Battelle Energy Alliance, LLC/ Idaho National Laboratory

Report from the Department of Energy Voluntary Protection Program Onsite Review October 19-30, 2009

U.S. Department of Energy
Office of Health, Safety and Security
Office of Health and Safety
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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. HSS continues to expand complex-wide contractor participation and is 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, research and development operations, 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 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 Battelle Energy Alliance, LLC, at the Idaho National Laboratory during the period of October 19-30, 2009, and provides the Chief Health, Safety and Security Officer with the necessary information to make the final decision regarding its continued participation in DOE-VPP as a Star site.

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ABBREVIATIONS AND ACRONYMS

AED	Automated External Defibrillator
ALARA	As Low As Reasonably Achievable
ATR	Advanced Test Reactor
BEA	Battelle Energy Alliance, LLC
BLS	Bureau of Labor Statistics
CFA	Central Facilities Area
DART	Days Away, Restricted or Transferred
DOE	Department of Energy
ES&H	Environmental, Safety and Health
EST	Employee Safety Team
FSS	Facility Support Services
HaRPS	Hazard and Risk Planning System
HASS	Hazard Assessment Sampling System
HPI	Human Performance Improvement
HSS	Office of Health, Safety and Security
ICAMS	Issues and Corrective Action Management System
ICARE	Issues Communication and Resolution Environment
ID	Idaho Operations Office
INL	Idaho National Laboratory
ITP	Individual Training Plan
JHA	Job Hazard Analysis
LEST	Laboratory Employee Safety Team
LI	Laboratory Instruction
LRD	Laboratory Requirements Document
LWP	Laboratory-Wide Procedures
MFC	Materials and Fuel Complex
NAICS	North American Industry Classification System
OJT	On-the-Job Training
OSHA	Occupational Safety and Health Administration
PDD	Program Description Document
PM	Predictive Maintenance
PPE	Personal Protective Equipment
RAE	Routine Activity Envelope
RWP	Radiation Work Permit
SMC	Specific Manufacturing Capability
SME	Subject Matter Expert
SOAR	Safety Observations Achieve Results
SOMD	Site Occupational Medical Director
Team	Office of Health, Safety and Security DOE-VPP Team
TRAIN	Training Records and Information Plan
TRC	Total Recordable Case
VPP	Voluntary Protection Program

EXECUTIVE SUMMARY

Battelle Energy Alliance, LLC (BEA), is a limited liability company whose sole member is Battelle Memorial Institute. The BEA Team consists of:

- **Battelle:** a global science and technology enterprise that develops and commercializes technology and manages laboratories for customers. Headquartered in Columbus, Ohio, Battelle has a vast science and technology reach.
- **Babcock & Wilcox Technical Services Group, Inc.:** manages Idaho National Laboratory's (INL) nuclear and national security operations.
- **Washington Group International:** assesses and optimizes INL's infrastructure and creates the new infrastructure needed to support the Department of Energy's (DOE) vision for INL.
- **The Electric Power Research Institute:** a nonprofit research and technology organization, serves as the vital link between INL and the domestic and international commercial nuclear power industry.
- **The Massachusetts Institute of Technology:** helps INL create the atmosphere of scientific inquiry and lead a National University Consortium, as well as the three Idaho research universities of the Idaho University Consortium in support of nuclear research and related education programs.

In operation since 1949, INL is a government reservation located in the southeastern Idaho desert. At 890 square miles (569,135 acres), the INL site is roughly 85 percent the size of Rhode Island. It was originally established as the National Reactor Testing Station and for many years was the site of the largest concentration of nuclear reactors in the world. Fifty-two nuclear reactors were built, including the U.S. Navy's first prototype nuclear propulsion plant. During the 1970s, the laboratory's mission broadened into other areas, such as biotechnology, energy and materials research, and conservation and renewable energy.

INL consists of several primary facilities situated on an expanse of otherwise undeveloped terrain. Buildings and structures at INL are clustered within these facilities, which are typically less than a few square miles in size and separated from each other by miles of undeveloped land. In addition, DOE owns or leases laboratories and administrative offices in the city of Idaho Falls, some 25 miles east of the INL site border. About 30 percent of INL's employees work in administrative, scientific support, and nonnuclear laboratory programs and have offices in Idaho Falls. These include: (1) engineers; (2) scientists; and (3) administrative, financial, technical, and laboratory employees.

BEA/INL was certified as a DOE-VPP Star site as a result of the DOE-VPP onsite review conducted during May 7-12, 2006. In accordance with program requirements, BEA/INL was due for its first triennial recertification in 2009. The review was performed by the Office of Health, Safety and Security DOE-VPP Team (Team) from October 19-30, 2009. This multi-disciplined Team included Federal employees and qualified subject matter experts from other DOE-VPP participant sites.

The onsite review addressed each of the five tenets of DOE-VPP. The Team determined that overall BEA has maintained a strong safety culture at INL with demonstrated efforts to continuously improve its safety and health programs. Having verified that BEA continues to meet all of the requirements of the five tenets, the Team recommends that BEA/INL continue as a participant in DOE-VPP at the Star level.

The standard for Star status is not perfection, but rather in addition to an excellent safety record, managers and workers are dedicated to and effectively pursuing continuous improvement and excellence in safety performance. Consistent with that goal, the Team identified a number of opportunities for improvement. These opportunities reflect those areas where BEA/INL can further improve its performance (see Table 1). While no formal action plan is required to address those opportunities, BEA/INL is expected to consider and specifically address them in its annual status reports.

TABLE 1

OPPORTUNITIES FOR IMPROVEMENT

Opportunity for Improvement	Page
BEA should consider dedicating additional resources and personnel to conducting safety observations and encouraging additional SOAR observations during periods of high-level activities, such as outages, turnarounds, or shutdown.	**9**
BEA should continue to evaluate methods to mitigate the potential fall hazard from the use of ice grippers on bus-walking surfaces or other smooth, hard surfaces, such as building entrances, and ensure adequate facilities for safely donning and doffing the grippers are conveniently available.	**10**
BEA should ensure committee charters are reviewed and updated as part of the annual self-assessment to ensure the charters reflect the desired governance structure or any other organizational changes throughout the preceding year.	**11**
BEA should continue to evaluate potential upgrade options to improve the effectiveness of the HASS IH database to a more user-friendly system with site-wide accessibility to pertinent data while ensuring protection of information subject to Privacy Act concerns.	**13**
BEA should revise its work control processes to ensure hazard analysis is documented for all work and that definition as routine activity or skill of the performer is based on the documented hazard analysis.	**14**
BEA should continue to explore improved data analysis tools and methods to integrate and evaluate data collected through multiple sources and use those analyses to develop better leading indicators for site-wide application.	**15**
BEA should continue ongoing efforts to refine the HaRPS tool to provide accurately formatted information to the maintenance planners (via form 62/62N), ensuring that efficiency and accuracy are improved.	**18**
BEA should evaluate the use of the "Planner Tool" and "Maintenance Macro" and their effective integration into the work management process.	**18**
BEA should consider revising LWP-6200 to include consistency of terms and appropriate language to ensure postjob reviews are performed.	**18**
BEA should review and update the CFA weld shop LIs to properly reflect the activities being performed there and the appropriate controls required for those activities, including sampling for hexavalent chromium exposures.	**19**
BEA should consider expanding the availability of AEDs based on recommendations by the American Heart Association.	**20**
BEA should evaluate the need to provide some form of consistent refresher training for routine LIs.	**25**
BEA should evaluate LIs for general areas to ensure that instructions include operation of emergency equipment in case of an incident, expected response to lights and alarms, and ensure employees fully understand those instructions.	**25**

I. INTRODUCTION

The Idaho National Laboratory (INL) is a science-based, applied engineering national laboratory dedicated to meeting the Nation's environmental, energy, nuclear technology, and national security needs. INL is a multi-program, federally funded research and development center emphasizing applied engineering to provide solutions for use across the Department of Energy (DOE) complex, as well as regionally, nationally, and worldwide.

INL is the Nation's lead laboratory for nuclear energy research and development and is one of 10 multiprogram National Laboratories supporting DOE missions. Scientists and engineers work at research facilities in Idaho Falls and various locations across INL's 890 square-mile (2,300 square kilometer) section of desert in southeast Idaho. Using state-of-the-art laboratories, INL conducts a wide range of engineering and scientific research supporting multiple programs and missions including:

- Advanced nuclear fuels, materials, and separations;
- Bioenergy, fossil energy, geothermal energy, hydrogen and renewable energy systems;
- Robotics, instrumentation control and intelligent systems; and
- Microbiological, geological, and environmental systems.

INL also supports other Government Agency work, including the manufacture of tank armor for the Department of Defense, and the production of nuclear power sources used by the National Aeronautical and Space Administration for space exploration. Nuclear reactor design, infrastructure testing, unmanned aerial vehicle development, and biotechnology applications are among INL's diverse capabilities.

In addition, the laboratory develops technologies and equipment for private industry and the Department of Homeland Security, which helps to:

- Protect important infrastructures, like electric grids, telecommunication networks, and transportation systems;
- Reduce risks to worldwide nuclear energy systems; and
- Secure our borders and cities from terrorist threats.

INL researchers pioneered many of the world's first nuclear reactor prototypes and advanced safety systems. INL's internationally recognized contributions in nuclear science, engineering and materials testing underpin the safe operation of nuclear power plants throughout the world. INL continues to lead the development of the next generation of nuclear energy technologies and is educating the next generation of nuclear scientists and engineers.

INL was established in 1949 as the National Reactor Testing Station. Initially, the missions at INL were the development of civilian and defense nuclear reactor technologies and management of spent nuclear fuel. Fifty-two reactors, most of them first-of-a-kind, were built, including the Navy's first prototype nuclear propulsion plant. Of the 52 reactors, 3 remain in operation at the site.

During the 1970s, the name of the site was changed to the Idaho National Engineering Laboratory to reflect a broadened mission into areas, such as biotechnology, energy and materials research, and conservation and renewable energy. The site's name changed again in the spring of 1997 to the Idaho National Engineering and Environmental Laboratory to reflect a major refocus of the laboratory toward engineering applications and environmental solutions for the Nation. Beginning on February 1, 2005, the name changed again to the Idaho National Laboratory (INL). This change reflects a move back to the Laboratory's historic roots in nuclear energy and national security.

Sponsorship of INL was formally transferred to the Office of Nuclear Energy (NE) in July 2002, supporting: (1) the Nation's expanding nuclear energy initiatives; (2) placing INL at the center of work to develop advanced Generation IV nuclear energy systems, nuclear energy/hydrogen coproduction technology, and advanced nuclear energy fuel cycle technologies; and (3) providing national security answers to national infrastructure needs.

In February 2005, Battelle Energy Alliance, LLC (BEA), was selected to operate INL. DOE entered into a 10-year management and operating contract with BEA valued at approximately $4.8 billion. BEA is led by Battelle Memorial Institute and the organization includes BWX Technologies, Inc., Washington Group International, Electric Power Research Institute, and an alliance of university collaborators. The alliance of university collaborators is led by the Massachusetts Institute of Technology and includes nuclear engineering universities, such as New Mexico, North Carolina State, Ohio State, and Oregon State, as well as a regional collaboration with the major Idaho-based universities: Boise State, Idaho State, and the University of Idaho.

Located 45 miles west of Idaho Falls, the Advanced Test Reactor Complex is engaged in research and development of nuclear reactor technologies. It is home to the Advanced Test Reactor (ATR), the world's most advanced nuclear test reactor, which is also a DOE National Scientific User Facility. ATR is vital for testing materials for the Nation's next generation of nuclear power plants. ATR is also used to manufacture a significant portion of the Nation's medical nuclear isotopes. A new radiochemistry laboratory is slated for completion at the ATR Complex by the end of 2009.

The Materials and Fuels Complex (MFC), located 28 miles west of Idaho Falls, focuses on research and development of nuclear fuels. Prototypes of new reactor fuels are made and evaluated at MFC. Pyroprocessing, which uses electricity to separate waste products in the recycling of nuclear fuel, is also researched here. At the Space and Security Power Systems Facility, workers make nuclear batteries (radioisotope thermoelectric generators, called RTGs for short) for use on the Nation's space missions. Such batteries are crucial to the Nation's deep space missions, which travel to extremely cold regions of space where sunlight is too weak to power photovoltaic cells.

The Research and Education Campus, located in Idaho Falls, is home to INL administration (located in the Engineering Research Office Building and the Willow Creek Building) and a wide variety of other facilities. At the INL Research Center, scientists working in dozens of laboratories conduct cutting-edge research in fields as varied as robotics, genetics, biology, chemistry, metallurgy, computational science, and hydropower. INL's Ice Storm supercomputer, ranked 64th fastest in the world according to the Nov 2007 top 500 list, provides the computational power our researchers need. The Center for Advanced Energy Studies, which opened in 2009, houses the Energy Policy Institute. Other facilities house National Security programs and INL precision machining and glass shops.

BEA/INL was certified as a DOE Voluntary Protection Program (VPP) Star site as a result of the DOE-VPP onsite review conducted during May 7-12, 2006. In accordance with program requirements, BEA became due for its first triennial recertification in 2009. The review was performed by the Office of Health, Safety and Security (HSS) DOE-VPP Team (Team) from October 19-30, 2009. This multidisciplined Team included Federal employees and qualified subject matter experts from other DOE-VPP participant sites. In addition, personnel from NE and the Los Alamos National Laboratory observed the assessment process. The assessment was performed by conducting multiple work observations at all major areas operated by BEA/INL, interviewing personnel at all levels, including senior managers, and performing assessments and walkdowns of BEA/INL facilities. The Team had contact with approximately 300 personnel. This report documents the results of the onsite assessment and establishes the basis for the Chief Health Safety and Security Officer to determine if BEA/INL meets the expectations for continued participation in DOE-VPP.

II. INJURY INCIDENCE/LOST WORKDAYS CASE RATE

Injury Incidence/Lost Workdays Case Rate (BEA)					
Calendar Year	Hours Worked	Total Recordable Cases (TRC)	TRC Incidence Rate	DART* Cases	DART* Case Rate
2006	6,605,935	35	1.06	14	0.42
2007	6,948,728	38	1.09	18	0.52
2008	7,401,870	35	0.95	18	0.49
3-Year Total	20,956,533	108	1.03	50	0.48
Bureau of Labor Statistics (BLS-2008) average for (NAICS**) Code # 5417, 5616, 221,811 & 332			3.86		1.94
Injury Incidence/Lost Workdays Case Rate (BEA Subcontractors and Vendors)					
Calendar Year	Hours Worked	TRC	TRC Incidence Rate	DART* Cases	DART* Case Rate
2006	211,729	1	0.94	0	0.00
2007	378,472	2	1.06	1	0.53
2008	281,862	5	3.55	4	2.84
3-Year Total	872,063	8	1.83	5	1.15
Bureau of Labor Statistics (BLS-2008) average for NAICS** (Code # 5417, 5616, 221, 811 & 332)			3.86		1.94

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

TRC Incidence Rate, including subcontractors: 1.06
DART Case Rate, including subcontractors: 0.50

The diversity of operations at INL makes comparison to industry statistics difficult. INL compares itself with five different industry codes: 5417, Scientific Research and Development Services; 5616, Investigation and Security Services; 221, Utilities; 811, Repair and Maintenance; and 332, Fabricated Metal Product Manufacturing. Of those, the Scientific Research and Development Services is the most restrictive, with a TRC rate of 1.2 and a DART rate of 0.5. BEA is at, or below, both those rates and meets the statistical requirements for continued participation in DOE-VPP.

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; and (4) accountability for both managers and workers. Finally, managers must be visible, accessible, and credible to employees.

The BEA/INL Safety Policy is clearly defined and integrated with the mission of the laboratory in POL-111, *Policies and Standards of Performance*. This document establishes a set of foundational elements the laboratory uses to achieve its long term vision. BEA has established the concept of simultaneous excellence that includes safety excellence as an essential basis for mission success. The Laboratory Director's performance expectation for leaders and managers clearly establishes that leaders and managers are responsible for their staff's safety and keeping them safe. This includes identifying safety standards and requirements. POL-111 further establishes that: (1) all INL staff are safety leaders and environmental stewards; (2) they are accountable for their own safety, for the safety of those around them, and the safety of the environment; (3) safety performance is a direct reflection of individual and organizational leadership; and (4) they are dedicated to display and reinforce the behaviors necessary to create and sustain a culture that actively and visibly underpins and fosters an injury-free workplace.

Roles, responsibilities, authorities, and accountability are established through an effective system of policies, procedures, and instructions, as well as by the overall organizational structure. The laboratory is organized into a matrix that begins with three Deputy Laboratory Directors who are responsible for management, science and technology, and projects (including nuclear support and production). The Deputies are supported by four Associate Laboratory Directors: (1) Energy and Environment Science and Technology; (2) Nuclear Science and Technology; (3) National and Homeland Security Science and Technology; and (4) the Next Generation Nuclear Plant Project. The laboratory is then further divided into several mission-enabling organizations that include Business Management, Facilities and Site Services, Nuclear Operations, Human Resources, and Environment, Safety and Health. Finally, there are three organizations that provide for risk management and assurance that include Laboratory Performance Assurance, Audits, and the General Counsel.

Managers, interviewed by the Team, clearly expressed their support for excellence in safety and health and recognized safety performance as not only a prerequisite for everything the laboratory did, but as a significant contribution to mission excellence. From the Laboratory Director down, all managers were committed to ensuring world class safety performance. The strong support by managers was consistently echoed by most workers encountered by the Team. An open-door policy was readily apparent for all managers.

At INL, managers are not just demonstrating their commitment to safety through words, but also through their actions. Many of the managers interviewed were clearly present in the facilities on a frequent basis and had established personal relationships with workers. Frequent communication and contact were apparent to the Team throughout the laboratory. Resources have been provided, both financial and personnel, to maintain the VPP effort as a standalone project that incorporates personnel throughout the laboratory. Those resources are being consistently used in creative ways to foster additional improvement, educate employees, build camaraderie, and improve teamwork in all organizations.

BEA/INL recently completed the Gallup Q^{12} Survey of Employee Engagement. This process, developed by the Gallup organization over the past 30 years, is designed to help organizations measure the degree of engagement by managers and workers on the premise that organizations with high levels of engagement perform significantly better than their peers. This is the first year that BEA/INL has used this instrument, and the results were somewhat surprising to many personnel. The results showed a high degree of disengagement, or even active disengagement, by a large segment of laboratory personnel. Roughly 55 percent of the respondents fell into the disengaged category (productive, but they are not psychologically/emotionally connected to their company); 26 percent were considered actively disengaged (physically present, but psychologically/emotionally absent, unhappy, and insist on sharing this unhappiness with others); and only 19 percent were considered engaged. These numbers were less favorable than the average of the United States working population and much less favorable than the average for Battelle-managed laboratories. BEA/INL requested that Gallup include a question that measures worker opinion that their leaders actively demonstrate a commitment to safety everyday. For that specific question, the numbers were much more favorable, reflecting the high degree of commitment to safety engendered by managers.

BEA/INL is using the results of the Gallup Q^{12} Survey to proactively improve employee engagement. Actions include training managers in the results, developing “Engagement Consultants,” and distributing organization-specific results to managers. Each manager will be working directly with their next level manager to understand the results and determine actions that can be taken to foster greater engagement. The survey will then be repeated in coming years to determine effectiveness of those actions, and further refine improvements.

Safety is clearly included in planning for major projects and capital improvements. This was demonstrated in one particular case at the Specific Manufacturing Capability (SMC). New production equipment was in the process of being installed to replace old equipment and expand capabilities. Workers have had historical concerns over the level of noise associated with some older equipment. As part of the selection process for the new equipment, reduced noise levels during operation was a key criterion. Although this resulted in a higher cost for the equipment, that higher cost was factored into the project.

Certified Safety Professionals, Certified Industrial Hygienists, and Industrial Hygiene Technicians were readily available when needed. These personnel are organizationally assigned to the Environment, Safety and Health (ES&H) organization, but are functionally deployed to specific field organizations. As the subject matter experts, these personnel are part of the work planning process, and no issues were raised regarding their availability.

Conclusion

Managers are visibly committed to creating and sustaining a culture of safety excellence at BEA/INL. This commitment is demonstrated not only through support of safety initiatives, but more importantly through active participation and leadership by example. BEA/INL meets the requirements of the Management Leadership tenet of DOE-VPP.

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.

INL has a longstanding tradition of effectively involving its employees in safety-related processes and activities. This tradition, along with strong support from managers, has led to the creation of a large number of effective employee involvement opportunities. Mature programs, such as VPP, the Laboratory Employee Safety Team (LEST), and affiliated organizational and geographically based Employee Safety Teams (EST), have been in place for many years and provide participation and leadership opportunities for channeling the employees' energy, interest, and creativity towards improving the safety culture.

Even though many outlets for employee participation exist, VPP continues to be a driving mechanism for safety at INL. The program has strong management support, receives an appropriate level of resources, and is managed effectively by competent, experienced, and dedicated individuals. INL clearly values its DOE-VPP Star status and is proactive in demonstrating its commitment to the public and to other peers within the complex. For example, INL VPP leaders actively participate in national VPP events and are recognized and sought after as mentors by other organizations desiring to improve the effectiveness of their program or those preparing to apply and achieve DOE-VPP Star status.

LEST is another important mechanism for employee participation at INL. It is chartered to protect employees and their families from injuries and illnesses at, and away from, work. An essential function of LEST is to facilitate communication between the unit ESTs and the laboratory leadership. In order to meet this goal effectively, a member of the BEA Leadership and Management Team is designated as the co-chair of LEST. Other voting members of LEST include individuals nominated by the unit ESTs, the VPP coordinator, and a union representative. LEST develops an annual Safety Improvement Plan for the laboratory that is used by unit ESTs for setting their individual annual goals. Unit ESTs utilize local safety and health data, such as injuries and illness statistics, data from a peer-to-peer behavior based observation system called "Safety Observations Achieve Results (SOAR)," and inspection data to eliminate at-risk behavior, unsafe conditions, and to reinforce good behavior. Whereas unit ESTs identify and resolve safety concerns and issues at the local level, LEST identifies and submits activities for resolution of the laboratory-level safety concerns to the laboratory managers.

At INL, 10 EST units comprise the primary mechanisms for safety and health-related employee involvement at the local and organizational level. ESTs conduct business per approved charters and have developed their own Web sites for communicating with the employees they represent. ESTs operate through five subteams for inspections, injury investigations, trending, safety improvement planning, and SOAR. The ESTs' leadership consists of a chair, a vice-chair, a management champion, subteam chairs, secretary, group representatives, and other participating employees and managers. Leadership is rotated annually and members typically serve for a period of 1 to 2 years even though there is no formal limit on length of service. Although union participation in ESTs is not required, bargaining unit employees participate as individuals to represent the workforce, but not their union. Union representatives interviewed by the Team expressed an interest in a more active participation in the selection of bargaining unit employees who serve as EST members and subcommittee members. ESTs have the authority to establish adhoc committees as deemed appropriate. ESTs conduct frequent meetings to share lessons learned, and to address safety concerns and corrective actions. During the VPP evaluation, the Team had the opportunity to attend several EST meetings and found the meetings to be conducted professionally with strong employee participation.

The architecture and implementation of the INL ESTs is a "best practice" for DOE. The design of ESTs has been an essential mechanism to foster active employee involvement and ensure managers' support by providing resources to fund and ensure "protected time" for employees to participate. This is a significant commitment to safety not only to support the monthly meeting but also to participate on ad-hoc or established subcommittees, which requires additional time from production-related duties by the employees. The ability of INL to not only charter these teams but also sustain them at a high level over an extended period of time is noteworthy.

SOAR is a strong safety-related employee involvement program at INL and an excellent vehicle for measuring behaviors against defined standards. The SOAR process is directed by SOAR/Behavior Based Safety subject matter experts (SME) and at the field level managed by the local ESTs. SOAR observers are trained in proper approach and techniques for performing observations. During the observation, the identity of the person being observed is not recorded on the observation sheet. Observers emphasize the reinforcement of safe behaviors and council how to correct at-risk behavior. Data gathered through SOAR observations are entered in the laboratory-level SOAR database. The individual data is analyzed, and behavioral trends are reviewed and interpreted by the SOAR coordinator and local ESTs for developing corrective action plans. Since program inception, 75,000 SOAR observations have been made. Employees are recognized and rewarded for making SOAR observations.

Experience has shown that during periods of high-level activity worker safety and health risks increase. Best practices within mature observation processes have identified opportunities for increased worker feedback, enhanced communication, and risk reduction through similar approaches when observers are intentionally scheduled to perform observations during periods of high activity (i.e., during outages, delays, turnarounds, or shutdown activities). These periods of high activity may drive workers to inadvertently adopt unsafe behaviors to accomplish time-critical work. Additionally, workers and managers alike may avoid performing observations due to schedule pressures. Scheduling observations helps reinforce safety as a priority during these high activity periods and ensures adequate time and resources for the observations are factored into the project.

Opportunity for Improvement: BEA should consider dedicating additional resources and personnel to conducting safety observations and encouraging additional SOAR observations during periods of high level activities, such as outages, turnarounds, or shutdown.

Employees interviewed reported proactive steps by BEA to mitigate slips, trips, and falls in the parking areas. This included providing shoe spikes, keeping the walkway lit and removing snow and ice from walkways, posting wet-area warnings, and promoting "walk like a duck." However, the use of ice grippers on bus-walking surfaces while traveling has introduced an unanticipated potential fall hazard as the spikes may slip on the floors of the buses. Workers reported that the shoe spikes increased the risk of workers slipping while boarding or exiting the buses. In response, BEA notified employees to firmly hold the handrail and doff the spikes prior to boarding the bus, and to carefully walk to a sitting location to don the spikes after exiting the bus. This was an excellent case demonstrating that safety improvements may have unintended consequences, and require followup and additional analysis after implementation to ensure the desired result is achieved. BEA should continue to monitor use of the shoe spikes and look for additional ways to further mitigate the slipping hazards.

Opportunity for Improvement: BEA should continue to evaluate methods to mitigate the potential fall hazard from the use of ice grippers on bus-walking surfaces or other smooth, hard surfaces, such as building entrances, and ensure adequate facilities for safely donning and doffing the grippers are conveniently available.

Many processes and procedures at INL are designed to allow employees to participate in hazards identification and analysis and to better understand and deal with the hazards of the work and work environment. Specifically, the work planning and control procedure for research and development (R&D) and operations, as well as the procedure for maintenance, requires involvement of specialized ES&H experts in hazard analysis and mitigation in various steps of the process. Employees are also involved in planning and execution of work through prejob, postjob briefings, prejob walkdowns, workplace inspections and injury investigation and followups. Employees interviewed were candid and spoke freely with the Team. They understood their rights under title 10, Code of Federal Regulations, part 851 and were knowledgeable about their safety and health responsibilities, including their responsibility for timeout and stop-work actions. Employees are knowledgeable about the steps involved in such actions, are encouraged by managers to exercise this responsibility, and are willing to do so when appropriate. The employees are also clear on how to report and document safety issues and concerns associated with unsafe conditions, at-risk behavior or near-misses.

In addition to these programs, INL has established processes, such as the "DO IT Process," a four-step process where a group of employees identify a potentially at-risk behavior, and intervene to change that behavior, as well as several awards programs for recognizing and rewarding safety-related ideas, behaviors, and activities, such as presenting at safety meetings and attending and/or delivering safety training. Other programs, such as "fitness-for-duty," raise employees' awareness and provide direction for employees to deal with their own and/or their coworkers' health and fitness issues that may have an impact on workplace safety.

A separate venue for safety-related involvement, mostly by the nonbargaining unit employees, is through the safety committees and boards that collectively report to the Operations Council. Some of these committees, such as Electrical Safety, Work Practices Committee, and the As Low As Reasonably Achievable (ALARA) Committee are laboratory-wide, where as others, such as the Corrective Action Review Boards and Operational Safety Boards, are facility-level organizations. These committees effectively provide the valuable and needed expertise to ensure safe operations across the laboratory. In discussions with the Operation Council Chair, it was clear that the INL SMEs, boards, and committees support the Operations Council by providing input to the management system owners and councils; however, they are not part of the decisionmaking governance structure of the laboratory. Even though this issue is clear to senior managers and no operational safety issues were observed by the VPP Team, some committee charters are out of date and in need of updating to reflect the prevailing governance structure.

Opportunity for Improvement: BEA should ensure committee charters are reviewed and updated as part of the annual self-assessment to ensure the charters reflect the desired governance structure or any other organizational changes throughout the preceding year.

BEA also provides many opportunities for employees to participate in the community, including outreach programs and activities, and events that raise their awareness for safety. BEA provides a collegial environment for managers to show that they care about the safety, health, and wellness of their employees and for the employee to demonstrate that, in addition to their own safety, they care about their coworkers and their community. Examples of such activities include stretching exercises during meeting breaks, safety promotions (e.g., driving safety or Skiing for Safety Skills) and participation in health and wellness forums.

Conclusion

Employee ownership is strongly rooted across the BEA organization. Managers and employees have worked together to develop open lines of communication to identify and promote safety and health responsibilities, goals and expectations, and eliminate hazardous conditions. BEA meets the requirements of the Employee Involvement tenet of DOE-VPP.

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 mitigative measures during work planning to anticipate and minimize the impact of such hazards.

BEA has a robust process for evaluating hazards and controls and incorporating them into work documents and procedures that are deemed high-risk, high consequence work. The process is managed via two work management processes. Laboratory-Wide Procedure (LWP)-21220, *Work Management,* applies to operations and laboratory research and LWP-6200, *Maintenance Integrated Work Control Process*, applies to maintenance work activities. LWP-6200 directs the use of LWP-21220 for some aspects of work planning and control. The scope and application of the two systems is well defined and planners and workers are highly trained to implement the correct process applicable to their scope of work. Both LWP-21220 and LWP-6200 follow a logical progression to identify the scope of work, hazards, and control sets. Although workers and planners interviewed were comfortable using the two-system process, they acknowledged that efficiencies could be realized by combining the two processes into one system. INL has self-identified this improvement opportunity and, as part of continuous improvement, has plans to integrate LWP-6200 and LWP-21220 into one work management system and eliminate some process redundancies and inefficiencies. For high-hazard work and work designated by procedure as requiring documented hazard analysis, the process is systematic, thorough, and produces a procedure or work document that may be reviewed or revised at a later date, thereby maintaining the corporate memory for hazard analysis. Work documents reviewed by the Team were comprehensive and complete. For example, the procedure in development for nanotechnology research was viewed by the Team as an excellent example of thorough analysis from the point of work to occupational medical monitoring.

A key component of the work management system is the Hazard and Risk Planning System (HaRPS). HaRPS is an electronic hazard analysis tool that guides the work planner through a hazard-tree architecture resulting in a planning document that can be used to develop Laboratory Instructions (LI), procedures, or work instructions. Both of INL's work control systems utilize HaRPS as the fundamental hazard analysis screening tool. It should be noted that HaRPS is not designed to provide "turnkey" hazard analysis, but is instead a tool that facilitates logical thinking by a skilled planner through the hazard analysis/hazard control cycle. HaRPS documents the analysis process and provides the basis for incorporation of controls and cautions into procedure/work document development. The development and application of the tool is noteworthy and will only improve as the tool is refined over time through the feedback component.

Embedded within the HaRPS/work control process are triggers to solicit direct input from Industrial Hygiene (IH), Industrial Safety, Fire Protection, Radcon, and Emergency Management into the work package review as determined by the HaRPS analysis tool. For example, if a work document requires the use of a particular chemical, the HaRPS process would require input from

IH. IH personnel would then check the Hazard and Sampling System (HASS) database, which contains the baseline and sampling data, and recommend appropriate controls or alternative methods of control. One of the discussions with IH personnel indicated that the HASS database could be more user friendly by using more intuitive command functions and menus. For example, IH personnel use a binder containing maps of sampling points for noise surveys that cannot be supported by the HASS database. Thus, the database is augmented by a paper system where incompatibilities exist. BEA is also trying to ensure personal identifying information that currently resides in the HASS database is properly protected, which further complicates migration of the data to a more user-friendly platform. IH managers are exploring other commercially available options to upgrade the HASS database system.

BEA should continue to evaluate potential upgrade options to improve the effectiveness of the HASS IH database to a more user-friendly system with site-wide accessibility to pertinent data while ensuring protection of information subject to Privacy Act concerns.

The VPP program manual (Part IV, *Onsite Review Handbook*, line 94) provides the following expectation for a Star site. "There is a written system of job hazard analysis which provides for the analysis of all jobs over a given period of time and sets priorities for the most hazardous jobs." Furthermore, per Laboratory Requirements Document (LRD)-14001, *Occupational Safety and Health Program*, laboratory managers shall establish procedures to identify existing and potential workplace hazards and assess the risk of associated workers' injury and illness by performing workplace and routine job activity-level hazard analyses. Also, per section 3.5.1.1 of LRD-14001, managers are required to "Establish and maintain complete and accurate records of all hazard inventory information, hazard assessments, exposure measurements, and exposure controls."

In March 2009, DOE Idaho Operations Office (ID) issued its final report on the effectiveness of corrective actions for the 2007 Office of Health, Safety, and Security Review of Environment, Safety, and Health at MFC. DOE/ID recommended further improvements relating to HSS-2007-ESH-C-2 (BEA), Independent Oversight Inspection finding that all hazards are not identified and analyzed. BEA instituted steps to improve the BEA system to identify and analyze hazards through changes in the work control procedures. Of the approximately 130 entries into the Issues Communication and Resolution Environment (ICARE) database system for 2009 related to work control, 4 entries indicated inadequate hazard analysis, 2 indicated training deficiencies, and 11 indicated process issues. Actions to address 34 ICARE issues were still in progress at the time of this review. While the percentages for work control-related issues are low, there are vulnerabilities for low hazard-high frequency work activities. LWP-21220 allows the decision to designate work as Routine Activity Envelope (RAE) to be made during the definition of scope of work and prior to any analysis. RAE means that hazards and risks are low and that they can be performed using "skill of performer." The assumption is that the performer has sufficient training and knowledge to perform the work. The same process is applied in LWP-6200 to maintenance work as "skill of craft." Per the LWPs, once these determinations are made, no hazard analysis is documented.

The Team observed several examples where a documented hazards analysis might have improved the performance and execution of work classified as "skill of performer" by identifying additional controls. Examples include operation of large awkward valves, positioning of workers during calibration evolutions, setback barricades for critical lifts, installation of two-block devices, cable installations, interim corrective actions/temporary safety precautions put in place during work evolutions, and chocking wheels for commercial vehicles.

The processes described in LWPs result in a very heavy reliance on worker skill and awareness for routine and perceived low-risk work. The Occupational Safety and Health Administration (OSHA) 3071 2002 (Revised), *Job Hazard Analysis*, provides an excellent process and examples of task breakdowns for a "skill of" work task. BEA would probably realize a significant improvement in worker awareness by using the OSHA Job Hazard Analysis (JHA) process. A critical part of recognizing this benefit will be documenting those analyses and making the results readily available to workers performing similar tasks. The work control process could then be revised such that the entry question for the process becomes "Is there an existing JHA for this task?" If there is a JHA, it becomes a simple matter to have workers review the existing JHA for applicability to the task. By doing it right once and using the results repeatedly, BEA can avoid the trap of JHAs becoming simply a paperwork exercise for the workers. In addition, by documenting the JHA for low hazard, low risk-high frequency work activities, BEA will establish a corporate memory that can be reviewed and revised as further improvements are identified and lessons learned are captured.

Opportunity for Improvement: BEA should revise its work control processes to ensure hazard analysis is documented for all work and that definition as routine activity or skill of the performer is based on the documented hazard analysis.

BEA collects performance data on performance, issues, observations, and noteworthy practices from a myriad of sources. Management assessments, employee-identified issues (ICARE), participation in promotional activities, SOAR, and a host of other sources discussed previously in the Employee Involvement section each collect varied types of data. Each of these sources can provide indicators of different aspects of safety performance. Although BEA safety statistics have been very good, managers and EST leaders are looking for ways to make the next step change in safety performance. To assist with that effort, BEA should consider applying expertise currently available within BEA or within participating associate organizations to look for ways to integrate and "mine" those data sources for data trends. BEA is introducing a replacement to the ICARE system called the Issues and Corrective Action Management System (ICAMS) that will allow them to collect tracking and trending information related to near-misses and high-volume, low-consequence issues or conditions. Reporting features within ICAMS will allow analysis of any data field within the database. Discussions with BEA personnel indicated that the ability to collect this information will help identify error precursors and facilitate identification and tracking of leading indicators. BEA expects ICAMS to be user-friendly and to provide a graded approach to issues management. The current ICARE system is labor intensive, difficult to use, and can result in the workforce being less apt to report low-consequence issues or conditions. BEA should consider the use of data mapping or other analysis tools that allow correlation of statistics to location, organization, date and time, shifts, activities, or other parameters to help identify data clusters or holes that can be addressed and then used to drive safety performance further toward zero.

Opportunity for Improvement: BEA should continue to explore improved data analysis tools and methods to integrate and evaluate data collected through multiple sources and use those analyses to develop better leading indicators for site-wide application.

Accidents and upsets are investigated in accordance with the BEA written procedure for accident investigation and causal analysis. The result of the BEA process produces a written report that is available to all employees and where required, corrective actions and the tracking to completion of action items. OSHA recordable rates for BEA are low when compared to the industry average.

Conclusion

BEA continues to improve and consistently seeks ways to achieve the next level of excellence with respect to identification and analysis of workplace hazards. This was evident throughout personnel interviews and observations of work activities. BEA meets the requirements of the Worksite Analysis tenet of DOE-VPP.

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; and/or Personal Protective Equipment (PPE)). Equipment maintenance, PPE, 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.

Work at INL involves potential for exposure to many types of industrial, chemical, and radiological environments and materials. Ensuring that worker exposure to these environments and materials is avoided, or at least minimized, requires following the established hierarchy of controls implemented by BEA. BEA is continually searching for ways to minimize or eliminate hazards, thus reducing the use of PPE. The BEA policy is to provide required PPE to protect workers from hazards that cannot be otherwise eliminated or avoided by substitution, engineered, or administrative controls. Personnel, procedures, training, work control processes, and facilities are available to ensure that required PPE is accessible and in proper operating condition.

As stated, when the hazards of a work activity cannot be mitigated using engineering and administrative controls, workers are protected using company-supplied PPE. During all work activities observed by the Team during the review, appropriate PPE was utilized as required by the specified controls.

Because INL is a nuclear site, BEA maintains a comprehensive radiological control program to protect workers, the public, and the environment from the hazards associated with ionizing radiation. This program is continually monitored, and refinements are made to ensure that radiological exposures are maintained ALARA. BEA implements the ALARA Program to maintain the highest standards of environmental, safety, and health protection. This is accomplished by controlling public and employee radiation exposure within applicable limits and further keeping exposures ALARA.

Earlier in 2009, BEA experienced a series of radiological control issues regarding personnel compliance with Radiation Work Permits (RWP) and radiological postings. BEA investigated these issues collectively, and has been working to resolve these self-identified issues. Corrective actions have included additional SOAR observations related to RWP use and compliance, as well as additional management attention related to RWPs. As a result, BEA has seen a significant reduction in RWP errors. Team observations during the review period identified no radiological control noncompliances.

As previously discussed, INL has developed an integrated process to manage and perform work in accordance with a documented Safety Management System. LWP-21220 and LWP-6200 clearly define work management processes for operations/R&D and maintenance activities at INL. By design, the work management system functional areas are the five core functions of the Integrated Safety Management System. Each functional area describes the process, requirements, roles, and responsibilities that, when applied, provide the means to define, analyze, plan, review, authorize, control, and document work activities. The work control methods thus enable work to be performed safely.

Controls are an integral part of INL work management system. HaRPS does provide some level of suggested controls for the planner to consider. Controls developed subsequent to analysis are further defined in LRD-14001, which states “Hazard Control methods shall be selected based on the following hierarchy:

1. Elimination or substitution of the hazards where feasible and appropriate;
2. Engineered controls;
3. Work practices and administrative controls that limit worker exposures; and
4. PPE.”

Many examples of this hierarchy of controls selection resulting from worksite analysis were observed by the Team. For example, legacy solvents and paints (i.e., lead-based, high-volatile organic compounds, etc.) had been replaced by products containing less hazardous chemicals (i.e., latex paint, low-volatile organic compounds). Existing table saws have been replaced with new "Saw-Stop" models that provide extraordinary protection for workers by stopping the sawblade in less than 5/1000ths of a second should its sensors detect the electrical impulses and moisture of an operator's hand come in contact with the blade. The use of this advanced technology all but eliminates severe injuries that can occur when operating high-risk, traditional saws. These efforts to provide the added protection of elimination/substitution/engineered controls were costly, but fully supported by managers.

An examination of INL work management system identified a robust process that fully satisfies the expectation of Integrated Safety Management and VPP for activities included in the documented work control process. However, some opportunities for improvement in the work control process were noted, particularly with respect to the nondocumented or "low-risk" and "routine" activities.

As previously discussed in the Worksite Analysis section, INL procedures (LWP-6200 and LWP-21220) exclude what is characterized as low-risk and routine activities from those work management systems. This type of work may be characterized as RAE, or “Performer Controlled Work.” The decision on the classification of this work is made during the scope definition stage and once made, precludes any further documentation of the work, including the hazard analysis. By making the decision whether to perform hazard analysis based on an assumption of the outcome, the application of adequate controls may not be assured. Furthermore, the "implied analysis" or "nondocumented analysis" may not promote the use of the hierarchy of controls, thus leaving the worker to use PPE when a more detailed analysis might identify substitutions or engineered controls. Injury and illness records document that routine low-risk activities are not performed without incident. Interviews with ESTs, safety professionals, and managers indicated that they felt most at risk performing routine activities. Greater emphasis on higher-risk activities has driven down at-risk behaviors and created confidence in the work management system and the performance of the workers. For INL to demonstrate further continuous improvement, BEA should reevaluate the way routine and low-risk activities are planned, controlled, and managed. (See Opportunity for Improvement in Worksite Analysis).

Although maintenance uses LWP-6200 for work control, they also incorporate the HaRPS system from LWP-21220 for hazard analysis. During this process, HaRPS populates the work planning forms with information from the analysis performed within HaRPS. Interviews with planners indicate that the output from HaRPS into the forms is incomplete and, therefore, not useable due to formatting issues. This results in planners having to cut and paste information from document to document in order to generate work instructions. This is not only inefficient, it also provides an opportunity for human error caused by a latent organizational weakness.

Opportunity for Improvement: BEA should continue ongoing efforts to refine the HaRPS tool to provide accurately formatted information to the maintenance planners (via form 62/62N), ensuring that efficiency and accuracy are improved.

Maintenance planners are required to use HaRPS as the starting point for job hazard analysis. However, HaRPS as designed primarily supports the language of researchers and operations activities. Consequently, maintenance planners have developed a "Planner Tool" and a Microsoft Word "Maintenance Macro" that they use to populate data in maintenance work instructions. These tools contain language and instruction that is compatible to performance of maintenance work. It should be noted that these tools are not used instead of HaRPS, but in addition to HaRPS. Some planners interviewed indicated that in some cases (because HaRPS is not primarily a maintenance tool) the use of HaRPS added little value, but they used it because it was required.

The Maintenance Macro that is used is actually a secondary hazard analysis that is customized to incorporate the tasks actually performed. These added supplements to HaRPS can add value, and BEA should consider incorporating them into the HaRPS process, thereby eliminating the need for planners to maintain and utilize multiple systems to create maintenance work packages.

Opportunity for Improvement: BEA should evaluate the use of the "Planner Tool" and "Maintenance Macro" and their effective integration into the work management process.

Followup reviews (i.e., postjob reviews) are described in LWP-9201, *Briefings*. They are a mechanism that serves to provide feedback regarding activity/task performance. Recognition of what went right is as important as what could have been done better to influence continuous improvement. Feedback from followup reviews is used to facilitate adjustments to activity/task performance and to promote continuous improvement in future planning and training. A review of several work packages revealed that the process could be improved if a boiler plate statement (similar to the language included for the Prejob Brief) were added to ensure the postjob review was completed. Also, procedure LWP-6200 identifies conducting a postjob review as the means to satisfy the Integrated Safety Management crosswalk on page 7 of 53. However, there is no discussion of a postjob review in the text of the procedure, which would direct the procedure user to ensure that the postjob is actually performed.

Opportunity for Improvement: BEA should consider revising LWP-6200 to include consistency of terms and appropriate language to ensure postjob reviews are performed.

During work observations and interviews, the Team identified a number of hazard controls that should be considered to improve operations and maintenance activities. Many of these controls would probably have been identified if more systematic approaches to hazard analysis had been followed during planning for skill-based work. For example, interviews with the ATR Hoisting and Rigging SME and other qualified riggers confirmed ATR's requirement for anti-two block device and the inclusion of barricading setback distances relative to the boom height in their hoisting and rigging training, and in the case of anti-two block devices, all rigging equipment was equipped with the devices with interlocks where appropriate. However, review of the ATR hoisting and rigging procedure and procedure checklists identified no mention of these requirements. While the requirements are included in the training, the procedure and the checklists should identify those requirements as well.

Team walkdowns of the Central Facilities Area (CFA) weld shop discovered evidence of extensive cutting, welding, and grinding of stainless steel materials. BEA took ownership of the shop approximately 2 years ago. The shop area was reduced and a hot metals laboratory was added to the floor space with an 8-foot high dividing wall between the two areas. The dividing wall does not extend to the shop's 20-foot ceiling such that workers in the hot metals laboratory could possibly be affected by any exposures not properly controlled in the machine shop. Due to previous IH recommendations, the shop ventilation systems were deemed ineffective in their current configuration and were no longer inspected or flow tested. Interviews with IH suggested the crafts use a "smoke-eater" localized ventilation device for welding activities. The "smoke-eater device" could not be located by workers in the shop at the time of the walkdown, but was later located against an adjacent wall immediately outside the CFA weld shop. While an LI document had been prepared for the work activities in the shop, it did not analyze and provide specific controls for welding activities involving stainless steel. Review of the IH HASS database also revealed that no IH sampling for hexavalent chromium has been performed in the past 2 years, nor was previous sampling data provided by CH2M-WG Idaho, LLC, when BEA assumed landlord duties for the building. Due to OSHA's lowering of the Permissible Exposure Limit for hexavalent chromium, and the increased welding activities performed with stainless steel in the shop, a baseline sampling for stainless steel welding, cutting, and grinding activities needs to be performed.

Opportunity for Improvement: BEA should review and update the CFA weld shop LIs to properly reflect the activities being performed there and the appropriate controls required for those activities, including sampling for hexavalent chromium exposures.

MFC is performing an extensive review of signs and postings to ensure postings are accurate. Some areas observed during field walkdowns identified signs and postings that needed improvement or clarification. For example, in the MFC and CFA some exit signs were observed on office trailers that were not illuminated. In addition, several photo luminescent exit signs were observed installed in locations were ambient lighting was low (the photo luminescent signs observed require five-foot candles of ambient lighting to meet manufacturers' instructions). Also, "Hearing Protection Required" signs were observed in shop areas where no hazardous noise sources were in operation. In those areas personnel were observed not wearing hearing protection as the posting required. These areas should be posted to require hearing protection only when equipment operating above established sound levels (as documented by sound level surveys) is operating.

At INL, the Occupational Medicine Program provides services to all INL employees, including INL subcontractors and DOE employees. The services described in a Program Description Document (PDD) include: (1) medical services at clinics and dispensaries at INL facilities; (2) employee assistance program to provide counseling services; (3) wellness program to promote healthy lifestyle; and (4) administration of claims and benefits for work-related injuries and illnesses. An LRD provides a comprehensive description of the purpose, scope, associated responsibilities and activities of the Occupational Medicine Program. Specifically, this document defines the requirements for the qualification of the Site Occupational Medical Director (SOMD), and other staff, such as nurses and physician assistants, implementing the program. The document also defines requirements for planning and implementation of the program, including program's access to hazard information necessary for medical decisions, record keeping, and medical evaluations. The medical evaluation, the center piece of the program provides a number of services including: (1) preplacement physicals; (2) periodic physicals; (3) health profile assessments; (4) return-to-work evaluations; (5) fitness-for-duty evaluation; and (5) non-acute occupational injury and illness and acute illness evaluation and referral. At INL, the occupational medicine services are provided by a directorate level organization within the Occupational Safety and Health division. Documents reviewed and staff interviewed (including the SOMD), and program elements (such as Beryllium Medical Surveillance Examination, and Medical Screening) examined during the evaluation, reveal a comprehensive program that is effectively implemented and well managed. In addition to the organizational strength, the staff, including the Medical Director, have an excellent understanding of INL environment and its employees and have established effective mechanisms to communicate with the workforce. Overall, the Medical Program is comprehensive and the physicians and technicians are highly qualified and able to respond to any medical emergency. Medical facilities are strategically located to provide rapid and effective response.

Several years ago, the SOMD determined that Automated External Defibrillators (AED) would not be useful and that emergency responders would be available in time to provide medical care without the need for an AED. Since then, a new SOMD has been appointed, and AED technology has improved significantly. AEDs are now available that can be operated without additional training, and maintenance is minimal. BEA has installed AEDs at the Fire Station and Nurse Station at Test Area North /SMC, and is evaluating other locations based on proximity to emergency services and projected response times. According to the American Heart Association, the availability of an AED improves the survival rates for sudden cardiac arrest victims from 5 percent to as high as 74 percent if the first shock and Cardio Pulmonary Resuscitation can be delivered in less than 3 minutes. Based on that statistic, the American Heart Association does not recommend that the decision to install AEDs be based on the response time of other emergency personnel, but that the AED can be accessed and used within 3 minutes. Consequently, BEA should consider revising their decision process to provide AEDs in all normally occupied facilities such that the AED can be available and used within 3 minutes.

Opportunity for Improvement: BEA should consider expanding the availability of AEDs based on recommendations by the American Heart Association.

BEA has an extensive Emergency Preparedness program in place. The program covers both intown and offsite facilities, including ATR, MFC, and CFA. Operational plans, staffing, and management support for emergency services are more than adequate and appropriately matched to the complexity of the operations within facilities. Intown facilities are serviced by municipal emergency service providers, and offsite locations are serviced by BEA-employed responders. BEA emergency service providers are cognizant of the potential hazards within their response areas. All responders have emergency medical technician and hazard material training.

Pre-incident plans are up to date and drills and exercises are routinely conducted to validate readiness. In addition to emergency response intervention and mitigation activities, considerable effort is placed on prevention through emphasis campaigns, proactive programs, and employee-sponsored initiatives. These prevention measures, for example the review of site-wide policies and procedures for the storage of flammable liquids and gases performed during the VPP evaluation, are effective and, on occasion, help to significantly reduce or eliminate the need for emergency services.

In order to promote excellence and maintain a safe work environment, BEA recruits and maintains a highly qualified staff of safety and health professionals. The staff includes nationally certified personnel, including certified safety professionals and certified industrial hygienists. The professionals are part of an entire branch of the company dedicated to supporting the ES&H needs of the company. The safety and health organization includes safety engineers, industrial hygienists, emergency response specialists, physicians, and nurses. ES&H personnel are encouraged and given resources to increase their level of technical competency by acquiring professional certifications, registrations, advanced degrees, continuing education, and training. Managers and employees may specify educational and training goals in performance appraisals to increase technical qualification and promote advancement. These personnel provide safety and health expertise to the company as a whole and provide matrix support to specific BEA facilities as needed. ES&H professionals provide safety awareness training, consulting, workplace analysis, medical support, radiological and industrial hygiene oversight, and safety issue resolution.

Proper maintenance of resources is crucial for the safe and effective operation of INL facilities. Preventive and predictive maintenance (PM) programs are, therefore, used to mitigate the chances and effects of unplanned equipment failure. Vital equipment is regularly maintained so that it will continue to provide safety and facility support. The PM program is tailored consistent with the INL missions and long-term facility planning.

Each INL facility executes the PM process with specifically scheduled actions to help prevent equipment failure. The facilities take a tailored approach based on the degree of risk and the nature of mission activities to prioritize resources for facility and equipment maintenance. Priorities are established and assigned relative to potential safety hazards and work importance as determined by project or program management, ES&H professionals, and other disciplines, such as engineering, environmental, waste management, and production, on an as-needed basis. Master equipment lists identify structures, systems, and components covered by the maintenance programs. PM is based on manufacturers' recommendations, plant operating experience, surveillance requirements, industrial codes and standards, safety analysis reports, technical safety requirement, and good engineering practices.

PM intervals are based on optimum application of calendar time requirements, machine runtimes, and repetitive motion or performance counting techniques. PM programs are periodically reviewed and revised to optimize the cost/benefit ratio of PM requirements and equipment reliability. Justification for PM actions is documented, and managers approve new and revised actions and their frequency based on program analysis and evaluation. Procedures are developed, verified, and validated as required, based on the level of complexity of work and potential risk to the workers, public, and environment. Craft workers, planners, engineers, trainers, technical writers, and ES&H professionals participate in the procedure development process. In establishing a balance between corrective maintenance and PM, the overriding consideration is safe and reliable facility operations achieved cost effectively.

Nonnuclear maintenance for the INL is primarily performed by Facility Support Services (FSS). The FSS organization is divided and based out of three regions across INL: (1) CFA; (2) intown facilities; and (3) MFC. Each region has an FSS director responsible for that region. Review of CFA and intown maintenance activities revealed reasonable PM and corrective maintenance backlogs indicative of appropriate staffing and resources. Various work packages were sampled and reviewed and controls were deemed appropriate.

Safety and health rules are established and posted throughout the facilities. The rules are basic and easy for employees to remember. The result of employees following the rules is a safe and productive work environment. The steps of the discipline policy are also effective tools when someone is found violating safety and health rules and requirements. As stated in the INL Safety Bulletin distributed to every employee, every person coming onsite is required: (1) to report any injuries or illnesses to appropriate supervisors; (2) to stop work when an activity is unsafe, whether caused by weather conditions, behavior, or anything else; and (3) to work safely by example and action.

Although disciplinary action is sometimes necessary, BEA managers recognize that positive reinforcement has greater effectiveness. BEA managers allocate funds specifically for recognizing employees for significant contributions to safety and health. Units are also allocated funds for recognizing and promoting safe behavior. Employee recognition programs are a key factor in reinforcing safe behavior. These programs help to establish good rapport between managers and employees.

Conclusion

BEA has adequate programs in place that generally apply the appropriate degree of rigor to proper selection of controls to eliminate or minimize workers' exposure to hazards, and meets the requirements of the Hazard Prevention and Control tenet of DOE-VPP. Efforts to better capture hazards associated with low-risk, routine work will ensure proper control selection in accordance with the desired hierarchy of controls.

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, that personnel recognize hazards they may encounter, and that they are capable of acting in accordance with management expectations and approved procedures.

Training and qualification programs are well established and ensure that employees are appropriately trained to recognize the hazards of work and the work environment and to protect themselves and their coworkers. PDD-12005, *INL Training*, is in place and appropriately describes the basic training process that ensures INL workforce is properly trained to work effectively and safely. The process as defined and implemented is systematic and covers the needed knowledge, skills, and abilities to perform tasks competently and safely. It applies to all employees and all aspects of BEA operations, including personnel involved in operations, research and development, design, procurement, and support activities.

All structured training programs are required to be defined in the Training Records and Information Network (TRAIN) system using job codes and or qualification codes. The training requirement for each employee is documented in an Individual Training Plan (ITP). Training records of employees and subcontractors are maintained in the TRAIN system. Each department has a training coordinator. The training coordinators send 90-day, 60-day and 30-day e-mail reminders to the employees and their supervisors for upcoming training. The employees, supervisors, and training coordinators all have access to TRAIN. Annually, as part of the performance review process the employees and managers evaluate the employee's ITP and determine if the elements are still relevant. The training plan can be revised at any time to reflect new or changed job requirements. Most training at INL is computer-based. In those cases where instructor-led training is required, the training coordinators work closely with the employees to schedule the classroom training.

INL employees and subcontractors are required to complete training requirements contained in the "General Employee Job Code," which includes completion of "ES&H Awareness" training. Training to exercise Time Out/Stop Work Authority, including review questions is a requirement and must be completed by all employees. Upon hiring a new employee at INL, his or her supervisor or manager is required to discuss work practices at INL with the employee, including Time Out/Stop Work Authority. The supervisor or manager is required to document the results of that discussion.

The on-the-job (OJT) training process for crafts is well defined and effectively implemented. When assigned to use new equipment, the craft serves under an experienced mentor or an SME to learn the operation of the equipment. To verify competency, they are required to successfully complete an oral board and demonstrate proficiency in operation of the equipment. Upon completion of OJT, employees are issued qualification cards with expiration date. OJT records are maintained in TRAIN, and can be readily accessed to verify qualification.

Supervisors identify the training required for a newly hired employee, and with assistance from training coordinators, develop ITPs for these employees. The ITPs identify the classroom and OJT training that a newly hired employee must complete before performing tasks that may involve exposure to hazards. During the evaluation, the Team had the opportunity to attend the

New Employee On-boarding, a 1-day program for new employees. The program included discussions of stop-work authority and VPP, as well as a brief overview of ES&H, and was found to be well organized and effective.

Training plans for “ES&H Awareness Refresher dated 8/19/09” and “Radiation Control Technician/Health Physics Technician Trimester Trainings dated 9/9/09” were reviewed by the Team. Lesson plans had appropriate technical content and included written examinations. Also the Team observed “hands-on” fire extinguisher training conducted for maintenance personnel who perform “fire watch” duties at the CFA. The training was performed using the “Bull Ex” training simulator, a state-of-the-art training tool focused on reducing hazards associated with burn barrels and extinguishing agents. There was active participation by the attendees. Also, observation of an upgrade project involving Lock Out/Tag Out at MFC and a prejob briefing at SMC revealed appropriate verification of training and qualification records before the employees are authorized to perform work.

Recognizing that effective leadership and management skills are essential to maintaining quality communication and a strong safety culture, management and leadership training is an area of considerable interest at INL. For example, a 3-day course, “Front Line Leadership Fundamentals,” targets supervisors, foremen, technical leads, and first-time leaders. The course, which is designed to deliver the essential skills and knowledge necessary to succeed at the operational level, covers topics, such as the INL Director’s expectations and standards of performance for leaders, human fundamentals of leadership, and performance leadership. “License to Lead” is another 3-day course for levels 2, 3, and 4 managers. It delivers essential skills for succeeding as a leader at the enterprise level. It includes a discussion of mission, vision, strategy, business model, the philosophy of simultaneous excellence, management systems, leadership culture, value and principal-based leadership, laboratory director’s expectations and standards of performance, core competencies for leaders, coaching and feedback, community service project, cultivation of common models and languages on situational leadership, performance leadership, generative thinking, change management, and social/interpersonal savvy.

BEA has taken the initiative to enhance understanding and execution of the principles of Human Performance Improvement (HPI) beyond basic training and implementation. Added training for the roles of Practitioner Level and Worker Level will further assimilate the principles of HPI across the organization. The Practitioner course is an advanced look into HPI that requires extensive effort, as well as formal training. It requires a commitment of approximately 6 months to a year for completion. To date, 38 employees have satisfied the course requirements with another 60 employees in some phase of completion. The Worker Level course requires an additional 3-hour classroom training above the basic course, along with a practical evaluation. The establishment of this new HPI program will help to ensure that human performance concepts, principles, and error reduction tools are integrated seamlessly into existing INL procedures, processes, and more importantly, into daily work activities. SOAR and HPI training has been extensive with a nearly 80 percent employee participation rate.

Per LRD-14001, laboratory managers shall provide periodic training as frequently as necessary to ensure that workers are adequately trained and informed. Employees and supervisors interviewed indicated that no refresher frequency had been established to ensure employees are aware of hazards and controls identified in the LI. While some groups do provide LI in the work package and LI is reviewed during the prejob brief, that practice is not consistent across INL.

Opportunity for Improvement: BEA should evaluate the need to provide some form of consistent refresher training for routine LIs.

During a walkdown of the chemical storage area at an INL Research Center, the custodian of the chemical storage area did not have knowledge regarding the emergency ventilation stop buttons that are installed at each substorage room. The custodian believed the "break glass and push button" devices would be used in case of fire, but was unsure and had not been trained in their use. Also, outside of some laboratory entry doors there are indicator lights installed and their function was not known by both the Team's escort and the point of contact for the laboratory.

Opportunity for Improvement: BEA should evaluate LIs for general areas to ensure that instructions include operation of emergency equipment in case of an incident, expected response to lights and alarms, and ensure employees fully understand those instructions.

Several good practices, including the following were noted by the Team:

- Key card locks for the INL Research Center verifies individual's training is current and sufficient prior to allowing access to each laboratory.
- FSS employees providing support for intown maintenance have job responsibilities and requirements in place that specify training required for work activities and any additional training for "location hazards" (i.e., laboratory hazards).
- BEA provides a 2-week window for busdrivers to train on a state-of-the-art bus simulator that is made available to the site annually. During this time, busdrivers are required to complete at least one session in the simulator and may attend additional sessions at their discretion. The simulator provides drivers with experiences to respond to real life accident scenarios. Time in the simulator prepares the drivers for real emergencies.
- Newly promoted supervisors and managers at MFC must take mandatory training to learn management and supervisory skills.

Conclusion

BEA provides adequate safety and health training to its employees, supervisors, and managers. Workers generally know and understand the policies, rules, and procedures established to recognize hazards they may encounter and to prevent exposure to these hazards. BEA meets the requirements of the Safety and Health Training tenet of DOE-VPP.

VIII. CONCLUSIONS

Since selection to manage and operate INL in early 2005, BEA has built upon an existing safety culture and continues to demonstrate a thirst for safety excellence and continuous improvement. This was first recognized when BEA achieved DOE-VPP Star status as a result of the initial onsite review in May 2006. Managers at BEA are committed and active leaders in the safety program. They have successfully empowered employees to build, maintain, and own safety and health at INL. Processes are generally well structured and provide for adequate hazard analysis and control identification and implementation. However, a reevaluation of the procedures for low-hazard, high-frequency routine work is in order and should significantly improve processes to properly identify and analyze hazards, and select the appropriate controls and steps, which are currently missing. Employees, supervisors and managers were all very open and receptive to discussion points raised during the review. Interviews and observations of work activities confirmed to the Team that a strong Safety and Health Training Program is in place at INL, which has prepared employees to work safely, avoid exposure to hazards, and take proper action to address and rectify unsafe conditions. The Team is satisfied that BEA continues to meet the requirements of the five tenets of DOE-VPP and recommends that BEA/INL continue to participate in DOE-VPP at the Star level.

Appendix A

Onsite VPP Audit Team Roster

Management

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