Battelle Energy Alliance, LLC
Idaho National Laboratory

Report from the Department of Energy
Voluntary Protection Program
Onsite Review
September 9-20, 2013

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. 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 September 9-20, 2013, 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

ALARA	As Low As Reasonably Achievable
ATR	Advanced Test Reactor
BEA	Battelle Energy Alliance, LLC
BLS	Bureau of Labor Statistics
CAES	Center for Advanced Energy Studies
C-REST	CAES-EROB EST
CFA	Central Facilities Area
DART	Days Away, Restricted or Transferred
DOE	Department of Energy
ECC	Emergency Communications Center
EOC	Emergency Operations Center
EPRI	Electric Power Research Institute
EROB	Engineering Research Office Building
ES&H	Environment, Safety and Health
EST	Employee Safety Team
FY	Fiscal Year
HaRPS	Hazard and Risk Planning System
HASS	Hazard Assessment Sampling System
HPN	Hazard Prioritization Number
HSS	Office of Health, Safety and Security
IH	Industrial Hygiene
INL	Idaho National Laboratory
ITP	Individual Training Plan
LEST	Laboratory Employee Safety Team
LI	Laboratory Instruction
LWP	Laboratory-wide Procedure
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
PPE	Personal Protective Equipment
RD	Requirements Document
RWP	Radiation Work Permit
SIP	Safety Improvement Plan
SMC	Specific Manufacturing Complex
SME	Subject Matter Expert
SOAR	Safety Observations Achieve Results
Team	Office of Health, Safety and Security DOE-VPP Team
TRAIN	Training Records and Information Network
TRC	Total Recordable Case
VPP	Voluntary Protection Program

EXECUTIVE SUMMARY

Battelle Energy Alliance, LLC (BEA), is a limited liability company wholly owned by Battelle Memorial Institute with support from integrated management subcontractors. The BEA Team consists of:

- **Battelle Memorial Institute:** 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.

- **Electric Power Research Institute (EPRI):** a nonprofit research and technology organization that serves as the vital link between INL and the domestic and international commercial nuclear power industry. EPRI 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.

BEA was first 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, and was reevaluated as a Star participant in 2009. In accordance with program requirements, BEA was due for its second triennial recertification in 2013. The review was performed by the Office of Health, Safety and Security (HSS) DOE-VPP Team (Team) from September 9-20, 2013. This multidisciplinary Team included Federal employees and qualified subject matter experts from other DOE-VPP participant sites.

Because the diversity of activities at INL makes comparison with a single industry difficult, HSS, the Idaho Operations Office, and BEA INL previously agreed to use a weighted average of

five different industry codes that cover the range of activities. BEA's 3-year average is approximately 50 percent below that weighted average. As of this assessment, BEA had 21 Total Recordable Cases, and 8 Days Away, Restricted or Transferred cases for calendar year 2013 showing an improving trend.

Managers are visibly committed to creating and sustaining a culture of safety excellence at BEA. This commitment is demonstrated not only through support of safety initiatives, but more importantly through active participation and leadership by example. BEA managers should expand their efforts to improve communications and foster trust with the unions, and closely involve the unions in developing solutions to safety issues.

BEA has developed and implemented mature programs to involve employees in the safety program at INL. Employees are empowered to take ownership of VPP. Restructuring Employee Safety Teams (EST) into a geographical-based system has increased employee involvement and the tenure of EST and Laboratory Employee Safety Team Chairs strengthens the VPP core within INL. The use of subteams at Central Facilities Area and huddles at the Materials and Fuel Complex are innovative ways to increase participation and involvement. BEA demonstrates a continued strong commitment to employee involvement as a significant element of safety.

BEA continues to improve and consistently seeks ways to improve its hazard analysis processes. Extra effort should be taken to document the linkage between hazard analysis and the selected control and clearly communicate the reason for control selection to the workers. Hazard analysis improvements are planned that support the laboratory's continuous improvement objectives.

The hierarchy for hazard control selection is evident. Work observations demonstrated effective use of personal protective equipment. The Team encountered multiple examples of professionals and workers solving issues together. BEA continues to reevaluate and improve the radiation protection program, identification and analysis of control selection, conduct of laboratory research, and engages the workforce in developing solutions. These efforts demonstrate BEA's commitment to continuous improvement.

BEA uses an effective systematic approach to training. The procedural flow from the program description document to implementing laboratory-wide procedures and training job guidance documents is logically linked and followed. INL's method to track employee's training requirements is systematic and used by employees, supervisors, and training coordinators to ensure employees receive the right training for the work hazards. The use of simulators, practical training exercises, and hazardous training mockups improves learning and leads to safe work practices. Supervisory and management training has recently been expanded and provides a wide range of management training.

BEA continues to demonstrate effective management leadership and employee involvement in its safety and health programs. The extensive participation by workers in ESTs and workers' willingness to pause or stop work to ask questions and address safety issues demonstrates a healthy respect for hazards and a mutually beneficial understanding of safety as a prerequisite for all work. Some events have occurred in the past 2 years that indicated some complacency, but all personnel are working together to identify effective actions and refocus efforts on safely accomplishing the INL missions. Managers face an ongoing challenge to restore and maintain workers' trust, and, in some cases, need to be more inclusive of unions when implementing changes. The Team recommends that BEA continue to participate in DOE-VPP at the Star level.

The standard for Star status is not perfection, but that 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 some opportunities for improvement. These opportunities reflect those areas where BEA can further improve its performance (see Table 1).

TABLE 1

OPPORTUNITIES FOR IMPROVEMENT

Opportunity for Improvement	**Page**
BEA managers should continue meeting regularly with union leaders and continue seeking opportunities to involve workers and their representatives in creating solutions to difficult safety and health issues.	**7**
BEA should provide a mechanism that allows employees to participate in VPP regardless of what funding source or contract they support.	**10**
BEA should continue to work toward documenting hazard analysis for all work that identifies assumptions, locations, work methods, or other parameters that define why identified controls ensure that all work is performed safely.	**14**
BEA should ensure that all employees are engaged in hazard identification and resolution of potentially injurious situations, resist working around hazards, and that managers do not tacitly accept hazardous conditions through inaction.	**17**
BEA should strengthen its postjob review process by training supervisors to perform good postjob reviews, tracking postjob reviews, and linking postjob reviews to supervisors' performance evaluations.	**18**

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 multiprogram, Federally funded research and development center (FFRDC) emphasizing applied engineering solutions for use across the Department of Energy (DOE) complex, as well as regionally, nationally, and worldwide. 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 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.

Sponsorship of INL was formally transferred to DOE's Office of Nuclear Energy 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 Babcock & Wilcox Technical Services Group, Inc. (BWX Technologies, Inc.), Washington Group International, Electric Power Research Institute (EPRI), and an alliance of university collaborators. The alliance of university collaborators is led by the Massachusetts Institute of Technology and includes other nuclear engineering universities, such as the University of 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.

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, or radioisotope thermoelectric generators (RTG), 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 (EROB) 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 has installed a new 12,512 processor supercomputer, known as *Fission* that is six times more powerful than its predecessor, *Icestorm*, which came online in 2007. The Center for Advanced Energy Studies (CAES), which opened in 2009, houses the Energy Policy Institute. Other facilities house National Security programs and INL precision machining and glass shops.

BEA 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 and again in 2009. In accordance with program requirements, BEA became due for its triennial recertification in 2012. The review was performed by the Office of Health, Safety and Security (HSS) DOE-VPP Team (Team) from September 9-20, 2013. The multidisciplinary Team included Federal employees and qualified subject matter experts (SME) from other DOE-VPP participant sites. The assessment was performed by conducting multiple work observations at all major areas operated by BEA; interviewing personnel at all levels, including senior managers, workers, and union leaders; and performing assessments and walkdowns of BEA facilities. The Team had contact with over 500 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 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
2010	7,920,654	53	1.34	29	0.73
2011	7,882,875	34	0.86	18	0.46
2012	7,327,754	31	0.85	15	0.41
3-Year Total	23,131,283	118	1.02	62	0.54
Bureau of Labor Statistics (BLS-2011) average for (NAICS**) Code # 5417, 5616, 221,811 & 332			1.96		1.0
Injury Incidence/Lost Workdays Case Rate (BEA Subcontractors and Vendors)					
Calendar Year	Hours Worked	TRC	TRC Incidence Rate	DART* Cases	DART* Case Rate
2010	542,464	5	1.84	0	0.0
2011	601,422	5	1.66	2	0.67
2012	389,428	0	0.0	0	0.0
3-Year Total	1,533,314	10	1.3	2	0.26
Bureau of Labor Statistics (BLS-2008) average for NAICS** (Code # 5417, 5616, 221, 811 & 332)			1.96		1.0

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

TRC Incidence Rate, including subcontractors: 1.04
DART Case Rate, including subcontractors: 0.52

Conclusion

The diversity of operations at INL makes comparison to industry statistics difficult. By previous agreement between HSS, the Idaho Operations Office and BEA, BEA uses a weighted average of 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. BEA is approximately 50 percent below the weighted average and meets the statistical requirements for continued participation in DOE-VPP. As of September 16, 2013, BEA has 21 TRCs and 8 DART cases, for a rate of 0.92 and 0.35, respectively, demonstrating an improving trend. The Team did not identify any disincentives to reporting injuries or illnesses.

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 finally, (5) managers must be visible, accessible, and credible to employees.

In 2009, the Team determined that managers were visibly committed to creating and sustaining a culture of safety excellence at BEA. This commitment was demonstrated not only through support of safety initiatives, but more importantly through active participation and leadership by example.

As in 2009, the BEA Safety Policy remains well defined and integrated with the mission of the laboratory in Policy (POL)-111, *Policies and Standards of Performance*. Roles, responsibilities, authorities, and accountability are established through an effective system of policies, procedures, and instructions, as well as by the overall organizational structure. Since 2009, the management team has been restructured to focus on both contract and institutional performance. The Laboratory Director is supported by three Deputy Laboratory Directors, but the Deputy for Projects has become the Deputy for Nuclear Operations. As of this assessment, BEA is expanding the role of the Deputy for Nuclear Operations to become the Deputy for Nuclear and Laboratory Operations. This change is intended to provide for enhanced management oversight and consistent operations across all INL activities. The Deputies are now supported by three (formerly four) Associate Laboratory Directors: (1) Energy and Environment Science and Technology; (2) Nuclear Science and Technology; and (3) National and Homeland Security Science and Technology. Three program directors (ATR Program, MFC, and Transient Reactor Test Facility (TREAT) Restart) are responsible for the three largest programs at INL. The laboratory is then further divided into several mission-enabling organizations: Business Management; Facilities and Site Services; Human Resources and Diversity; Communications and Governmental Affairs; Project Management; Information Management; Human Resources and Diversity; Environment, Safety and Health; Applied Engineering; Laboratory Protection; and Technology Deployment. Two organizations provide for risk management and assurance: Audits, and the General Counsel.

Managers interviewed by the Team continued to express their support for excellence in safety and health and recognized safety performance as not only a prerequisite for all work, but as a significant contributor to mission excellence. The Laboratory Director espoused his commitment to achieving world class safety performance, and all managers interviewed by the Team echoed that commitment. The strong support by managers was consistently echoed by most workers encountered by the Team. An open-door policy was readily apparent for managers.

At INL, managers are not just demonstrating their commitment to safety through words, but also through their actions. During walkthroughs of the major facilities and areas of INL with managers, workers frequently spoke with the managers, discussed current issues, and were

comfortable in their relationships with managers and supervisors. The managers' presence in the facilities, on a frequent basis, is an expectation not only to conduct formal management observations, but to understand and address workers' issues and concerns. BEA provides resources, both financial and personnel, to maintain the VPP effort as a standalone project that incorporates personnel throughout the laboratory. Managers and workers consistently use those resources in creative ways to foster additional improvement, educate employees, build camaraderie, and improve teamwork in all organizations.

BEA is actively participating in the Battelle "Communities of Practice," a process by which Battelle leverages its management role with multiple laboratories. This process is a learning practice that focuses on sharing best practices, implementing innovative business solutions, and developing future lab leadership through integrated talent management.

In 2009, BEA was using the Gallup Q^{12} Survey of Employee Engagement to proactively improve employee engagement. Since 2009, that survey has broadened and incorporates other organizational measures, including the Safety Conscious Work Environment. The results from the annual Safety, Leadership and Engagement survey are integrated with other "Bright Spot, Hot Spot" analyses of other indicators to identify potential issues and take proactive corrective actions. This approach is similar to a predictive approach being developed by Pacific Northwest National Laboratory, and is being shared through the Battelle Communities of Practice.

Commitment of resources for safety and health continued to be evident. For example, BEA was performing extensive repairs on sidewalks and walking surfaces across the site, including intown facilities, in preparation for the upcoming winter. New tools and equipment were available in many areas, such as the "Big Shop" in the Central Facilities Area (CFA). In many project areas, modifications of equipment related to research and development to improve safety were evident. 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 SMEs, these personnel are part of the work planning process, and no issues were raised regarding their availability.

BEA has been effective in managing subcontracted work. Laboratory-wide Procedure (LWP)-7201, *INL Construction*, and LWP-7205, *Subcontracted Work*, establish the procedures and requirements for subcontract management. BEA considers safety and health performance of the subcontractor during the evaluation and selection process. Subcontractors must follow the BEA safety and health plan. TRC and DART rates for subcontractors at INL are below the industry average. Requirements Document (RD)-1003, *Subcontractor Oversight*, establishes how INL oversees and enforces the safety and health programs at INL. RD-1003 allows for the prompt correction and control of hazards by BEA in the event that subcontractors or individuals fail to correctly control hazards. This document also allows BEA to dismiss the subcontractor from the site for willful or repeated noncompliance. RD-1008 establishes subcontractor training requirements and ensures that subcontractor and lower-tiered contractors possess the experience, knowledge, skills and abilities that are necessary to discharge their assigned responsibilities under the contract. The requirements of RD-1008 must be met prior to the execution of work. These processes collectively helped BEA subcontractors achieve a record of zero injuries in 2012, and thus far in 2013.

BEA managers have faced some challenges in the 4 years since the previous assessment. Diminishing Federal budgets have led to reductions in staffing across INL and the need for much tighter management of program costs. BEA has been working to prevent those budget reductions from creating unsafe conditions or production pressures for workers. One particularly pertinent example occurred recently when programs at ATR suffered a $5 million reduction. Managers and workers at ATR worked together to identify ways to reduce operating costs and absorb that reduction in funding without losing trained and qualified workers. BEA also worked with the customer to explain that further reductions in funding would lead to problems meeting future project targets and operational limitations at ATR. BEA was clear that it would not compromise its ability to safely operate ATR in order to meet mission goals.

As previously discussed, BEA is expanding the role of the Deputy Director for Nuclear Operations to include laboratory operations. This action is in response to recent events and observations indicating the need to improve formality of operations in the laboratory environments. Other actions in progress include a new Conduct of Research manual that will be issued in the near future and increased management presence in laboratory and research spaces.

In some cases, the experience and knowledge of the senior management team at BEA has led to managers implementing programs or processes without gaining support or buy-in from workers. Well-meaning actions or statements by senior managers are sometimes misunderstood by workers and lead to worker distrust of the managers' real intent. One case, in particular, continues to be a source of contention for some union leaders. Several years ago, BEA purchased equipment to evaluate workers' physical ability to perform critical job tasks. One person was sent for training and certified by the manufacturer to administer tests, recognize potential problems, and implement safety protocols. The equipment manufacturer advertises the equipment as an effective method of screening personnel prior to employment and evaluating work restrictions following an injury. BEA has effectively used this equipment in both situations, and even used it to assist workers in returning to work more efficiently. Unfortunately, BEA also expressed interest in using the equipment for incumbent testing, expecting it to identify potential problems that could lead to an injury. BEA thought performing such evaluations would help them keep workers from getting injured during their normal work. However, that use is not described in the manufacturer's literature, and there is no research or other analysis demonstrating that injury history at INL is related to conditions identified by the equipment. While that interest has not been implemented to date, nor have procedures or policies been established for incumbent testing, the previously existing distrust by some workers and union leaders make them suspicious that such testing might eventually be used to remove workers from their jobs.

A contributor to worker distrust has been the desire by some managers to reiterate company expectations for safety by distributing memorandums that employees must sign to acknowledge receipt. In many cases, the workers perceive these memorandums as a means to take action against them in the event that an accident or injury occurs. Although nothing in the memorandums specifically states that intent, and the content is derived from existing policies and procedures, managers might see better results by working closely with employees to identify alternative solutions and approaches that foster trust. For example, two power operators fell from utility bucket trucks within the past year with resultant injuries and lost worktime. In response, the power operators developed their own "Declaration of Inter-Dependence" and each worker signed it. That document committed them to raising their own personal expectations in order to keep themselves and their coworkers safe. The power operators were very proud of

their commitment, and this action was more meaningful to the workers than the previous three memorandums from managers outlining company expectations.

Finally, workers' distrust was compounded because, until recently, BEA was not actively promoting open and direct communication between union leaders and senior managers. Approximately 4 months prior to this evaluation, BEA began holding monthly meetings between union leaders, safety and health representatives, and senior managers to discuss safety issues and solutions. As a result of those meetings, union leaders are developing more trust in senior managers, although much work remains to be done. BEA managers should continue meeting regularly with union leaders and continue seeking opportunities to involve workers and their representatives in creating solutions to difficult safety and health issues.

Opportunity for Improvement: BEA managers should continue meeting regularly with union leaders and continue seeking opportunities to involve workers and their representatives in creating solutions to difficult safety and health issues.

Conclusion

Managers are visibly committed to creating and sustaining a culture of safety excellence at BEA. This commitment is demonstrated not only through support of safety initiatives, but more importantly through active participation and leadership by example. BEA managers should expand their efforts to improve communications and foster trust with the unions, and closely involve the unions in developing solutions to safety issues. BEA meets the expectations of the Management Leadership tenet of DOE-VPP as a Star participant.

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 welcomed. 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.

Employee involvement is the heart of the success of VPP within BEA. BEA has been a Star site since 2006 and has numerous employees who have served as Laboratory Employee Safety Team (LEST) or Employee Safety Teams (EST) chairpersons. These past chairpersons functioned as advisors to the EST to help keep the core of the VPP energized and in the forefront of the organization. Interviewees at the various facilities spoke proudly of VPP and the safety program at BEA. Employees emphasized that they can stop work at anytime, and many have stopped or paused work. Managers and employees share a common bond to work safely since workers know that managers will support their decision to stop work.

Charter (CTR)-26, *Employee Safety Teams (EST and LEST) Charter*, revised on April 25, 2013, establishes the purpose, structure, and procedures for the LEST and the individual ESTs. Supported by line managers and employee involvement, LEST is chaired by a staff employee, while a Vice-Chair is groomed for the Chair position (for the following year), and the former Chair remains on board as a LEST advisor (for as long as needed). The Vice-Chair is selected by the VPP office and sustained by a voting quorum of the LEST. The Vice-Chair becomes the Chair after 1 year, and finally becomes an advisor. That employee will have served in a leadership role for 3 years supporting VPP. The charter is silent on selection, election, or appointment of individual EST Chairs, but discussions with the VPP manager and EST members indicated that the process mirrored the LEST Chair appointment process. This strategy ensures knowledge, continuity, and commitment to VPP well after the tenure of the Chair.

Since the 2009 Team assessment, BEA reorganized ESTs to foster better lines of communication. In the former structure, employees belonged to an organizational EST. Attending EST meetings was difficult for deployed workers since they had to leave their assigned work area and travel back to the parent organization. After the 2009 assessment, the VPP manager retired. BEA selected a new VPP manager who solicited feedback from employees on potential improvements. Based on input from workers, BEA changed ESTs to geographical-based organizations. This change allows anyone working in a location or site to attend the meeting. Based on interviews with employees, geographical ESTs are more responsive to solving safety issues raised since the issues are within the responsible area of the EST. Also, employees can easily attend EST meetings, and they continue to receive safety information from their parent organization.

Currently, there are eight standing subteams within the LEST, and those are mirrored in the eight ESTs. The subteams include: (1) Safety Observations Achieve Results (SOAR); (2) Recognition and Promotion; (3) Inspections; (4) Injury Analysis and Trending; (5) Safety Improvement Plan (SIP) (Focus Areas); (6) Communications and Nucleus Neighborhood;

(7) Safety 24/7 (home and community); and (8) New Member Orientation. These subteams provide the continuity BEA employees feel they need to support the safety culture and employee involvement. The number of ESTs can change from year to year as shifts in organizations occur; thus, ESTs might merge or disband depending on needs.

The Team observed a monthly LEST meeting. It was a mandatory meeting for the LEST Chair and Vice-Chair, the LEST advisor, VPP management teams (all EST Chairs and Vice-Chairs, and Laboratory Management Team), LEST Leadership (VPP staff), and the eight standing LEST subteams. The meeting was open to everyone, and approximately 100 people attended during the Team's visit. The LEST meeting was carried out in a manner that effectively conveyed the safety message and encouraged all attendees to participate, often incorporating humor or other emotions to emphasize a point. For instance, an EST Chair dressed as a farmer called 'Popcorn Presley Egbert,' or 'PPE,' delivered a briefing on the five tenets of VPP. It was the capstone for the "Back2Basics Passport" campaign where employees received passport like booklets. The 'passport' contains the five tenets of VPP, and once all the activities for a tenet are completed, a destination stamp is marked in the passport. After all five tenets are completed, the employee is recognized and may receive prizes, such as pens and lanyards. Overall, the meeting was well attended and energized.

Each month, several topics are discussed at the LEST meeting, which in turn is discussed at EST meetings. The Team observed a workplace-focused topic briefing called, *Avoiding the Cutting Edge*. It emphasized the various sharp edges found at work, and encouraged workers to think about how to avoid cuts. The home safety topic focused on gun safety since hunting season is approaching. The presenter discussed the proper handling of guns, and several EST members shared stories about accidental gunshot injuries, emphasizing the safety message. Lastly, a presenter talked about avoiding impact with wildlife. It reminded employees that since the migration season has started, there could be large animals on the road in the early morning as people drive in to the site. The ESTs developed seasonal briefings on safety topics during the year to help employees think about the hazards for that time of year, and to help them plan on how to avoid them. Also, security shares and seasonal weather changes were presented at the LEST meeting and were later discussed at the individual EST meetings. All the presenters reminded the group that safety also extended to home activities. Each of the EST Chairs and the eight standing subteams described their teams' accomplishment of goals and participation in activities, such as community involvement, fund raisers, or safety celebrations.

Although not in the Charter, the VPP Manager began a LEST Collaboration Meeting, which meets immediately after the monthly LEST meeting. Attendees include the LEST Chair and Vice-Chair, the LEST advisor, all EST Chairs and Vice-Chairs, and the LEST leadership (VPP staff). This meeting covers various topics, including closing out the current fiscal year (FY) SIP to developing the new FY SIP, listening to feedback from employees, trying to keep the safety message fresh, and training individuals in VPP leadership roles. The training includes leadership development, self-improvement, project management, and scheduling. The VPP Manager gives the LEST and ESTs a budget to accomplish projects, and oftentimes books are read and discussed for leadership and self-improvement development. The Team observed this group discussing the book *Leadership and Self Deception: Getting out of the Box* (Arbinger Institute, Inc, 2010, Berrett-Koehler Publishers, San Francisco*).* The group at each meeting discusses a chapter from the book. The Team observed a very open discussion and the use of personal stories to convey the ideas of the book to fellow members and to better understand

themselves. Afterwards, the group continued to network and share ideas while having lunch at a local restaurant.

Most EST meetings are fashioned after the LEST meeting, but several facility ESTs used other strategies to enhance their VPP efforts. The Team visited five EST meetings and one EST subteam meeting. The meetings were well attended with good discussions as the meetings progressed. The CFA EST uses its subteams to allow safety discussions to occur at the working level and to resolve their local issues; if issues are beyond the scope of the subteams' authority, then they are elevated to the CFA EST for resolution. The subteams operate just like the LEST or EST, and they also pass along safety information that was presented at the two higher level meetings. There are currently eight subteams that report to the CFA EST. The Team also attended the MFC EST. Since MFC is large and diverse like CFA, the MFC EST developed a strategy of using "huddles." The MFC EST worked with the MFC Facility Manager to develop a list of meetings that are occurring throughout MFC. The MFC EST Chair, Vice Chair, or any MFC EST advisor attends those meetings to huddle with employees to increase contact with employees, pass along information, and understand issues they may be having. By attending other MFC group meetings, the MFC EST has increased participation from 80 employees per month, to approximately 300 employees per month. The MFC EST is using this attendance as a key performance indicator for its group. They plan to focus these huddles to ensure that shift personnel are also included. At the CAES-EROB EST, or C-REST, subcontractors are encouraged to participate in the EST. C-REST holds a monthly service subcontractor safety meeting for those companies who work at intown locations. The types of service subcontractors attending include: custodians, groundskeepers, carpenters, mechanics, plumbers, and landscapers. Additionally, there is a quarterly services subcontractor VPP meeting, and the subcontractors provide the presentations. BEA posts the LEST, LEST Collaboration Meeting, and all EST meeting minutes on the dedicated BEA VPP Web site.

At the Specific Manufacturing Complex (SMC), in addition to using SOAR, they have developed the "Fresh Eyes" program. While SOAR is a peer behavior-based safety observation system, the "Fresh Eyes" program focuses on work evolutions and the facility itself. It allows another person, not familiar with the area, to walkdown the facility and observe conditions that have been missed by the workers in that area; i.e., a tripping hazard that has been overlooked because workers are too familiar with their environment. The "Fresh Eyes" program has been successfully used for more than 6 years.

BEA employees can be tasked through several funding sources and/or contracts to provide services. As BEA executes contracts, the time spent on a project is billed to that contract. During discussions with employees that bill to certain contracts, they thought attending VPP events could not be billed to their client, so they do not participate in VPP. BEA should provide a mechanism that allows employees to participate in VPP regardless of what funding source or contract they support.

Opportunity for Improvement: BEA should provide a mechanism that allows employees to participate in VPP regardless of what funding source or contract they support.

Conclusion

BEA has developed and implemented mature programs to involve employees in the safety program at INL. Employees are empowered to take ownership of VPP. Restructuring ESTs into a geographical-based system has increased employee involvement and the tenure of EST, and LEST Chairs strengthens the VPP core within INL. The use of subteams at CFA and huddles at MFC are innovative ways to increase participation and involvement. BEA demonstrates a continued strong commitment to Employee Involvement as a significant element of safety and continues to meet the expectations for participation in DOE-VPP at the Star level.

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.

BEA's process for evaluating hazards, controls, and incorporating them into work documents and procedures have not significantly changed since the previous assessment. The work control process at BEA is via two work management processes. LWP-21220, *Work Management*, applies to operations and laboratory research, and LWP-6200, *Maintenance Integrated Work Control Process*, applies to maintenance work activities. 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. In addition to LWP-21220 and LWP-6200, LWP-7201, *INL Construction*, is applicable to all construction service subcontracts, and Decontamination and Decommissioning (D&D) work performed for BEA. These procedures set the minimum controls through a risk-based graded approach where there is a need for greater analysis and control. Most work documents reviewed by the Team were comprehensive and complete. For example, the Team reviewed the recovery actions and processes to remove a highly radioactive pellet lodged in a vent tube at ATR. The identification of hazards, analysis, and controls selected to minimize dose to workers were very effective. Significant reductions in radiation exposure were achieved through rigorous analysis and collaboration between workers and management (see Hazard Prevention and Control).

The Hazard and Risk Planning System (HaRPS) tool continues to be used as a key component of hazard identification and analysis process for BEA. HaRPS is a computer-based 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 use HaRPS as the fundamental hazard analysis screening tool.

Refinements to the process have occurred over the past 3 years and discussions with BEA personnel indicated that HaRPS is undergoing improvements intended to focus the process on tasks rather than its current broad approach. When necessary, HaRPS provides fields that allow documenting any hazard analyses performed that identify a specific or unique control selection.

Embedded within the HaRPS/work control process are triggers to solicit direct input from safety professionals. For example, if a particular chemical is considered for use, HaRPS requires input from the industrial hygienist. The industrial hygienist reviews the Hazard Assessment Sampling System (HASS) database for past use, sampling data, and recommended controls. The HASS database contains the hazard baselines, and the industrial hygienists review the baseline for information to support their decision.

The HaRPS software has been updated since the last VPP review to be more user-friendly and includes surveys and record information that was previously only available on a paper system.

Interviews with BEA industrial hygienists confirmed that the improvements are beneficial and simplify their ability to input and retrieve information.

During the last review, the Team identified opportunities to improve and document the hazard analysis for work performed at BEA. BEA has been developing a better process to achieve that goal, and BEA is continuing to work this issue. During this review, the Team observed and discussed the involvement of employees in the development of work documents with the planning staff. Preuse and prestartup activities are more rigorous, in many cases requiring ready-to-work reviews where workers and supervisors walkdown the job again, ensuring material is available to complete the work, and the documentation is complete. Work cannot be authorized until the ready-to-work review is complete. Once work is authorized, prejob briefings occur prior to commencing work that reminds employees about jobscope, hazards, and controls. Interviews with employees validated that the process is consistent with the description of improvements provided by BEA work control managers and supervisors.

The Team reviewed LI-FM-015, *Vehicle and Equipment Painting and Using the Breathing Air System*, LI-165 RTC, *General Carpenter Shop Work*, and LI-196, *Shop Work, Carpenters*. Most LIs exhibited a thorough explanation of scope, hazard, and control selection. However, during the review of BEA work documents, the Team found some work task definitions and directions broadly written and not specific to a particular task. The projected improvements by BEA should address this issue, but the information provided to the Team did not include a specific path forward to document the hazard analysis for low hazard or skill-of-craft work. Recently, a worker fell from a from a bucket truck performing an activity that was assumed to be low risk, skill-of-craft work. Because BEA did not analyze and document the hazards associated with workers climbing the bucket trucks to access the bucket, it did not analyze or mitigate the fall hazard. After investigating the event, BEA modified the trucks to include handholds and rails to provide the worker a means to steady themselves as they climbed toward the bucket. BEA should continue to work toward performing and documenting hazard analysis for all work.

The Team performed a walkdown of the instrument calibration shop and observed that a solvent is used to clean air pressure gauges within the shop. Approximately 12 low-pressure gauges and 2 high-pressure gauges are cleaned at one time, using about 2 to 6 milliliters, respectively, of solvent per gauge to flush out debris from the gauge interiors prior to calibration. Originally, shop technicians used a Freon-based cleaner for all gauges, but switched to the solvent to reduce emission of ozone-depleting chemicals. Freon is still used for cleaning oxygen gauges. Although less hazardous, the current solvent contains multiple hazardous components, each of which has an individual exposure limit, and the Material Safety Data Sheet recommends an industrial hygiene (IH) evaluation and general dilution ventilation or local exhaust ventilation. LWP-14603, *Industrial Hygiene Assessment*, offers an appendix to calculate a Hazard Prioritization Number (HPN) based on the quantity of material, frequency of use, and the health hazards associated with the material. The industrial hygienist evaluates the chemical use with the user and determines the entries into the HPN calculation. The resulting HPN only requires sampling for high HPNs and leaves lower HPN values to the discretion of the industrial hygienist. BEA intends this process to help the industrial hygienists prioritize their efforts to those chemicals presenting the highest risk. Although the industrial hygienist's input numbers to the HPN calculation are captured, the system does not capture the basis for those individual inputs that lead to the final HPN determination. In the solvent example, the industrial hygienist did not document the quantity of solvent, did not describe the airflow in the laboratory, and did

not compare the health risk number of the solvent (National Fire Protection Association (NFPA) label) to the health risk number in the HPN calculation. The BEA industrial hygienist determined the solvent had a medium HPN that did not require further assessment. The Team performed an evaluation using the BEA procedure and arrived at a *high* HPN that would have required a more detailed analysis. Without documenting the details of the HPN determination, BEA makes it difficult for the end-user to fully understand the important parameters of the analysis, or know when procedure or practice changes require another evaluation. BEA should continue to work toward documenting hazard analysis for all work that identifies assumptions, locations, work methods, or other parameters that define why identified controls ensure that all work is performed safely.

Opportunity for Improvement: BEA should continue to work toward documenting hazard analysis for all work that identifies assumptions, locations, work methods, or other parameters that define why identified controls ensure that all work is performed safely.

BEA collects performance data and observations from multiple sources. Management assessments, participation in promotional activities, SOAR observations, radiological incidents, exposure reports, IH sampling, implementation of the Integrated Safety Management System, occupational injury and illness data, training, LEST attendance, at-risk behaviors, and employee wellness programs are just a few of the areas tracked by BEA. During this review, BEA safety professionals told the Team that they are evaluating options to better report, capture, and trend performance data.

In the past 3 years, there have been 21 cases of slip, trip, or fall injuries at INL that were reported in the Computerized Accident Incident Reporting System (CAIRS). Some of the injuries involve slipping on icy surfaces. BEA ES&H staff are aware of these injuries, and an over-the-shoe product called Yaktrax© is available to all BEA employees. Yaktrax© slips over the shoe and improves traction when walking over ice and snow. Training on Yaktrax© is available to all BEA employees. In an effort to further reduce injuries from slips, BEA evaluated bringing a mobile slip simulator from Los Alamos National Laboratory, but determined that effort was cost prohibitive. Current BEA training already contains critical elements of the slip simulator training, and BEA continues to evaluate other approaches to reducing slips, trips, and falls, especially during winter weather.

BEA investigates accidents and incidents to determine causes and corrective actions using LWP-9301, *Event Investigation and Occurrence Reporting*. The result of the BEA investigative process produces a written report that is available to all employees and where required, corrective actions are tracked to completion in the INL Issues and Corrective Action Management System (ICAMS). One union representative is trained in accident/incident investigation and participates through all phases of the process. If information or expertise from a specific craft is needed in the investigation, craft personnel are invited to attend and participate in the process.

Conclusion

BEA continues to improve and consistently seeks ways to improve its hazard analysis processes. Extra effort should be taken to document the linkage between hazard analysis and the selected controls and to clearly communicate the reason for control selection to the workers. Hazard analysis improvements are planned that, when finalized, will facilitate BEA's continued quest for

excellence. BEA meets the expectations of a Star site in the Work Site 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, 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.

BEA follows the hierarchy of controls to eliminate, mitigate, or protect the worker against the potential for exposure to many types of industrial, chemical, and radiological environments and materials. Laboratory Requirements Document (LRD)-14001, *Safety and Health Program*, states: "Hazard control methods shall be selected based on the following hierarchy…Elimination or substitution of the hazards where feasible and appropriate...Engineering controls…Work practices and administrative controls that limit worker exposures…Personal protective equipment." The Team observed numerous examples of hazard elimination, substitution, administrative controls and PPE.

BEA has implemented many engineered solutions to eliminate hazards to the workers. For example, at ATR, two large valves from beneath the reactor required maintenance. The valves needed to be removed and transported up a steep set of stairs. In the past, workers moved these valves with winches and sleds to slide the valves up the stairs. BEA procured a battery operated, tracked, remote controlled, motorized hand truck (Track-O) to move the valves up the stairway. The new approach only required the workers to secure the valves to the flatbed on the Track-O and the machine did the rest. The operator used a remote control to guide the machine up the stairway so the valves could be removed from the building. As a result of choosing this option, BEA did not have to construct a winch system and use sleds to move the valves up the stairway, eliminating worker exposure to lifting, pinch points, or ergonomic hazards associated with the construction and operation of the winch system.

In the ATR machine shop, the industrial hygienist, painter, and other workers described the process employed to remove paint from components. Working together, the industrial hygienist and workers developed a process to use a hierarchy of methods. The method used depended on the component and the difficulty of paint removal. The first consideration was sanding off the paint, if feasible, depending on the paint (i.e., leaded versus nonhazardous enamel) and component (i.e., precision, intricacy). If sanding was not feasible, the next choice was a nontoxic, citrus-based removal agent. The process continued all the way to the use of methylene chloride as a removal agent. Methylene chloride requires multiple controls due to its carcinogenic properties and its use requires following a specific procedure, LWP-14605, *Carcinogens,* to ensure the safety of the worker and the workplace. BEA's hierarchical approach to the activity resulted in a thoroughly analyzed hazard analysis that effectively accomplished the safe removal of paint while reducing the workers' exposure to unnecessary hazards.

During this assessment, the Team observed BEA workers consistently wearing appropriate PPE while performing work. In one case, the Team observed workers inside a hot cell removing waste material during a cleanout evolution. Workers were wearing clear plastic, air-supplied hoods for protection against airborne radioactive contamination and Tyvek® protective suits to minimize the potential for contamination reaching the skin. The Team also observed craft

workers in shop areas routinely wearing PPE. Face shields and hearing protection were in use during the operation of large cutting machines. Machine guards were in place and in good condition. Signs were evident warning other workers of noise hazards when machinery was operating.

A procedure currently in the development stage is a Web-based process to improve worksite analysis associated with research-related work activities. BEA briefed the Team on the new procedure, LWP-20000, *Conduct of Research*. The new procedure was developed as a result of the lessons learned from the Alkaline Metal Reformer Molten Salt Gasification event that occurred in February 2013. A buildup of pressure caused an ejection of steam and molten salt through a space in the top of a reaction vessel. The steam and molten salt struck a researcher standing near an open access door burning portions of his left arm, shoulder, left side of the face, and portions of his chest. The investigation found managers accepted behaviors that did not meet laboratory expectations for performing greater than low hazard work, and researchers performed work outside the workscope established in laboratory instructions. The contributing factors included less-than-effective instructions for identifying hazards, a weak work and authorization process, lack of rigor associated with hazard mitigation, and a failure to follow the work management procedure. The procedure development included input from the majority of the research community and documents how researchers analyze risk, prepare work control documents, request permission to execute work, perform walkdowns in laboratory spaces, seek feedback, integrate crosscutting topics, and improve the awareness of hazards in laboratory workspaces. BEA expects to implement LWP-20000 by December 2013.

Most employees interviewed did not indicate any fear of retribution for pausing, stopping, or questioning work. However, in one case, workers, supervisors, and managers had allowed a hazardous condition to develop in a carpenter shop at MFC rather than stopping or pausing work until the condition was resolved. The storage of material awaiting release for installation presented tripping and bumping hazards identified by both workers and managers. When the Team questioned why this situation was not resolved, workers stated that they felt they could work safely, and that there was no other place to store the materials. Managers were aware of the condition, but did not step in to correct the situation. After the issue was raised by the Team, all stored material presenting injury potential was moved out of the carpenter shop to a proper storage location. BEA should ensure that all employees are engaged in hazard identification and resolution of potentially injurious situations, resist working around hazards, and that managers do not tacitly accept hazardous conditions through inaction.

Opportunity for Improvement: BEA should ensure that all employees are engaged in hazard identification and resolution of potentially injurious situations, resist working around hazards, and that managers do not tacitly accept hazardous conditions through inaction.

Because the 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. Earlier this year, ATR encountered an unexpected condition created by a Colbalt-60 pellet (approximately 4,000 Rem/hour contact) lodged in a vent tube as a transport cask was being vented. Per procedure, the workers immediately evacuated the area and BEA developed a recovery plan. The recovery plan included both engineered controls to shield the workers and administrative controls to minimize exposures. Using the recovery plan, BEA successfully removed the tubing and the pellet and placed the equipment in a shielded container. The deep

dose estimates for this work were 1,200 millirem total exposure to workers. By using robotics, shielding, mockups, training, video cameras, and long-handled tools as described in the recovery plan, the total exposure was only 345 millirem, or 75 percent lower than expected.

BEA frequently evaluates its Radiation Protection program and makes refinements to ensure that radiological exposures are maintained as low as reasonably achievable (ALARA). Discussions with the Radiation Protection Program Manager indicated that future improvements include redefining the radiation work permit (RWP) process to make RWPs more user-friendly and eliminate unnecessary information currently included in RWPs. Currently, some RWPs are up to eight pages in length.

BEA needs to continue efforts to improve its postjob reviews. Conversations with workers indicate that postjob reviews are not typical for minor work evolutions. BEA has a requirement for followup reviews (i.e., postjob reviews) in LWP-9201, *Briefings*. Most interviewed workers did not remember participating in a postjob review for low hazard work. BEA should strengthen its postjob review process by training supervisors to perform good postjob reviews, tracking postjob reviews, and linking postjob reviews to supervisors' performance evaluations.

Opportunity for Improvement: BEA should strengthen its postjob review process by training supervisors to perform good postjob reviews, tracking postjob reviews, and linking postjob reviews to supervisors' performance evaluations.

The INL Occupational Medicine Program has remained unchanged since the last review. It continues to provide services to all INL employees, including INL subcontractors, and DOE employees. The medical facilities are geographically located to provide rapid and effective response to employees. Occupational Medicine providers occasionally visit the workplace, are involved with clinical evaluations, employee assistance, wellness programs to promote healthy lifestyles, and administer claims and benefits for work-related injuries and illnesses. They also perform preplacement physicals, periodic physicals, Health Profile Assessments, return-to-work evaluations, nonacute occupational injury and illness, and acute illness evaluation and referral. Overall, the Medical Program remains comprehensive and the physicians and technicians are highly qualified and able to respond to any medical emergency.

BEA has a comprehensive Emergency Preparedness program in place. An Emergency Operations Center (EOC) is located in town that has excellent communications capability, modern computer systems, and designated seating areas by position. Many of the capabilities of the EOC are mirrored at local Emergency Communications Centers (ECC) located in the CFA and ATR. The Emergency Director duties rotate among a cadre of qualified managers. The EOC and ECCs are exercised on a regular basis, including during actual emergencies, such as wildland fires. The emergency response capability at INL is provided by the site fire brigades and the security forces. Three onsite fire stations are well manned and equipped to handle the range of emergencies experienced at INL over the years. Onsite training facilities for fire fighters and security personnel provide a range of realistic training courses. Fire fighters and security personnel have access to excellent physical training facilities, and are provided time to use those facilities while on shift. The emergency responders are supported by state-of-the-art communications equipment that interfaces with local authorities. All facilities onsite participate in regularly scheduled drills that include both evacuation and shelter-in-place responses.

Discussions with workers and managers indicated that access to safety professionals is effective and meets the needs of the workforce. The Team observed workers and safety professionals conversing, and jointly resolving issues at MFC. Safety professionals at the ATR shop indicated that some of their best resources were the experience and knowledge that craftsmen bring to the workplace. Craftsmen and planners interviewed did not express any problems with access to SMEs to assist them with technical issues, regulatory questions, or hazards encountered in the workplace. The ES&H support for workers is readily available.

Discussions with planners and managers indicate that the procurement of material is increasing as the end of the fiscal year approaches. This has led to a backlog of requests for work plans to install new equipment or upgrade existing facilities. The maintenance backlogs are minimal and priorities are established and assigned relative to potential safety hazards and work importance as determined by project or program management. For planned and unplanned emergent work, planners indicated that craft workers, engineers, and ES&H professionals participate in the work package development with upper management approval as needed.

The Team did not encounter or observe any significant changes in the BEA safety and health rules. The BEA expectation for employees continues to be that they follow company rules to produce a safe and productive work environment. The Team did not observe any significant changes to the BEA disciplinary system since the last review. The use of positive reinforcement and recognition for promoting safe behaviors is clearly visible across all facilities.

Conclusion

The hierarchy for hazard control selection is evident. Work observations demonstrated effective use of PPE. The Team encountered multiple examples of professionals and workers solving issues together. BEA continues to reevaluate and improve the radiation protection program, identification and analysis of control selection, conduct of laboratory research, and engagement of the workforce in developing solutions. These efforts demonstrate BEA's commitment to continuous improvement. BEA continues to meet the expectations of the Hazard Prevention and Control tenet of DOE-VPP as a Star participant.

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.

Program Description Document (PDD)-12005, *INL Training,* defines the training program. The INL training program is performance-based and uses a systematic and graded approach to training. Eleven LWPs identify the INL training program requirements, and 12 training job aids help managers and employees implement the training process. BEA requires managers to create and maintain individual training plans (ITP) for all employees. These ITPs identify the initial and continuing training requirements based on the employee's job functions, as well as any professional development activities or additional training needs identified by the respective manager. BEA policies, procedures, and associated job aids create a systematic approach to training, require ITP updates, and provide instructions and links to forms for completing an employee's ITP.

BEA developed the Training Records and Information Network (TRAIN), a computer-based program system to track training requirements and completions. Each organization has an assigned training coordinator. The training coordinators send 90-day, 60-day, and 30-day e-mail reminders to the employees and their supervisors for upcoming required 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 is required to be revised any time the employee's jobscope changes. The Team's review of training records demonstrated that employees, supervisors, and training coordinators are effectively using the TRAIN system and completing their training requirements.

Interviews with employees demonstrated that they understand the process for identifying their specific training needs as described above, and had access to and reviewed their training records in TRAIN. They discussed the importance of training to ensure they understand and are qualified to mitigate the hazards of their job. In one case, two Fuel Manufacturing Facility workers stated that new chelation therapy and transuranic hazards training now provide significantly more information of the hazards associated with their work and might have prevented an event in 2011 where workers were exposed to airborne plutonium at the Zero Power Pulse Reactor.

Employees know their training coordinator by name and stated that they routinely discussed training needs, training progress, and training effectiveness. They repeatedly stated that their training coordinators were integral in ensuring that the hazards associated with their work were understood and that they were appropriately trained for the work. Worker interviews demonstrated that they valued their working relationship with their respective training coordinators and that they considered that relationship a vital part of the training program.

While employees stated their training was effective, in some cases workers questioned the value of some training requirements. Specifically, many workers believe they are being trained beyond their scope of work for lock-out/tag-out. Many employees are required by their ITP to complete a very rigorous lock-out/tag-out training course, but rarely perform lock-out/tag-out

duties. The BEA lock-out/tag-out procedure establishes two levels of qualification for workers: Authorized Employees or Authorized Employees (limited). Training managers agreed that too many employees were authorized employee lock-out/tag-out trained and supervisors and managers are in the process of reevaluating their workers actual training needs for lock-out/tag-out based on their work. Similarly, some craft employees commented they were required to take fire watch training that they never use. The requirement to train most craft in fire watch training was a conscious management decision to ensure sufficient fire watches were available to support welding work. The training manager recognized that BEA should communicate changes and expectations for fire watch and lock-out/tag-out training requirements to workers.

The training at INL includes on-the-job training (OJT), interactive, classroom, and system training. Experienced operators or SMEs mentor new employees assigned to use equipment. To verify competency, they are required to successfully complete an oral board examination and demonstrate proficiency in operation of the equipment. Upon completion of OJT, employees receive qualification cards with an expiration date. OJT records are maintained in TRAIN, and can be readily accessed to verify qualification.

INL's interactive training includes several dynamic learning centers located in major areas of the site, including the Willow Creek Building. Dynamic Learning Centers contain static displays and exercises for students to complete. For example, the Dynamic Learning Center in the Willow Creek Building consists of 18 displays, 8 for managers and supervisors, and 10 for workers that provide hands-on training simulating realistic conditions. Employees are paired with individuals they normally do not work with to provide a mild level of stress. They perform exercises that include a display on slips, trips, and falls; hoisting and rigging; lock-out/tag-out; elevated work; fitness for duty; and human performance improvement. The exercises encourage workers to think about each situation, promote teamwork, constructive feedback, and improved hazard identification.

The Team observed system training at CFA with the closed loop simulator used for lock-out/ tag-out training. A craft employee who had just completed the practical lock-out/tag-out training explained that the hands-on training was challenging and realistic. The Team noted several simulated conditions made the closed loop simulator very realistic, including equipment label tags partially worn and hard-to-reach valves. The Team also observed the bus driver simulator training at CAES. Bus drivers use the simulator to improve their driving efficiency and promote safe driving habits. The actual routes the drivers travel have been programmed into a simulator with their buses' performance characteristics. With 30 percent of the drivers having trained on the simulator, the fleets' fuel consumption has improved from 5.9 miles per gallon (mpg) to 6.35 mpg. One driver's fuel efficiency had improved to over 7 mpg. The bus drivers and their supervisors receive advanced driver's training that included classroom and practical training. The INL bus pools drive approximately 3-million miles a year and have not had a moving accident in 2 years. Without the bus service, BEA estimates that the additional drivers and vehicles on the road could result in up to three traffic-related fatalities per year.

INL has developed a rigorous training/mentoring program to develop supervisors and managers. For example, a 3-day course, *Front Line Leadership Fundamentals*, targets supervisors, foremen, technical leads, and first-time leaders. Supervisory training includes mentoring by an assigned manager to foster the supervisor's strengths and address weaknesses. The course is designed to cultivate common understanding, practice and appropriate application of:

- INL's management model, principles, and values;
- Roles and responsibility leadership;
- Clear expectations on performance management framework to work and coach employees;
- INL's supervisory resources, policies, processes, and practices (this includes fitness for duty, formal discipline, time and attendance, lessons learned, workplace violence, etc.); and
- Fundamentals of supervisory practices that encompass several training activities on developing teamwork, employee skills, employee leadership, and situational leadership.

Another class, *License to Lead,* is targeted at supervisors, managers, or workers that require, may require, or want to participate in a 5-day interactive leadership experience that provides essential skills and knowledge for succeeding as an enterprise level leader. This course covers INL's mission/business; six guiding performance management elements; elements involved in creating engagement, empowerment, alignment, and collective accomplishment of a task or scope; and using these skills to increase ones leadership effectiveness and influence. This course includes a 30-day project in which participants are assigned an element of performance management, and directed to go back to their respective workgroups and "influence" the elevation of the assigned element. The class participants then return in 30 days and present to each other and managers:

- What they did to influence;
- What the results were; and
- What they believe was helpful and not helpful.

The class participants and managers then review successes and areas for improvement.

Managers participate in *Mandate to Manage,* an 8-day management training activity that includes a 20-day application project. This course was originally designed to provide an overview and orientation of INL's business systems, functional organizations, programs, and resources. BEA recently enhanced the *Mandate to Manage* course to provide greater competency in planning, organizing, staffing and capability development, performing management functions, processing management, and controlling performance. A whole day addresses the area of ES&H. The topics covered include:

- Developing safety conscious culture roles;
- Conducting lessons learned discussions, which apply to their respective work;
- Addressing injuries and illnesses, and how to secure an accident scene; and
- Managing environmental stewardship.

The 20-day application project requires attendees to apply learned objectives to their respective job function. The *Mandate to Manage* training activity was recently expanded to provide a wide range of needed management training, exercises, and a final exam to evaluate the manager's knowledge of the material presented that was used to identify developmental gaps.

Conclusion

INL uses an effective systematic approach to training. The procedural flow from the PDD to the implementing of LWPs and training job guidance documents is logically linked and followed. INL's method to track employee's training requirements is systematic and used by employees, supervisors, and training coordinators to ensure employees receive the right training for the work hazards. The craft employees and their respective training coordinators have an excellent

working relationship and routinely had open communication on training needs, statuses, and training effectiveness. The use of simulators, training practicals, and hazardous training mockups improve learning and lead to safe work practices. Supervisory and management training has recently been expanded and provides a wide range of needed management training. BEA meets the expectations of the Safety and Health Training tenet of DOE-VPP as a Star participant.

VIII. CONCLUSIONS

BEA continues to demonstrate excellent management leadership and employee involvement in its safety and health programs. The extensive participation by workers in employee safety teams and workers' willingness to pause or stop work to ask questions and address safety issues demonstrate a healthy respect for hazards and a mutually beneficial understanding of safety as a prerequisite for all work. Some events have occurred in the past 2 years that indicated some complacency, but all personnel are working together to identify effective actions and refocus efforts on safely accomplishing INL missions. Managers face an ongoing challenge to restore and maintain some workers' trust in some cases, and should work to be more inclusive of unions when implementing changes. The Team recommends that BEA continue to participate in DOE-VPP at the Star level.

Appendix A

Onsite VPP Audit Team Roster

Management

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