any systematic hazard analysis for work assumed to be low hazard. Worksite inspections for safety and health hazards are conducted in some cases, but not with the frequency and structure expected of a VPP Star participant. In order to achieve Star status, LANS needs to ensure a systematic, efficient approach is applied to analyze all hazards, including periodic worksite inspections that involve more than just deployed safety and health staff. Further, LANS needs to complete the additional exposure assessments and implement a sustainable exposure assessment process. LANS should also continue with current efforts to improve and streamline the IWM process, including the implementation of peer reviews for scientific work.

VI. HAZARD PREVENTION AND CONTROL

Once hazards have been identified and analyzed, they must be eliminated (by substitution or changing work methods) or addressed by the implementation of effective controls (engineered controls, administrative controls, or Personal Protective Equipment (PPE)). Equipment maintenance processes to ensure compliance with requirements and emergency preparedness must also be implemented where necessary. Safety rules and work procedures must be developed, communicated, and understood by supervisors and employees. These rules/procedures must also be followed by everyone in the workplace to prevent mishaps or control their frequency/severity.

Part One and Part Two of IWD perform the essential function of ensuring workers are aware of and able to implement identified hazard controls. The LANS model for work instruction is to include all hazard controls in Part One of IWD at the point of the instruction where the control is needed. For example, a LANS IWD will contain the precautions found in an applicable Material Safety Data Sheet (MSDS) rather than just referencing or including the MSDS in the IWD. This ensures that the worker is aware of the hazard and the control that is to be implemented, resulting in an additional barrier to more severe consequences. An effort has been made to ensure that the work instructions are worker friendly. To that end, LANS has initiated a training program for the planners preparing work packages for TA-55 and MSS that emphasizes an HPI approach to work package development. The training emphasizes a more "workable" document. Some examples of that "workability" are clearly stated work instructions, inclusion of hazards warning boxes at the work step involving that hazard, and the rollup of all hazard analysis documents results into the work package (i.e., JHA, MSDS, etc.) so that the worker only needs the work package to perform the work. There is also an increased emphasis on the solicitation and inclusion of worker postjob input to continuously improve IWDs. Part One also contains work training requirements to perform the task. Although some opportunities for improvement are noted, IWDs reviewed were very well written. The emphasis to provide a more "workable" IWD should be continued and expanded to all FODs.

Controls identified in Part Two (facility access controls, work area hazards not associated directly with the work) of the IWD are required per P-300 to be transferred into the work instructions in Part One. LANL has done a very good job in creating this model as these hazard controls are often missing from typical work planning processes observed at other sites. Including these controls in the work instructions helps ensure the controls are reliably understood and implemented by the workers.

Opportunities for improvement related to implementation of controls and incorporation of lessons learned were identified by the Team through reviews of numerous work packages (IWDs), field observations of work performed using IWDs, and interviews with workers. Typical deficiencies that were identified in both the development and implementation of the instruction included:

- Some hazards were identified without appropriately identified controls (i.e., noise and electrical hazards documented yet no controls were proposed in Part Two); therefore, controls for these hazards were not included in the work instruction for Part One;
- The work instructions with IWDs were not followed;
- Required preevolution documentation was not completed prior to commencing work;

- Physical inspections were not completed as required; and
- Assigned employees' training was not confirmed.

The deficiencies noted indicate a lack of rigor by the planning group to consistently provide an IWD of high quality and in compliance with the LANS IWM. Interviews with the field personnel to discuss those errors identified a lack of understanding with regard to some requirements and expectations of the program. LANS is developing a planning checklist to help planners ensure that IWDs meet expectations. However, additional measures are needed to raise the knowledge level of the PIC and the workers with regard to process. Those expectations should be reinforced by managers to ensure success. LANS has initiated a process to improve the IWD packages by ensuring that employee post-job review comments are integrated into the IWDs as received. This effort has had varying degrees of success amongst FODs. However, the efforts should be continued to ensure effective hazard analysis and controls are identified in IWD packages.

The safety and health staff at LANL is comprised of individuals with varying degrees of experience, education, and certification. Qualified resources that are available onsite include qualified Fire Protection Engineers, Associate Safety Professionals, Certified Safety Professionals, Certified Industrial Hygienists, Radiological Control Technicians, Certified Professional Ergonomists, and a fully staffed Occupational Medical Department. These functions are bounded by developed roles, responsibilities, authority, and accountabilities. The staff serves various organizations from both an embedded and deployed model.

Several observations by the Team indicate that the level of staffing may not be sufficient to adequately support day-to-day activities and maintain the programmatic elements of the Environmental, Safety and Health (ES&H) systems. For example, lack of resources was cited by several ES&H managers as the reason that LANS does not have sustained implementation of its process for assessing worker exposure to chemical, physical, and biological hazards as required by 10 C.F.R. 851.21. In addition, some deployed safety representatives were not well known to the facility workers, indicating that they may be assigned to cover too much territory within the Laboratory (see Management Section for more details).

The Occupational Medicine program at LANL resides under the Associate Director for Environment, Safety, Health and Quality. The Occupational Medicine Division Clinic is located in TA-3 in Building 1411. The Occupational Medicine Division is currently staffed with two licensed physicians (there are also two physician vacancies, including the Medical Director position), one nurse practitioner, four physicians' assistants, four full-time nurses, three part-time nurses, two employee assistance program counselors, four psychologists, a wellness coordinator, an epidemiologist, and worker compensation staffers.

Occupational Medicine provides services to all workers at the Laboratory. Medical evaluation for work (fitness for work) may be determined through physical examination, a medical interview to determine work and medical history, diagnostic testing and psychological examination. Occupational Medical staff provides medical evaluations for new-hire employees; employees who transfer to a new job with new functions and hazards, as well as workers in the Human Reliability Program (HRP). HRP personnel receive an annual comprehensive evaluation of fitness to perform assigned work that includes physical examination, medical interview to determine work and medical history, diagnostic testing, psychological testing, and psychological examination. Laboratory workers may receive medical evaluations for any of a number of

reasons, including a work-related injury, illness, or exposure; return to work after injury; any absence lasting 5 or more consecutive days because of illness or injury; manager-requested Medical Evaluation of Work (fitness-for-duty) evaluation, or a termination evaluation for those employees that have been in a periodic surveillance or certification program. Injuries, illnesses, or exposures that are deemed a medical emergency, and/or exceed the services provided by the Occupational Medical Division Clinic are transported by ambulance or referred to a higher medical facility by calling 911.

The evaluation of task/work/environment, enrollment and unenrollment, and ongoing monitoring of potential work hazards is a cooperative process involving the worker, manager, radiological professionals, and safety and health SMEs. First-line managers are responsible for completing a comprehensive Job Demands Worksheet form (Form 1793) to describe the physical, emotional, and psychological demands of the job, as well as any potential work hazards. Form 1793 was recently updated and Form 2134 Medical Surveillance and the Medical Certification Program enrollment form was cancelled. When a worker transfers to a new job at LANL and Human Resources is involved, Form 1793 enrollment is completed by Occupational Medical personnel and routed to the responsible manager and industrial hygienist for evaluation. For a job change or work assignment without a change in organization, the worker's manager must take the initiative to complete Form 1793 and send it to Occupational Medical and IH for review. Managers are required to request an evaluation anytime a worker has a change in job or work environment hazards. The Team identified several cases where managers had not updated Form 1793. Interviews with several first-line managers throughout the Laboratory and with Occupational Medical staff indicated that Form 1793 is not updated on a periodic basis and may not truly reflect current data. Many workers were not aware of Form 1793 and, consequently, it has not been updated. Employees can request evaluation of their surveillance and medical certification enrollment status at any time by completing the top portion of Form 1793 and submitting it electronically.

Opportunity for Improvement: Managers should involve the worker in the completion of Form 1793 to gain engagement and ownership and to better communicate job physical demands, emotional demands, cognitive or sensory demands, environmental demands, and potential workplace hazards.
Opportunity for Improvement: LANS should consider requiring managers to update the Form 1793 on a periodic basis with an automated notification process to ensure job demands are adequately understood by both workers and supervisors.

Interviews with managers, supervisors, and workers revealed that, in many cases, the correct revision of Form 1793 was not being used. Instead, older forms from files, office stocks, or personal supplies were being used. LANS should ensure the current version of Form 1793 is readily available for managers, supervisors, and workers and that only the most current version of the form is accepted by Occupational Medical staff. In cases where the wrong form is submitted, Occupational Medical staff should assist personnel with locating and completing the correct form.

Opportunity for Improvement: LANS should ensure the current version of Form 1793 is readily available for managers, supervisors, and workers and that only the most current version of the form is accepted by Occupational Medical staff.

The Health and Fitness program provides health promotion to the workforce through health and physical fitness classes, fitness consultation, fitness and health education programs, employee health outreach programs, and exercise facilities. A Wellness Center is located in TA-3 Building 1663, and satellite wellness centers are located across the Laboratory. The Wellness Centers have rules regarding the use of all exercise equipment, appropriate behavior, and cleanliness.

Occupational Medical Division staff conducts some worksite visits, but those visits tend to be of limited frequency and duration, possibly due to staff availability, unfilled job vacancies, and workload at the clinic. Consistent with the opportunity for improvement in the Management Leadership section of this report, staffing needs analysis might indicate some critical staffing shortages related to Occupational Medical personnel. LANS should ensure Occupational Medical staff is included in any staffing needs analysis to ensure medical staff have the opportunity to visit high hazard areas at least annually.

The means for eliminating or controlling hazards must be implemented in accordance with an established hierarchy of controls. In most cases, LANS does ensure that higher-level controls are used. For example, P101-20, Fall Protection Program, specifically requires the application of a documented hierarchy for fall protection controls. Table 2-1 (Fall Hazard and Control Matrix) provides recommendations for fall protection based on the various types of fall hazards. By selecting the fall protection from the matrix, the requirements of the hierarchy of controls is applied, thereby reducing the dependence on less reliable controls (Administrative Controls and PPE). Further evidence of application is found in the ladder policy. LANS discourages the use of ladders for elevated work. In fact, the fall protection procedure only allows the use of a ladder after other methods (e.g., scaffolds) have been evaluated and documented by ES&H personnel to be not feasible. When ladder use is deemed necessary, ES&H personnel are required (in certain FODs) to visually evaluate the conditions the ladder is to be utilized under and provide a ladder use exemption form for that day's activities. Observations at TA-21 revealed that day-to-day decontamination and demolition activities were frequently delayed while workers waited for ES&H personnel to be available to provide the ladder-use exemption and evaluation. While LANS' expectation to utilize alternative (and, in some cases, safer) working platforms for workers is commendable, the requirement by certain FODs to obtain ladder-use exemptions may represent an unnecessary burden on limited ES&H resources and result in productivity delays with minimal safety improvement considering the workers' ladder-safety training.

Several opportunities for improvement were observed. A review of IWDs, procedures, and field walkdowns indicates that the hierarchy of controls (though required) is not always practiced. Improvement is needed to ensure that the appropriate hierarchy is used as hazard controls are developed. Interviews with planners and a review of work packages indicates that field level planning tends to default to PPE as the control of choice. There was little evidence that steps are taken at the planning level to eliminate the hazard (e.g., noise, chemical substitution).

Other examples where improvement is needed are:

- The document exemption for the use of ladders is applied with varying degrees of rigor resulting in mixed compliance across FODs;
- The use of guard rails for open holes was not compliant as observed in a computer room with a floor opening guarded only by orange cones;
- Fall protection issues on roof work, raised by staff at TA-59, is another example of unclear instructions noted on IWD versus application in the field; and
- LANS utilizes administrative controls in the form of procedures and policies. However, there is no evidence that a system exists to ensure those documents are updated at least annually.

While PPE is considered the last line of defense in the hierarchy of controls, PPE is a "control staple" for the Laboratory. Given the nature of the hazards, the selected and use of PPE must be appropriate. Nearly all personnel observed by the Team were wearing the proper PPE for the task they were performing. In the few cases where noncompliances were observed, the lack of PPE was associated with use of eye protection and hearing protection. Typically, this was in areas where workers were not complying with postings or postings which were inconsistent. For example, in several locations most workers believed that protection was only required if there was actual work being performed that introduced a hazard. However, the postings did not support that position and made no exception that would allow workers to make a distinction. While postings in some areas made that exception clear, others simply stated that protection was required. Consequently, workers followed a generally accepted practice that did not comply with the postings. LANS should reevaluate its expectations for PPE postings for site-wide adherence and issue those expectations at the institutional level for FOD implementation.

Opportunity for Improvement: LANS should reevaluate its expectations for PPE postings for site-wide adherence and issue those expectations at the institutional level for FOD implementation.

The LANS disciplinary process resulted in 21 safety-related disciplinary actions during the past 18 months. Methods of positive reinforcement are limited for those who obtain or maintain certified professional designations as there are no opportunities for salary bumps, or stipend. Professional certifications within LANS staff performing industrial hygiene and safety duties is greater than normal, but ES&H staff do not receive increased pay as a result of those certifications.

The safety and health rules for LANS are described in SD100, "Integrated Safety Management System Description Document," with embedded 10 C.F.R. 851, "Worker Safety and Health Program." The LANL disciplinary system, as described in P731.0, "Discipline," is used for enforcing all rules at LANL, including safety and health rules.

Two positive recognition systems at LANS are the Spot Awards and the Los Alamos Awards Program (LAAP). The Spot Award Program provides a means for managers to provide immediate recognition to employees who contribute significantly to the mission or values of the organization. LAAP enables Laboratory managers to recognize exceptional contributions and noteworthy achievements of their employees in a timely manner. In addition, the Laboratory has introduced two safety management initiatives that focus on positive reinforcement and feedback: HPI and BBS. Both of these initiatives are part of the Laboratory's implementation of ISMS and

are described in SD100. (See Management Leadership for additional discussion of rewards and recognition.)

Team observations did not identify any problems with the Radiological Protection Program. Discussions with radiological technicians centered on their input into work planning and work performance relative to the requirements of 10 C.F.R. 835. All personnel interviewed at the technician level indicated that their input and assistance was valued and sought out by workers and managers alike.

The Emergency Management program has implemented corrective actions from the 2006 Independent Oversight emergency management inspection. At the time of the VPP review, the HSS Office of Emergency Management Oversight (HS-63) was conducting a scoping review in preparation for reassessment of LASO and LANL to ensure the necessary program elements have been corrected to protect the site workers and public from potential events involving a significant release of hazardous materials. The Team reviewed changes made to the hazard surveys/building run sheets and the emergency planning hazards assessment, as well as the LANL emergency management plan. The Emergency Management organization recently acquired the chemical inventory database to more accurately track chemical inventories. The chemical inventory database is under development and will replace the current system within the year. Major changes have been made to strengthen emergency procedures, response guides, implementing procedures, protective actions, training rigor of response personnel, notifications, as well as management changes, and increased resources focused on becoming compliant to DOE Order 151.1C, "Comprehensive Emergency Management System." Furthermore, any actions resulting from the HS-63 oversight assessment must be included as part of LANS' VPP improvement efforts.

Conclusion

While the hierarchy of controls to mitigate hazards is present at LANS, identification and implementation of controls lacks sufficient rigor in some areas. To meet the requirements of the Hazard Prevention and Control tenet, LANS needs to continue its efforts to improve the IWD processes to ensure proper and consistent identification and implementation of controls based upon an accurate identification and detailed analysis of the hazards associated with that work.

VII. SAFETY AND HEALTH TRAINING

Managers, supervisors, and employees must know and understand the policies, rules, and procedures established to prevent exposure to hazards. Training for health and safety must ensure that responsibilities are understood, personnel recognize hazards they may encounter, and they are capable of acting in accordance with management expectations and approved procedures.

LANS managers understand their safety and health responsibilities. In addition to training given to all LANS employees, all supervisors, first-line managers, and top-level managers must complete specific safety and health-related courses within 1 year from the date of assignment as a new manager. These courses include:

- Supervising Fitness for Duty;
- Integrated Work Management Overview (ISM-related);
- Human Performance Principles for Workers (HPI-related);
- Maintaining a Respectful Workplace;
- Management Observations and Verification; and
- LANL Assessment Program Overview.

Nuclear facility managers must also complete a specific technical course on Radiation Control Responsibilities for Managers, Supervisors, and PIC, as well as the Core Management Supervisory Training required of all supervisors and managers. Notably, all of these courses are to be completed within the first 90 days of assignment to management duties.

Importantly, LANS has also developed a leadership-training program called "Leading @LANL," which is intended for all LANS managers. This leadership training program includes a full-day leadership summit in which the managers gain exposure to the upper managers and participate in discussions about the Laboratory mission, alignment, and common challenges and opportunities. LANS held its first summit entitled "Engaged Leadership" in 2008, which was attended by 300 managers. The Associate Laboratory Directors led the discussions in this leadership summit and topics included: The Power of Effective Decision Making; Emotionally Intelligent Leadership; Engaged Leadership at LANL; and a session on Vision, Courage, and Passion. The second leadership summit was entitled "Aligned Leadership." It was held in 2009 and focused on the Laboratory alignment and mission and the challenges that LANL managers face. It also had about 300 managers in attendance. The third leadership summit entitled "Empowered Leadership" was held in May 2010. This leadership summit focused on the LANL employee engagement survey and on the action plans developed for the employee empowerment survey. Approximately 300 managers attended this summit.

Also of note was an information and reference tool called "First Line Manager Tool Kit," which serves to supplement the various supervisor and management training and the techniques taught to supervisors and managers. This tool provides a quick reference guide to many of the services, programs, and resources available at LANL and provides a broad overview of functions, contacts, and tools that managers are likely to need. It contains brief descriptions of the Emergency Operations Division, the Industrial Hygiene and Safety Division, the Occupational

Medicine Division, ISMS, Fitness-for-Duty Program, the Employee Assistance Program, and VPP. It is available on LANL Web site and as a hardcopy.

Review of technical documents, courses, and interviews shows that managers and supervisors at the site annually participate in some form of formal training and/or workshop discussions regarding their safety and health responsibilities. It was evident that managers and supervisors interviewed understood their safety and health program responsibilities and were able to adequately describe those responsibilities. Based on technical information reviewed and the evidence collected during interviews, the Team concluded that the LANS program of training managers and supervisors in their safety and health responsibilities is effective.

A review of training documentation and interviews with employees indicated that training is being carried out in a thorough and systematic manner. LANL training records are maintained in the Employee Development System (EDS) and all employees, their managers, and training coordinators have access to EDS. EDS is the master plan or master system through which employee training is managed.

Prior to the first entry for a given worker in EDS, the supervisor and the worker develop a training plan focusing on the worker's primary job function. This is accomplished by using a formal training plan questionnaire. The training plan identifies all of the training required for the worker and takes into account the potential hazards of that employee's job. Once this process is completed, the training plan is then entered into EDS. Semiannually, as part of the performance review process, employees and managers evaluate the employees' training plans and determine if any elements need to be deleted or new elements need to be added. The employees and their managers are notified by EDS in several steps: first, via e-mail 60 days in advance of expiration; then, 10 days in advance of expiration, and finally, at the expiration of the training.

Certain mandatory, site-wide training, such as substance abuse and ethics, is required for all workers and is automatically entered in the official training plans of all employees. However, the training plans of some employees do not include all of their training and as such, the training information in EDS is incomplete. This can create some planning problems as employees and their managers are not notified by EDS when such training is about to expire. This can lead to work delays when training requirements expire before workers complete retraining.

In addition, notification of required training courses does not always reach the functional managers of the deployed employees. This occurs due to the limitation of the EDS to track or show the actual supervisor of record versus the functional manager of the deployed employee. In these cases, the manager of record of the employee has the responsibility to notify the functional manager of the employees' training needs since EDS lacks the capability to track or show the functional manager when employees are deployed under different groups within the operation or unit. As a result, in some instances, the direct supervisors of deployed workers were not verifying essential training prior to the start of work. This was also probably a contributing factor to training deficiencies identified by the HSS Office of Enforcement in its investigation of an electrical shock event that occurred in March 2009. That report noted numerous deficiencies related to workers training and qualification related to electrical safety that contributed to the event. In addition, training has consistently been identified as a contributing cause to many occurrences at the Laboratory over the past several years. According to the training staff, when the LANS training system migrates to the Plateau database in 2011, this limitation will be remedied.

Opportunity for Improvement: LANS should take intermediate steps to address the training notification gap for assuring appropriate training qualifications for deployed workers until the transition to the Plateau database is completed.

All new employees, subcontractors, and visitors for 10 or more workdays during any consecutive 12-month period must complete the General Employee Training. Depending upon their job function, workers are provided additional safety and health training that focuses on hazards and controls applicable to their job function. Most of the training is computer-based, although there are classroom courses led by instructors. Some courses such as Fork Lift Safety, Fall Protection, Confined Space Hands-On, and Radiological Worker Practical have hands-on or demonstration of proficiency components. For training required for maintaining qualifications or certification, LANL uses quizzes and tests to determine the level of retention of ES&H training course information. A score of 80 percent is required for passing the quizzes or tests.

The on-the-job training (OJT) process is well defined and effectively implemented. A qualified worker or OJT instructor/evaluator directly supervises the newly hired or reassigned employee until he has completed OJT. These instructors/evaluators must be SMEs in the activities that they will train and evaluate. In addition, they must undergo a formal 4-hour instructor training to become designated OJT instructors/evaluators, and they must requalify every 3 years. Most OJT instructors/evaluators are SMEs and first-line supervisors. OJT lesson plans and performance checklists are used to train and test the trainees.

Another example of OJT is the formal mentoring program at LANL. Students, postdoctoral candidates, and new scientists are mentored by experienced scientists and engineers to ensure that they learn all applicable safety, security, and environmental practices and procedures applicable to their research documentation and publication. This mentoring plan is uniquely tailored to each new worker. However, Team interviews with some employees suggested that the number of training courses and the amount of time required to complete them are excessive and could be streamlined to save resources. This may be especially important for students, interns, and short-term researchers. Spending too much time in training without opportunity to practice lessons in real situations can reduce the effectiveness of training. There are probably opportunities to optimize the amount of training by looking for redundant training requirements or using student feedback to determine the value of training.

The researchers interviewed by the Team frequently felt that training courses were overly simplified for their level of education and background. Training is developed for all Laboratory workers as the audience and often goes to the simplest concepts. Tailoring training to the type of worker according to their education and background (e.g., researcher, craftsman, technician) may improve acceptance by the workforce. For example, in TA-03 several researchers noted that LANS required training could have test-outs available for those individuals who have extensive chemical safety training and application experience rather than taking several hours to go through the training modules.

Opportunity for Improvement: LANS should identify tailoring approaches to training that are more compatible with workers' background and experience.

The use of OJT process ensures the mastery of basic safety and health skills and knowledge, and greatly enhances the overall training process at LANL. The craft workers interviewed felt they received necessary training, and the courses were informative and valuable. Supervisors, superintendents, and foreman who are assigning workers to jobs indicated that they check to ensure that workers' training is current for the jobs being assigned. The supervisors and managers also stated that their own training was informative and valuable.

The Team attended the Confined Space Entrant/Attendant class. The attendees were required to demonstrate proficiency in setting up harnesses and tripods for rescue and using equipment to monitor the level of oxygen, carbon monoxide, carbon dioxide, and combustible gases. The Team also attended the BBS Atomics Class, the Human Performance Improvement Class and the HAZWOPER Refresher class. The technical content was appropriate, the instructor was knowledgeable, and attendees participated actively in all of the classes. However, there was no examination at the conclusion of any of the classes. LANS would probably recognize significant benefit from some method of verification that attendees have met the learning objectives and can apply the lessons in practice. For example, as an alternative to written tests, the use of audience polling technology in the classroom could be used to determine whether attendees understand a set of concepts by instantly responding to questions posed by the instructor. This would also provide valuable feedback to course instructors and planners on overall effectiveness of the training, and could be used to revise training curricula.

Opportunity for Improvement: LANS should identify more effective methods to ensure learning objectives have been satisfied for all training courses.

Conclusion

LANS safety and health training and the associated qualification programs are generally effective and ensure that employees are appropriately trained to recognize hazards of work and the work environment, and to protect themselves and their coworkers. An investigation of a shock event that occurred in March 2009 identified some problems with electrical worker training, and LANS needs to ensure corrective actions from that investigation are effective. LANS also needs to ensure worker qualifications and training is adequately verified prior to performing work and to ensure notices of upcoming training are adequately communicated to workers and supervisors. LANS substantially meets the requirements of the Safety and Health Training tenet of DOE-VPP.

VIII. CONCLUSIONS

Senior managers at LANL are clearly committed to achieving DOE-VPP Star status and are willing to provide workers with the tools and resources needed. That commitment has not yet been fully accepted at all levels of the organization as demonstrated by the inconsistent level of employee involvement observed by the Team. There were some work groups observed that were very actively engaged and involved, but employee involvement and participation in the LANS safety program has not yet reached the level of consistency and maturity expected of a DOE-VPP Star participant. WSSTs are generally functioning very well. Workers and managers alike need to work together, along with WSSTs, to become more proactive in safety promotion and education. Finding creative ways to engage the LANS workforce will help to drive safety performance to the levels expected of a VPP Star participant. LANS must especially focus on its scientific community and find means to engage, encourage, reward, and recognize researchers and research staff for safety excellence. By getting workers more involved in developing and implementing the processes and procedures they are expected to use, LANS will improve those workers' acceptance of the processes, especially the IWM process.

Hazards for moderate and high hazard work are effectively identified, but the analysis of those hazards was not consistently documented and thus captured. The structure of IWM process bypasses systematic hazard analysis for work assumed to be low hazard. By expanding hazard analysis for work assumed to be low hazard, LANS may become more consistent in its application of controls to such work, which will help address some issues that are currently frustrating workers. Those frustrations may be a significant barrier to the greater worker involvement necessary to achieve Star status.

The frequency and quality of worksite inspections for safety and health hazards should be significantly raised, but must also involve a greater portion of the workforce. This process can be an effective method to get workers to raise their personal standards and expectations for safety in the workplace, which will then translate to significant improvements in safety performance.

Efforts to revise the IWM process are moving in the right direction. This process, as the primary means of implementing ISM must be widely accepted and used by the workforce. Further, LANS needs to complete the additional exposure assessments identified as part of the IH baseline and implement a sustainable exposure assessment process.

Training programs at LANS are extensive. Most of the improvements can be gained through systematic analysis of training needs for workers, and ensuring they are getting the most effective mix of classroom training, computer-based training, or OJT. Additionally, identifying redundant training requirements, as well as more effective tailoring of training to workers' experience and education, will help achieve more worker acceptance of training.

Finally, safety performance statistics (TRC and DART rates) do not yet meet the expectations for DOE-VPP Star status. Those data are trending down, with the exception of two directorates. The Team fully expects that if LANS effectively addresses the opportunities for improvement identified in this report, they will continue to improve, and should be able to achieve DOE-VPP Star Status within 3 to 5 years. As such, the Team is recommending that LANS be admitted to DOE-VPP at the Merit level.

Appendix A

Onsite VPP Audit Team Roster

Management

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