Babcock & Wilcox Technical Services Y-12, LLC
Y-12 National Security Complex

Report from the Department of Energy
Voluntary Protection Program
Onsite Review
April 10-19, 2012

U.S. Department of Energy
Office of Health, Safety and Security
Office of Health and Safety
Office of Worker Safety and Health Assistance
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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 implementation by 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. HSS is expanding complex-wide contractor participation and coordinating DOE-VPP efforts with other Department functions and initiatives, such as Enforcement, Oversight, and the Integrated Safety Management System.

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

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

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

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

This report summarizes the results from the evaluation of Babcock & Wilcox Technical Services Y-12, LLC, during the period of April 10-19, 2012, and provides the Chief Health, Safety and Security Officer with the necessary information to make the final decision regarding its participation in DOE-VPP.

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ABBREVIATIONS AND ACRONYMS

AED	Automated External Defibrillator
AFL-CIO	American Federation of Labor and Congress of Industrial Organizations
AJHA	Automated Job Hazard Analysis
ALARA	As Low As Reasonably Achievable
ATLC	Atomic Trades and Labor Council
B&W Y-12	Babcock & Wilcox Technical Services Y-12, LLC
BBS	Behavior-Based Safety
BLS	Bureau of Labor Statistics
CBDPP	Chronic Beryllium Disease Prevention Program
CBT	Computer-Based Training
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
DART	Days Away, Restricted or Transferred
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DSA	Documented Safety Analysis
EMBOS	Electronic Medical Business Operations System
ES&H	Environment, Safety and Health
FIS	Facilities, Infrastructure, and Services
FY	Fiscal Year
GET	General Employee Training
HAZCOM	Hazard Communication
HEUMF	Highly Enriched Uranium Materials Facility
HIW	Hazard Identification Worksheet
HPI	Human Performance Improvement
HSS	Office of Health, Safety and Security
IH	Industrial Hygiene
IRB	Indirect Review Board
IS	Industrial Safety
ISO	International Organization for Standardization
ISMS	Integrated Safety Management System
JHA	Job Hazard Analysis
KBCTC	Knoxville Building and Construction Trades Council
MSDS	Material Safety Data Sheet
MTC	Metal Trades Council
NAICS	North American Industry Classification System
NNSA	National Nuclear Security Administration
OEA	Occupational Exposure Assessment
OHS	Occupational Health Services
OJT	On-the-Job-Training
OSB	Operational Safety Board
OSHA	Occupational Safety and Health Administration

PPE	Personal Protective Equipment
R&D	Research and Development
RADCON	Radiological Control
RAR	Radiological Awareness Report
SME	Subject Matter Expert
Team	Office of Health, Safety and Security DOE-VPP Team
TRC	Total Recordable Case
TSR	Technical Safety Requirement
USW	United Steelworkers
VPP	Voluntary Protection Program
VPPCC	Voluntary Protection Program Champions Committee
Y-12	Y-12 National Security Complex
YSO	Y-12 Site Office

EXECUTIVE SUMMARY

Babcock and Wilcox Technical Services Y-12, LLC (B&W Y-12), is a partnership between Babcock and Wilcox Company and Bechtel National, Incorporated, that manages and operates the National Nuclear Security Administration's (NNSA) Y-12 National Security Complex (Y-12). Y-12's national defense missions focus on weapon components, production of nuclear weapon secondaries, and prevention of the spread of weapons of mass destruction.

B&W Y-12 submitted its application to the NNSA Y-12 Site Office (YSO) for participation in the Department of Energy (DOE) Voluntary Protection Program (VPP) in December 2011. YSO reviewed and concurred with the application and forwarded it to the Office of Health, Safety and Security (HSS). The Office of Worker Safety and Health Assistance, within HSS, reviewed the application and scheduled an onsite assessment from April 10-19, 2012. This report documents the results of that assessment and provides the HSS DOE-VPP Team's (Team) recommendation regarding B&W Y-12's participation in DOE-VPP to the Chief Health, Safety and Security Officer.

B&W Y-12 employs approximately 4,600 workers consisting of managers, supervisors, administrative support, engineers, other professional staff, and roughly 1,200 labor and craft personnel. Additionally, there are approximately 2,500 support contractors, vendors, and visitors to the site each year. Three unions present at the site represent craft and labor personnel. The Atomic Trades and Labor Council (ATLC) represents the production and maintenance crafts. The Knoxville Building and Construction Trades Council (KBCTC) represents construction crafts, and the United Steelworkers (USW) represents a small group of high voltage electricians. All three unions strongly expressed their support for B&W Y-12's participation in DOE-VPP.

During the assessment, the Team was able to observe the full range of activities at Y-12 and had contact with many workers, supervisors, and managers. Overall, accident and injury rates are far below the comparison industry. Further, there was no indication that workers were in any way discouraged from reporting all injuries, no matter how minor. Statistical rates to date for 2012 are far below the 2011 rate and represent a step change largely attributed to the DOE-VPP pursuit.

B&W Y-12 has a strong management team that understands and demonstrates the necessary leadership qualities to advance a strong safety and health program. They recognize VPP as an effective investment to foster excellence and continuous improvement. They consistently act in concert with that commitment, and have formed a trusting partnership with the workforce.

B&W Y-12 employees are fully aware of their safety responsibilities and look out for their coworkers' safety. They are fully empowered to pause or stop work without fear of reprisals. The employee teams provide employees with an avenue to express their safety concerns and ensure timely resolution. They have multiple avenues for meaningful involvement in the safety and health program. While some employee teams function well, most could improve by emulating the more successful teams. Managers should continue to emphasize employee ownership as employee teams mature.

B&W Y-12 has a documented system to evaluate the hazards encountered by workers at the site. Interviewed workers understood the hazards in the workplace and were able to demonstrate adherence to effective controls to mitigate those hazards. B&W Y-12 is working on corrective actions and improvements on work control and hazard analysis issues identified by the Defense Nuclear Facilities Safety Board in 2011. Those process improvements have not fully matured, but improvements are ongoing.

B&W Y-12 demonstrated an effective hazard control process. The effective use of substitution and engineered controls was evident. While the Team identified one issue regarding adherence to its beryllium procedure, the majority of observations indicated an effective hazard control process. B&W Y-12 is addressing aging facility issues through its maintenance program while awaiting construction of newer facilities. B&W Y-12 has implemented an effective wellness program that has achieved measureable results and significant cost savings.

B&W Y-12 has a systematic approach to training that appropriately prepares and qualifies employees prior to performing work. The employees believe they are well prepared to perform their job safely. B&W Y-12 maintains training electronic records that are accessible to the employees, supervisors, and managers. All of the employees' records examined were current.

B&W Y-12 has established a strong safety and health program. Since winning the contract in 2000, it has steadily implemented a series of program improvements that resulted in excellent safety performance and strong support and trust of the workforce. The strength of the management team and commitment to safety and health excellence, in some cases, masks the active worker involvement, making it difficult for the Team to determine where management leadership ends and employee involvement begins. However, workers interviewed by the Team were equally committed. Improvements in work planning and control and hazard analysis, particularly in the research and development processes, address weaknesses commonly seen elsewhere in the DOE complex and provide excellent examples for others to follow. B&W Y-12 has established itself as a strong community member and is reaching out to the surrounding areas to expand safety awareness and safe work practices to work and home. Its commitment to reinvest cost savings from process improvements has produced additional savings and improvements in worker health and morale. Although the Team identified some opportunities for improvement, it is confident in its recommendation that B&W Y-12 be admitted to DOE-VPP at the Star level.

TABLE 1

OPPORTUNITIES FOR IMPROVEMENT

Opportunity for Improvement	Page
B&W Y-12 should work with the unions to establish a formal charter clearly defining the roles, responsibilities, and authorities for safety representatives.	8
B&W Y-12 should find ways to encourage employee teams to become more self-directed and creative in their approach to improvements.	11
B&W Y-12 planners and supervisors should ensure that hazard analysis is current, accurate, and supports the work packages before work is authorized.	16
B&W Y-12 should continue its work toward eliminating AJHA as work instructions. Improvements to consider include inserting a column in the AJHA report that links the rationale for hazard selection to the hazard and describes why that control was selected (analysis), and eliminating generic descriptors in the AJHA and work documents (adequate, proper) that leave the final analysis to the worker.	16
B&W Y-12 should update the injury and illness files to reflect the findings of NNSA and HSS Office of Corporate Safety Analysis, assign the responsibility for recordkeeping decisions to a single, knowledgeable person on the Case Management Panel, and continue to improve supporting documentation in the case files.	17
B&W Y-12 needs to continue evaluating the fire retardant clothing issue and address the vendor's use of peroxide in conjunction with fire retardant clothing. B&W Y-12 should perform surveillance verifications to ensure the laundering practices of UniTech Services Group and the Y-12 laundry service meet specifications and recommendations of the independent laboratory.	20
B&W Y-12 should carefully review the work processes and procedures using rotating equipment to identify engineered controls that eliminate the exposure of the worker to rotating equipment, permitting workers to wear the appropriate protective clothing to reduce the risk of skin contamination.	21
B&W Y-12 should address the potential for beryllium hazards for the inactive stack monitoring cabinets.	21

I. INTRODUCTION

Babcock and Wilcox Technical Services Y-12, LLC (B&W Y-12), is a partnership between Babcock and Wilcox Company and Bechtel National, Incorporated, that manages and operates the National Nuclear Security Administration's (NNSA) Y-12 National Security Complex (Y-12). Located in the Bear Creek Valley of East Tennessee, the site is adjacent to Oak Ridge, Tennessee. Initially built as part of the World War II Manhattan Project, construction began in February 1943, and operations began in November of that year. The first site mission was the separation of Uranium-235 from natural uranium by the electromagnetic separation process. In the years following World War II, Y-12 evolved into a high-precision manufacturing assembly and inspection facility while maintaining the Nation's uranium and lithium technology base. Missions have expanded since the end of the Cold War and the ensuing easing of international tensions. Y-12's national defense missions focus on weapon components, production of nuclear weapon secondaries, and prevention of the spread of weapons of mass destruction.
The Y-12 National Security Complex is currently one of four production facilities in NNSA's Nuclear Security Enterprise. The current mission of Y-12 is to:

- produce/rework/dismantle complex nuclear weapon components and secondaries;
- receive, store, and protect special nuclear materials;
- perform quality evaluation/enhanced surveillance of the Nation's nuclear weapons stockpile;
- maintain the safety, security, and effectiveness of the U.S. nuclear weapons stockpile;
- help reduce the global threat posed by nuclear proliferation and terrorism;
- provide safe and effective nuclear propulsion systems for the U.S. Navy;
- process and store uranium and develop technologies associated with those activities;
- prevent the spread of weapons of mass destruction; and
- support DOE, other Federal Agencies, and other national priorities.

B&W Y-12 submitted its application to the NNSA Y-12 Site Office (YSO) for participation in the Department of Energy (DOE) Voluntary Protection Program (VPP) in December 2011. YSO reviewed and concurred with the application and forwarded it to the Office of Health, Safety and Security (HSS). The Office of Worker Safety and Health Assistance, within HSS, reviewed the application and scheduled an onsite assessment from April 10-19, 2012. This report documents the results of that assessment and provides the HSS DOE-VPP team's (Team) recommendation regarding B&W Y-12's participation in DOE-VPP to the Chief Health, Safety and Security Officer.

B&W Y-12 employs approximately 4,600 workers consisting of managers, supervisors, administrative support, engineers, other professional staff, and roughly 1,200 labor and craft personnel. Additionally, there are approximately 2,500 support contractors, vendors, and visitors to the site each year. The Atomic Trades and Labor Council (ATLC), an affiliate of the Metal Trades Council (MTC) of the American Federation of Labor and Congress of Industrial Organizations (AFL-CIO), represents the production and maintenance crafts. The Knoxville Building and Construction Trades Council (KBCTC) represents construction crafts, and the United Steelworkers (USW) represents a small group of high voltage electricians. All three unions were unequivocal in their support for B&W Y-12's participation in DOE-VPP.

The hazards encountered by B&W Y-12 workers are varied. Physical hazards include those associated with site and building maintenance, machine and repair shops, disassembly and assembly of nuclear devices, construction, and decontamination and decommissioning. Chemical hazards range from commonly used janitorial supplies to research and development chemistry. Biological hazards range from a multitude of insects indigenous to the southern United States to reptiles and mammals that can carry a variety of pathogens. The B&W Y-12 Environment, Safety and Health (ES&H) department provides industrial and transportation safety policy, safety standards, safety procedures, and compliance oversight to B&W Y-12 to protect employees and contractors against safety and health hazards in their work environment. Included in the safety department's sphere of responsibilities are Industrial Safety (IS), Industrial Hygiene (IH), Occupational Health Services (OHS), and Radiological Control (RADCON).

During the assessment, the Team was able to observe the full range of activities at Y-12, and had contact with many workers, supervisors, and managers. In many cases, the nature of work at Y-12 precludes the Team from providing details of specific processes, materials, or locations. Additionally, immediately prior to this onsite assessment, the HSS Office of Safety and Emergency Management Evaluations performed a safety culture assessment related to the Y-12 Uranium Processing Facility project. Although the results of that assessment were not available, the Team did discuss the general findings with the Deputy Director for Oversight, and factored that discussion into its recommendation.

II. INJURY INCIDENCE/LOST WORKDAYS CASE RATE

Table 2.1 Injury Incidence/Lost Workdays Case Rate (B&W Y-12)					
Calendar Year	Hours Worked	Total Recordable Cases (TRC)	TRC Rate	DART* Cases	DART Case Rate
2009	9,111,430	57	1.25	17	0.37
2010	9,561,482	66	1.38	29	0.61
2011	9,780,755	50	1.02	9	0.18
Last 3 Years	28,453,667	173	1.22	55	0.39
Bureau of Labor Statistics (BLS-2010) average for NAICS** Code #332999, All other miscellaneous fabricated metal product manufacturing			7.0		4.2

Table 2.2 Injury Incidence/Lost Workdays Case Rate (Subcontractor)					
Calendar Year	Hours Worked	TRC	TRC Incidence Rate	DART Cases	DART Case Rate
2009	706,736	3	0.85	3	0.85
2010	1,071,042	1	0.19	1	0.19
2011	747,763	0	0.00	0	0.00
Last 3 Years	2,525,541	4	0.32	4	0.32
Bureau of Labor Statistics (BLS-2010) average for NAICS Code #332999, All other miscellaneous fabricated metal product manufacturing			7.0		4.2

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

TRC Incidence Rate, including subcontractors: 1.14
DART Rate, including subcontractors: 0.38

Conclusion

The Team reviewed the accident and injury records and did not identify any issues. An audit performed by NNSA and the HSS Office of Corporate Safety Analysis in 2011 identified 19 cases out of 400 cases (16 in 2009, and 3 in previous years) that were not correctly categorized. The Worksite Analysis section includes further discussion of the process for categorization and classification of injuries. While the Team identified that opportunities exist to improve the documentation for the decision, overall accident and injury rates are far below the comparison industry. Further, there was no indication that workers were in anyway discouraged from reporting all injuries, no matter how minor. In fact, the Team found workers that had received nondisciplinary performance counseling for not immediately reporting minor cuts and scrapes. Statistical rates to date for 2012 are far below the 2011 rate (0.16 and 0.08 through March 2012) and represent a step change largely attributed to the DOE-VPP pursuit. The accident and injury statistics meet the expectations for 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; (4) accountability for both managers and workers; and (5) managers must be visible, accessible, and credible to employees.

B&W Y-12 managers left little doubt of their commitment to a strong safety culture and excellent safety program. Since winning the contract to operate Y-12 in November 2000, B&W Y-12 has steadily implemented a logical series of improvements focused on improving processes and procedures, facilities, and increasing worker awareness of their role in safety. In 2001, B&W Y-12 implemented its Integrated Safety Management System (ISMS) per DOE orders and policies. In 2004, it began implementing a behavior-based safety (BBS) process. It made further improvements in conduct of operations and work control through an enhanced floor surveillance program that began in 2005. In 2007, B&W Y-12 began implementing human performance improvement (HPI). In 2008, it implemented employee teams as a means of getting employees more effectively involved in identifying and implementing safety improvements.

Throughout the last several years, B&W Y-12 has used its "7S" process to improve productivity and efficiency in the plant, which also helps improve safety by reducing opportunities to be injured. This process is an outgrowth of the Lean Six Sigma process, and uses seven principles (Sort, Straighten, Shine, Standardize, Sustain, Safety, and Security) to optimize production processes. B&W Y-12 has channeled savings from productivity improvements to fund additional safety improvements and programs. In 2010, B&W Y-12 implemented a new health and wellness program (LiveWise) that included installation of three fitness centers, staff physical trainers, nutritional counseling, and medical support. These efforts have produced additional cost savings in insurance premiums and reserves. All managers see the application for VPP as the next step in what has been a continuous improvement process over the past 12 years.

The ES&H policy states, "The safety and health of our workers and the protection of public health and safety are paramount in all that we do. We maintain a safe workplace and plan and conduct our work to ensure hazard prevention and control methods are in place and effective." B&W Y-12 documents this policy and communicates it through Web pages, procedures, training, posters, billboards, videos, safety meetings, and employee training.

Adequate resources in terms of safety and health expertise are available to appropriately identify, analyze, and control hazards. B&W Y-12 distributes RADCON, IS, and IH personnel to the facilities with other centralized technical expertise available. No personnel contacted by the Team identified issues with availability of subject matter expertise when questions or issues arose.

B&W Y-12 initiated the process to obtain recognition under DOE-VPP in response to requests by the workforce. The previous Y-12 operating contractor applied for DOE-VPP in the late 1990s, but difficulty in obtaining the support of all the unions at the site led to withdrawal of the application. Improvements made since 2000 convinced the local union leadership of B&W Y-12's sincere commitment to giving the unions a meaningful role in the safety program, and they were unequivocal in their support during this assessment.

A repeated theme during all interviews with senior managers was that they supported safety because it was the right thing to do, not because it was expected. Managers recognized the need to meet requirements, but repeatedly demonstrated their willingness and expectation to go beyond those requirements where necessary to ensure workers' safety. This attitude has been essential given the challenges of the aging facilities at Y-12. In many cases, the buildings and equipment have remained in service well past their expected life cycle, creating hazards to workers. Identifying, repairing, controlling, or eliminating those hazards often requires processes, procedures, and worker skills that surpass normal commercial or industrial standards. Oftentimes, workers must step back (pause) or stop work to evaluate a previously unidentified hazard or condition. Managers and supervisors have been supportive of workers' right to stop work, ask questions, and then implement corrective actions. This is evident in that very few employees initiated concerns in the YSO system over the past few years. Of the concerns entered by workers, YSO only substantiated one concern, and it did not deal with any aspect of safety.

B&W Y-12 has multiple management level review boards (Executive Steering Group, Management Review Board, Operational Safety Board, President's Employee Team, and President's ES&H Forum) that either directly or peripherally affect the safety program. Each of these boards appropriately balances the responsible execution of the production mission, stewardship of resources, and protection of the public, the environment, and the workforce.

Managers all recognize excellence in safety as a beneficial investment in mission success and commit the necessary resources to address safety issues and promote excellence. When B&W Y-12 formed the employee teams in 2008, the number of safety issues raised was overwhelming. There was no committed budget at that time to address and correct those issues. In response, B&W Y-12 established an Indirect Review Board (IRB) consisting of representative senior managers from across the organization. B&W Y-12, in cooperation with YSO, established an approximately $250,000 budget from other program line items. The IRB reviewed and prioritized all the safety issues to enable B&W Y-12 to systematically correct issues. This process continued over the next 2 years until the budget cycle permitted program managers to establish the necessary direct funding. For example, many employee teams identified issues related to broken, cracked, and failing sidewalks. Repairing all the identified problems individually would have been inefficient and unnecessarily expensive. Through the IRB process, B&W Y-12 collected all the sidewalks into a single improvement project and put a single contract in place to complete all the repairs. This improvement was a significant, visible sign to workers of the managers' commitment to improvements and responsiveness to employee concerns.

B&W Y-12 provides resources for employee reward and recognition. The contract identifies a pool of money (1/2 of 1 percent of the salary pool) to provide reward and recognition tied to annual performance reviews. B&W Y-12 provides additional resources for other programs, such

as the VPP roadmap initiative (see Employee Involvement). Some divisions have established employee-driven peer awards. For example, the Chief Financial Officer implemented a peer award process where employees in that division can nominate other employees for specific acts or services. An employee committee reviews those nominations and determines if the act or service warrants an award, and at what level. Other divisions have been less successful in customizing the reward and recognition programs.

The VPP Champions Committee (VPPCC) is the most direct form of management leadership in the VPP effort. This committee is composed of senior managers, supervisors, and workers. Other than the senior management members, all the other members are volunteers. This committee serves as a central steering committee for B&W Y-12 to evaluate its readiness for VPP, develop the application, identify and implement processes and programs to address any gaps, and find means to foster continuing improvements. All members of VPPCC understood their role and were actively involved in preparing for this onsite assessment.

A particularly effective means of communicating managers' commitment and improving visibility was the VPP Road Show. Led by the Senior Vice President/Deputy General Manager and the ATLC Vice President, the road show was presented 34 times and was also recorded and made available on the internal Web site. The road show highlighted that further improvement in safety required new efforts (VPP); that safety improvement was a journey, not a destination; and helped workers understand safety as a value rather than a priority (values do not change, priorities do). At the end of the road show, the Deputy General Manager asked employees to add their signatures to a banner signifying their commitment to accomplishing the mission without injury in a safe, healthy workplace. B&W Y-12 managers and employee leaders have consistently repeated the message from the road show over the past several months in other forums in order to help the workforce make safety personal.

In some cases, efforts by managers to encourage safe behaviors and implement safety improvements may not have the intended consequences. For example, the Facility, Infrastructure, and Services (FIS) division implemented a reward process where workers could receive a "wooden nickel" for a safe act. Workers could turn the wooden nickel in at an employee team meeting for a quarterly drawing. Workers receiving positive feedback from customers could receive a "dollar" coin that they could keep and have their name entered into an annual drawing. The program ended up with workers not being satisfied that they had sufficient opportunities to enter the drawing for large prizes (large screen televisions). The responsible vice president discontinued the program without identifying an alternative approach. Another example has been the BBS implementation. In many cases, workers' performance evaluations contain an element to perform observations, typically 1 per month. BBS programs tend to be more effective when workers perform observations voluntarily rather than as part of a requirement. Workers perform observations in the course of their normal work, but only document a small fraction of those observations using the BBS forms. The program might gain more energy and provide more usable data if observations are voluntary or even incentivized with some small, noncash recognition for workers conducting and documenting multiple observations.

B&W Y-12 has an effective process for control and monitoring of subcontractors. Title 10, Code of Federal Regulations, part 851, *Worker Safety and Health* (10 CFR 851), requirements are imposed through subcontracts. B&W Y-12 requires that bidders for work have a 3-year

average interstate experience modification rate (a standard rating used to calculate Workers Compensation Insurance premiums) not to exceed one (which can be waived based on work package review and proposed compensatory actions), and submit the previous 3-years Occupational Safety and Health Administration (OSHA) Accident and Injury Summary Form 300-A. Subcontractor Technical Representatives from within the program organization requesting the work are specifically qualified and trained to monitor the subcontractor. Safety personnel also periodically monitor work. Based on worker concerns, B&W Y-12 has increased its attention to ensuring subcontractors work to the same high safety expectations as plant employees.

The current contract ends September 30, 2012, with transition expected to begin before the end of June 2012. Senior managers are aware of the potential disruptions and distractions that will be associated with the new contract announcement, and are already focusing on how to maintain a safety focus during the upcoming contract transition process. The senior managers (vice presidents and president) are committed to continuing the safety emphasis through the entire transition period, no matter the outcome of the contract award.

Y-12 has an extensive system of assessments and audits, including an approved contractor assurance system. These audits and assessments cover a broad range of topics, including safety and health. As a DOE-VPP participant, they need to develop a process that integrates and analyzes these audits and assessments on an annual basis and uses the results of that analysis to identify improvement goals and objectives for the coming year. That process is under development, but B&W Y-12 has not yet implemented it.

Y-12 uses its current system of audits, appraisals, and performance indicators to establish annual performance goals. Managers establish the current corporate goals based on the performance evaluation plan. Managers derive divisional goals that middle managers and supervisors translate into departmental and individual performance goals. This system effectively translates company goals to individual performance, but does not yet effectively allow for active employee input in the organizational safety improvement initiatives. Employees are working to implement improvements, but goals for those improvements have not been established (e.g., BBS participation rates, employee team attendance, and LiveWise participation).

Conclusion

B&W Y-12 has a strong management team that understands and demonstrates the necessary leadership qualities to advance a strong safety and health program. They recognize VPP as an effective investment to foster excellence and continuous improvement. They consistently act in concert with that commitment and have formed a trusting partnership with the workforce. B&W Y-12 fully meets the expectations of Management Leadership for participation in DOE-VPP at the Star level.

IV. EMPLOYEE INVOLVEMENT

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

As discussed in the Management Leadership section, the DOE-VPP effort began many years ago at Y-12. In 2010, the Deputy General Manager and ATLC Vice President took a benchmarking trip to the Norfolk Naval Shipyard, which has been an OSHA-VPP participant for several years. Until that trip, union support for DOE-VPP had been lukewarm at best. During the benchmarking trip, the local union leadership became convinced that DOE-VPP would allow them to be fundamentally involved in the safety program and help create a safer workplace for its members. With that support, B&W Y-12 renewed its efforts to achieve DOE-VPP Star status. To review the application, educate the workforce, and lead B&W Y-12's quest for VPP Star status, B&W Y-12 formed VPPCC. Headed by the Senior Vice President/Deputy General Manager, the committee includes the ES&H Director, the president and vice president of ATLC, the president of KBCTC, and the VPP facilitator. The committee also has many volunteer participants from all levels of the organization and all functional groups.

Several years ago, ATLC had two safety representatives that covered the entire Y-12 site. When work increased under the American Recovery and Reinvestment Act, B&W Y-12 added three ATLC safety representatives to the maintenance organization to assist with the increased workload. Recognizing the value these safety representatives added, the production organization also added three safety representatives. In a similar fashion, the construction organization has five construction safety representatives from KBCTC. The ATLC safety representatives operate a safety issues hotline for all Y-12 craft employees. All these safety representatives meet on a regular basis with their respective managers, the Deputy General Manager, and the General Manager to discuss safety issues and potential improvements. They also track any open safety issues. While these safety representatives are functioning well, B&W Y-12 has not defined their roles, responsibilities, authorities, the processes for prioritizing safety issues, conduct of meetings, expectations, and interactions in a systematic fashion, such as a charter, policy, or procedure. B&W Y-12 should work with the unions to establish a formal charter clearly defining the roles, responsibilities, and authorities for safety representatives.

Opportunity for Improvement: B&W Y-12 should work with the unions to establish a formal charter clearly defining the roles, responsibilities, and authorities for safety representatives.

The VPPCC spearheaded the "Roadmap" initiative to educate employees about VPP. The roadmap contained 34 individual activities for workers and an additional 7 activities for supervisors. To complete the roadmap, employees perform four mandatory activities and then choose 16 additional activities. Supervisors complete the employee portion plus four of the seven supervisor activities. The committee designed the activities to enhance worker awareness of safety; highlight aspects of the safety, health, and wellness programs; and give employees experience at conducting new activities. After the roadmap is completed and verified, the employee receives a $50 gift card. At the time of the assessment, 75 percent of the Y-12 employees had completed the roadmap. All of the employees interviewed by the Team stated that the activity taught them a lot about VPP. Many employees continued to carry their roadmap with them even though they had already completed the activities, which is a testament to its acceptance and effectiveness.

The Team interviewed a broad spectrum of employees, supervisors, and managers, including the janitors, engineers, office, laboratory, maintenance, construction, and production workers. These employees are actively engaged in the safety and health program and, in many cases, are the originators of ideas that significantly contribute to the success of the overall safety and health program. In addition, these employees also stated that managers empower them to be individually involved in the safety and health program, and that employees feel a strong sense of ownership for the safety program. With a few exceptions, employees in the bargaining unit feel that barriers to communication to and from management are minimal. Most interviewees were able to explain how they were personally involved, and a number of them gave specific examples. Several employees described their involvement in terms of being their "brother's keeper." Most also reported taking safety lessons learned at work, home. B&W Y-12 has encouraged employees to use personal protective equipment (PPE), such as safety shoes, gloves, and safety glasses while engaged in work at home.

In addition to exhibiting extensive knowledge of hazards in the workplace and a questioning attitude, workers and supervisors interviewed were comfortable in reporting hazards without fear of reprisal, understood how to report concerns, and were satisfied with the disposition of reported concerns. As previously mentioned, ATLC safety representatives operate a VPP hotline for workers to report potential environment, safety, and health issues. B&W Y-12 has advertised the hotline through posters, Web site announcements, and e-mail, but because the hotline is relatively new, some workers are still unaware of its existence.

Employees were comfortable in exercising the right to pause or stop work without fear of retribution or retaliation. For example, at the Metrology Laboratory, the carpenters were using a scaffold to repair a steam leak. During the job, workers in the laboratory recognized a potentially uncontrolled hazard. A glass partition separated the area of the leak from two adjacent corridors, and there was a risk that the glass could be broken during the course of work. The carpenters had not considered that hazard, and paused work until the areas were cordoned off.

B&W Y-12 took a unique approach to safety committees by intentionally establishing 176 employee teams. The teams were established to involve every employee in improving the overall performance of Y-12 in all areas, not only safety. B&W Y-12 purposefully identified them as employee teams instead of safety teams, so the scope would not be limited to safety issues. The employee teams have the authority to address any barriers identified by an

employee. Should issues preclude quick resolution, employee teams have an established hierarchy to get an issue more attention to assist resolution. This hierarchy ends at the President's employee team. The President's employee team is comprised of senior managers, most of which sponsor multiple employee teams. Team membership can be as few as two members, a management co-lead and an employee co-lead, or may have upwards of 25 members. B&W Y-12 expects employee teams to meet quarterly, but some teams meet more frequently. Employee teams function in accordance with a charter that identifies the team's purpose, goals, membership, meetings, and the responsibilities of management and employee co-leads, the secretary, and team members. Team members also sign an Employee Team Commitment placed in a conspicuous place relative to the work location of each team.

One success of this approach was that B&W Y-12 has expeditiously addressed hundreds of safety issues identified by employee safety teams. B&W Y-12 formed the IRB (discussed in Management Leadership) just to deal with the volume of identified issues. The Team noted several improvements made in response to employee-identified safety problems. As an example, the main road in front of the new steam plant had pipe junctions that could pose a hazard to pedestrians on a nearby sidewalk. In response, B&W Y-12 covered the pipe junctions with pliable material that would mitigate the potential injury in the event of a steam leak. Additional improvements included the building of a new platform at the material access area entrance, repair or replacement of cracked, broken, and failing sidewalks across the entire site, installing and marking crosswalks, and repainting of curbs. All these repairs were in response to issues raised by employee teams.

Some employee teams are functioning very well. One employee team, in particular, clearly demonstrated how employee teams could take a leadership role in safety. Team 74, within the Safeguards, Security and Emergency Services directorate took the initiative to completely restructure its activities. Team 74 is comprised primarily of security support professionals who work in an office environment. Early on, the team realized the importance of looking after each other, establishing a mindset of approaching safety with what makes sense to its employee team members, looking for innovative solutions, and thinking outside the box with respect to safety. The management co-lead challenged the team to identify self-directed activities that went beyond the typical office work. The team took into consideration the VPP tenets, OSHA requirements, BBS, an internal "Enhanced Floor Surveillance" process, and the "Pryde" (Y-12 facility housekeeping inspections) program in formulating its team approach. After focusing on ergonomics in the workplace and initiating improvements, the team began to expand its focus to surrounding areas, including building ingress and egress, parking areas, walkways for potential slip and trip hazards during all times of day and night, and adverse weather conditions, such as ice or snow. This resulted in the redesign and scheduled replacement of a sidewalk and ramp that had a steep slope and no handrail. The safety and engineering staff surveyed the ramp and found it did not comply with current building standards. B&W Y-12 installed temporary handrails due to inclement weather and scheduled installation of a new sidewalk with a proper slope and approach. The team is also using noncash incentives for safety conscious acts by employees, such as recognizing workers for small acts and services related to safety improvement with a magnetic sign incorporating the teams "mascot" that is displayed on the individual's door or work area.

While some teams are functioning very well and serving as an effective means of stimulating employee involvement, others are less so. Many teams are not meeting on a regular basis,

depend on the management co-lead to schedule and run the meetings and have not taken the initiative similar to Team 74. Many employee teams are involved in walkdowns of their workspaces; and the employees have received training in BBS and HPI, but they are not actively seeking meaningful involvement in the safety program. The employee teams have been in existence since 2008, but B&W Y-12 has only begun stressing the need for effective employee ownership of the team in recent months. Other DOE-VPP participants have clearly shown that such teaming and ownership by employees can drive significant positive change. B&W Y-12 should find ways to encourage employee teams to become more self-directed and creative in its approach to improvements.

Opportunity for Improvement: B&W Y-12 should find ways to encourage employee teams to become more self-directed and creative in their approach to improvements.

In some cases, B&W Y-12 may be missing opportunities to foster greater employee involvement. For example, several years ago, the maintenance group began providing bottled water and Gatorade® to workers. Water from the plant potable water systems met drinking water standards, but due to old systems, it tasted bad, and workers were not drinking sufficient water during the workday. Providing these individual bottles of water and Gatorade® cost approximately $250,000 per year. To reduce costs, the maintenance group is in the process of eliminating the bottled water and installing filtered water dispensers throughout the site and providing maintenance workers with a refillable water bottle they can carry with them. The maintenance group is also creating Craft Centers (one on the East end and one on the West end) that provide a clean break room with ergonomic tables and chairs and computers for the crafts. One Craft Center is completed and work is due to start on the second center this year. However, Team interviews identified that some workers are not enthusiastic of this change. The managers in the FIS division did not seek workers' opinions in the decision to make the change. The maintenance managers should work with the crafts through the various employee committees and ATLC safety representatives to encourage and seek worker involvement in resolving issues affecting the workers. By involving the workers and soliciting their input and recommendations, the transition to this new process could be more successful.

Conclusion

B&W Y-12 employees are fully aware of their safety responsibilities and look out for their coworkers' safety. They are fully empowered to pause or stop work without fear of reprisals. The employee teams provide employees with an avenue to express their safety concerns and ensure timely resolution. They have multiple avenues for meaningful involvement in the safety and health program. While some employee teams function well, most could improve by emulating the more successful teams. Managers need to emphasize employee ownership as employee teams mature. B&W Y-12 meets the expectations of Employee Involvement 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.

As discussed in the Management Leadership section, B&W Y-12 is using the Lean Six Sigma 7S process to intentionally analyze and improve production processes. This process not only removes waste and improves efficiency, but it also improves worker safety. In many cases, sorting, straightening, and standardizing processes eliminates hazards associated with material or worker movement. It may eliminate excess contact between the worker and hazardous materials or reduce the time such contact occurs. By eliminating opportunities for slips, trips, and falls, and excess worker actions, the systems eliminate opportunities for worker errors to cause an accident or injury. This process will play a significant role in the design and construction of the new Uranium Production Facility as B&W Y-12 incorporates lessons learned into the final design.

Workers perform a significant amount of work at Y-12 in gloveboxes. They face a variety of ergonomic issues that includes repeated bending, reaching, and lifting. Because workers are not identical, design of gloveboxes to address ergonomic issues is very challenging. Designers, leveraging knowledge gained from glovebox use at Y-12, have used an innovative approach to analyze and evaluate ergonomic issues associated with worker glovebox interfaces. Specifically, designers use a commercial software package, DELMIA®, to model and analyze ergonomic interface hazards to accommodate worker size and strength variability and to engineer out ergonomic hazards before work begins. Initially procured on a trial basis to evaluate a glovebox in the new Highly Enriched Uranium Materials Facility (HEUMF), the software identified significant ergonomic problems and a number of issues with constructability and usability of the final product. This program allowed engineers to redesign the glovebox at an early stage with a significant savings of cost, materials, and time. B&W Y-12 has adopted the software as an ongoing part of the design process for new facilities and equipment.

The Y-12 site includes nine Category 2 Nuclear facilities, that have DOE-approved Documented Safety Analyses (DSA), with a separate Y-12 Safety Analysis Report that documents the safety management programs used by, and applicable to, all facilities with a DSA subject to the guidance and requirements of 10 CFR 830, *Nuclear Safety Management, subpart B, Safety Basis Requirements*. The documents and associated Technical Safety Requirements (TSR) provide the analysis and assurance that these facilities operate safely to protect workers, the public, and the environment. The resulting implementing procedures and operating instructions derived from the DSA and TSRs are subject to the Unreviewed Safety Question process.

The IH department maintains the hazard baseline for the Y-12 site. They perform an Occupational Exposure Assessment (OEA) every quarter and report the findings of that assessment in a formal report. The OEA is an assessment of a facility or activity that evaluates the hazards and sampling requirements. This assessment includes previously evaluated facilities or activities. B&W Y-12 uses the assessment results to update hazard and exposure information in the existing historical database. That database serves as a repository for sampling results and is a tool to track and trend exposures. Y73-66-IH-011GUD, *Occupational Exposure Assessment,* provides guidance for this assessment. Members of the IH organization that perform these assessments described the current process as comprehensive and valuable to systematically evaluate new hazards and processes or reevaluate known hazards across the site. The IH laboratory recently completed an International Organization for Standardization (ISO) 17025, *General Requirements for the Competence of Testing and Calibration Laboratories*, assessment by the American Association for Laboratory Accreditation and is now an accredited laboratory. ISO 17025 evaluates the competence to carry out tests and/or calibrations, including sampling. It covers testing and calibration performed using standard methods, nonstandard methods, and laboratory developed methods. The IH laboratory provides noise-monitoring, personnel exposure monitoring, and area sampling.

B&W Y-12 has a documented process to address activity-level hazard analysis. The ES&H Technical Services section provides the process to evaluate activity level work in maintenance, production, and research and development. Y73-045, *Job Hazard Analysis,* describes the purpose, applicability, roles and responsibilities, and process flow to accomplish the analysis of work, associated hazards, and development of appropriate controls. This document specifies that a team-based walkdown of the work activity performed by subject matter experts (SME) and line workers is the most effective method to provide a clear understanding of the work scope and hazards. The process tool for evaluating maintenance and production work activities are the Hazard Identification Worksheet (HIW) and the Automated Job Hazards Analysis (AJHA). Several employees interviewed confirmed that they had participated in the development of an AJHA for upcoming work.

The Research and Development (R&D) division uses a more indepth process due to the nature of the work performed. The process is applicable to hands-on technical tasks and other activities in support of research and development involving unknowns, or hazards that require hazard analysis, and Operational Safety Board (OSB) review. The OSB is a senior review team that evaluates the planned work and associated controls, and recommends additional precautionary safety actions if required. Y15-15-001 Rev 5.0, *Planning and Authorizing Work in Development*, requires the use of "What if?" hazard analysis techniques to fully analyze and document the analysis prior to OSB review. The "What if" process includes analysis of chemical compositions/mixtures, temperatures, pressures, over filling, and other scenarios that may affect safety margins or produce unanticipated hazards. A discussion with the R&D manager indicated that the intent of this process is to fully evaluate potentials and eliminate the possibility of an unanticipated occurrence. The Team believes B&W Y-12 R&D hazard analysis process is an excellent example of hazard analysis in an experimental organization.

In 2011, the Defense Nuclear Facilities Safety Board (DNFSB) identified concerns with the B&W Y-12 work control processes. Because of that review, the site has created and is executing a work control and activity analysis improvement plan, Y/IA-452 Rev 0, November 2011, *Work Planning and Control Performance Improvement Plan*. Contained within Y/IA-452 are

immediate actions, short-term and long-term goals to improve work control and hazard analysis. Examples of immediate actions include issuing standing orders to define workscope, performing walkdowns, preparing hazard analysis bounded by workscope, and incorporating hazard controls in the work instruction. B&W Y-12 now divides planning activities into two major categories, nuclear and nonnuclear facility. By dividing the two categories, B&W Y-12 streamlines the work planning effort removing the unnecessary steps required for nuclear activities when planning for nonnuclear facility work. Short-term goals include revision of the integrated work control manual, revision of the Job Hazard Analysis (JHA) manual, and training managers, supervisors, and crafts. Long-term goals include bringing outside resources to evaluate processes, benchmarking activities to measure progress, organizational changes to enhance the process improvements, and assess the technical SME process.

The focus of the improvements was to improve the quality of the overall production and maintenance work packages by ensuring planners optimize the work package for the worker and their supervisor to use. For example, the worker does not require the information that the planner and SMEs need to identify and mitigate the hazards, so AJHAs, Material Safety Data Sheets (MSDS), and HIW do not need to be included in the work package. The sequence of the work package is logical and any identified controls should be embedded into the work steps at the point the worker is addressing the associated hazard.

The Team reviewed the improvement plan and reviewed procedural changes that have occurred since 2011. Some weaknesses identified by DNFSB remain since all aspects of the implementation plans have not yet matured. In addition, B&W Y-12 has not yet applied improvements to the AJHA process to all previous hazard analysis documents (discussed later in this section).

The Team found that workers at B&W Y-12 were knowledgeable of hazards in their workspace and had many years of operational experience. Y73-201, *Chronic Beryllium Disease Prevention Program*, implements the expectations of 10 CFR 850, *Chronic Beryllium Disease Prevention Program*. It contains programmatic chapters with instructions and guidance for implementing the requirements from 10 CFR 850. As an example, the Team interviewed a beryllium-sensitized worker at one of the facilities. He was aware of the Chronic Beryllium Disease Prevention Program (CBDPP), beryllium hazards, and his rights under the program. The worker expressed a concern about a designated beryllium area in the facility where he worked, but not in his immediate work area. The Team initiated a discussion with IH and the affected worker to communicate and inform the worker of the status of the area in question. In another case, B&W Y-12 did not identify or label inactive stack breakthrough monitoring cabinets that contain beryllium items or equipment. In addition, these cabinets are not included in CBDPP (see Hazard Prevention and Control section).

Team observations in general work areas during facility walkdowns identified housekeeping in machine shops, other production areas, and in plant common areas as better than average, especially considering the age of some of the facilities. Observations made during walkdowns of B&W Y-12 machine shops found no common machine shop deficiencies in typical problem areas, such as machine guarding, electrical safety, or material handling and storage. Workers interviewed demonstrated an adequate level of hazard awareness and a questioning attitude. For example, one worker in the foam shop, while demonstrating his operation that entailed material handling, chemical use, and powered equipment, easily and completely described the hazards of

the work he was performing and was proud of the input he provided to his supervisors and procedure writers that improved safety and productivity. In another machine shop work area, the Team interviewed a welder. He was aware of hazards associated with welding stainless steel and showed the Team the engineered "snorkels" to remove fumes while welding stainless steel. Workers interviewed also confirmed that certified industrial hygienists (CIH) routinely monitor during their work activities and provide monitoring results to the worker. The welder told the Team that the CIHs have monitored him many times. The welder did raise questions regarding the appropriate ventilation for welding in another area. Although personnel did not normally weld in this area, he was unsure if IH had evaluated it for welding activities. The Team contacted the IH group who immediately responded and recommended that welding not take place in that particular area. IH took action to preclude welding in that area until they could perform more analysis and sampling. Further discussions with IH indicated that they were unaware of welding in the area in question and it was not part of their baseline exposure assessment.

As discussed above, the corrective actions in response to DNFSB work control evaluation to address weaknesses in the work control and hazard analysis have not had time to mature. The Team observed 15 maintenance work activities. All observed work activities had work packages prepared under the new work controls process. The resulting work packages demonstrated a uniquely simple approach to an effective work control process. As discussed earlier, the new process focuses on a well-defined workscope, detailed description of hazard controls, and logically sequenced work steps. Many of the packages satisfied the expectations of the new process and workers received them well. However, several of the work packages did indicate further maturation was necessary to implement the new process across the Y-12 complex. For example, the Team observed a glove change in a glovebox. The work involved a new type of glovebox "glove change out tool," which utilized a unique process that pushed the damaged glove into the glovebox as the new glove was being inserted. This process is very efficient and minimizes the contamination potential. The workers were wearing nitrile gloves, but the work package specified rubber gloves. The Team asked the workers why they wore nitrile instead of the prescribed gloves in the work package. Further discussions and research revealed a previous AJHA-specified nitrile gloves, and demonstrated nitrile gloves as the correct PPE to control exposure to lithium. Apparently, the new work package, while in the new format, had not updated the AJHA to reflect the new emphasis on hazard analysis and the completeness of the information derived from that analysis. In another example involving rebuilding a heat exchanger in an onsite facility, the PPE control for breaching a potentially pressurized Kathene system required use of chemical goggles and leather gloves. A worker performing this work was dressed in a full Tyvek suit with chemical face shield. The Team asked why the worker was not using the prescribed, lesser PPE. The worker explained the previous AJHA identified the apparel he was wearing the last time he did this job, but since then, the PPE had been downgraded to leather gloves and chemical goggles. Since he had previously performed the work and was aware of the hazard presented by the Kathene, he opted for the Tyvek suit and a face shield to preclude exposure to Kathene. As stated by the worker, contact with skin or eyes by Kathene produces skin irritation and rashes. The PPE prescribed for the job would not have provided the optimum protection for the worker.

Opportunity for Improvement: B&W Y-12 planners and supervisors should ensure that hazard analysis is current, accurate, and supports the work packages before work is authorized.

The Team reviewed the AJHA process and forms used to document the JHA. The current process describes the scope by task step, hazard, controls/requirements, and implementation strategy. The Team reviewed several AJHA reports to compare and evaluate the documented information. For example, in a generic standing AJHA associated with machining operations, the AJHA report does not contain a link from the hazard to the control that explains why the preparer selected the control or why the control is adequate for that hazard. Additionally, the AJHA called out specific chemicals in the task steps, but only described them generically as chemicals, toxic metals, exhaust gases, or carcinogens in the hazard section. The control section describes "controls required by RADCON" as adequate for the chemical hazard without further analysis or description. The implementation strategy throughout the report contains mostly prejob briefings as the communication method for informing the worker. However, some controls identify training, work packages, medical qualifications, and engineering controls as implementation strategies in addition to the prejob briefing. In another AJHA associated with performing maintenance activities alongside roadways, the AJHA describes the control as maintaining an adequate distance from the roadway. The AJHA does not define adequate distance. A tree trimming maintenance package identified the same generic control. The Team found that in some cases workers continue to use AJHAs as work instructions, such as for minor maintenance activities or in janitorial activities. B&W Y-12 should continue its work toward eliminating AJHAs as work instructions. Improvements to consider include inserting a column in the AJHA report that links the rationale for hazard selection to the hazard and describes why that control was selected (analysis), and eliminating generic descriptors in the AJHA and work documents (adequate, proper) that leave the final analysis to the worker.

Opportunity for Improvement: B&W Y-12 should continue its work toward eliminating AJHA as work instructions. Improvements to consider include inserting a column in the AJHA report that links the rationale for hazard selection to the hazard and describes why that control was selected (analysis), and eliminating generic descriptors in the AJHA and work documents (adequate, proper) that leave the final analysis to the worker.

The Team interviewed individuals that have injury and illness recordkeeping responsibilities to evaluate B&W Y-12 records concerning injuries, illnesses, and hazards. B&W Y-12 has two full-time employees focused on injury and illness recordkeeping; one recently appointed supervisor (ES&H Safe Work Improvements) with a nursing background, and one experienced clerical recordkeeper. A Case Management Panel reviews injury and illness cases on a weekly basis. The Panel consists of the Panel Chairperson (Supervisor, ES&H Safe Work Improvements), representatives from ES&H Performance Improvement, Occupational Health Services, Safety, IH, Worker's Compensation, Legal, and other affected organizations.

The charter for the Case Management Panel defines the purpose, scope, and responsibilities for the panel members. Interviews with the Panel members found varying expertise regarding injury and illness recordkeeping. Each Panel member has information and a role to provide for the

Panel to be successful. The charter identifies the Supervisor, ES&H Safe Work Improvements, as the Panel Chairperson. However, the charter does not specifically identify who has the ultimate authority and responsibility to decide if an injury or illness is recordable. Because of the varying level of knowledge about the intricate OSHA recordkeeping rules, there is a risk that the Panel may arrive at an erroneous recordkeeping decision and therefore affect the accuracy of the injury and illness statistics.

Based on an August 2011 assessment conducted by NNSA and the HSS Office of Corporate Safety Analysis, erroneous decisions have already occurred. That assessment identified 19 cases (out of 400 cases reviewed) judged by NNSA and the HSS Office of Corporate Safety Analysis review team to be inaccurate. As of the date of this VPP onsite evaluation, the status of those 19 cases has not changed. NNSA and the HSS Office of Corporate Safety Analysis review found that B&W Y-12 could improve documentation to support case classifications in the injury and illness case files. While not specifically an OSHA recordkeeping requirement, inclusion of clear documentation of classification decisions in the injury and illness case files is a good practice and is consistent with the VPP philosophy of performing above minimum requirements. In addition, B&W Y-12 should identify the single person responsible for making OSHA recordkeeping decisions and document it. B&W Y-12 should update the injury and illness files to reflect the findings of NNSA and HSS Office of Corporate Safety Analysis review. The Team reviewed cases since 2009 and did not identify any additional erroneous decisions.

Opportunity for Improvement: B&W Y-12 should update the injury and illness files to reflect the findings of NNSA and HSS Office of Corporate Safety Analysis, assign the responsibility for recordkeeping decisions to a single, knowledgeable person on the Case Management Panel, and continue to improve supporting documentation in the case files.

The Team found that B&W Y-12 performs trend analysis for a large variety of functional areas. B&W Y-12 uses performance indicators required by Y15-906PD, *Contractor Assurance System*, to measure the effectiveness of the safety program. The approved Line Oversight Contractor Assurance System includes these performance metrics and measures performance for many functional areas. B&W Y-12 has also established site-level indicators for review by senior management to identify safety and health trends. B&W Y-12 has established organizational-level metrics used by line managers to identify negative safety and health trends. All these performance metrics are collectively available on the company's internal Web site. This "dashboard" provides monthly updates on a variety of indicators and contains active links that allow the user to drill down into the specific indicators to the source data. At the company level, the Team found evidence that B&W Y-12 performs trend analysis using injury and illness statistics. Injury and illness trending information is also provided to workers through various publications, as well as posters found around the Y-12 site.

Some of the indicators may represent good leading indicators, but B&W Y-12 needs to continue reviewing and refining some of its indicators. For example, B&W Y-12 uses changes to JHAs (either existing or in development) as a performance metric. The metric establishes a percentage of AJHAs that did not require revision as a goal with 95 percent considered excellent. This performance indicator could dissuade personnel from critically reviewing AJHAs and suggesting improvements. A better approach might be to track the number of AJHAs reviewed and

improved as a leading indicator without any specific goal identified. B&W Y-12 should initially track indicators to determine the normal condition. Using that information, B&W Y-12 should set high and low deviations from that normal level and investigate to determine if there are other issues present. B&W Y-12 should consider similar approaches to its other leading indicators and ensure the system does not dissuade personnel from taking desired actions.

In addition to performance metrics, B&W Y-12 maintains an Issues Management System using the Y15-312, *Issues Management Process*. B&W Y-12 implements Y15-707, *System Feedback and Improvement Process*, to analyze data from this system to identify trends in 16 categories or functional areas. B&W Y-12 does not have a single, specific program that specifically addresses the VPP requirement for conducting routine, general hazard control and compliance verifications. Rather, a combination of many programs or systems satisfies this requirement. Primary among them is the Contractor Assurance System. The Team found that assessments and inspections are risk-based. B&W Y-12 uses authorization basis documents to determine the risk priorities for assessments and inspections of nuclear facilities and operations. OSBs identify highly hazardous, infrequently performed, nonroutine activities, in conjunction with the Executive Steering Group, for increased assessments and inspections. B&W Y-12 performs formal and informal workplace inspections for routine operations and tracks appropriate data and issues using the Issues Management System.

B&W Y-12 provided evidence to the Team demonstrating that weekly construction site walkdowns and inspections are performed using knowledgeable and trained safety and health professionals in addition to supervisors and workers. Daily and weekly safety and health walkdowns use inspection checklists that document issues. Responsible personnel correct most issues immediately. B&W Y-12 tracks remaining issues, and uses signs, barriers, or other interim controls to help workers avoid the hazard. The Team did not find a pattern of hazards or compliance issues missed during self-inspections or identified hazards left uncorrected.

Conclusion

B&W Y-12 has a documented system to evaluate the hazards encountered by workers at the site. The CBDPP is consistent with the expectations of 10 CFR 850, and the approved worker safety and health program is consistent with 10 CFR 851. B&W Y-12 workers exhibited knowledge about the hazards in the workplace and were able to demonstrate adherence to effective controls to mitigate those hazards. B&W Y-12 is working on corrective actions and improvements on work control and hazard analysis issues identified by DNFSB in 2011. To date, progress on process improvements, documented in the November 2011 improvement plan and implemented in March 2012, have not fully matured, but improvements are ongoing. B&W Y-12 has documented safety programs, policies, and processes that meet the Worksite Analysis tenet at the Star level.

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 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 and procedures must also be followed by everyone in the workplace to prevent, control the frequency of, and reduce the severity of, mishaps.

The means for eliminating or controlling hazards is accomplished by using the hierarchy of controls (substitution, engineering, administrative and, lastly, PPE). Team observations identified several examples of the appropriate application of the hierarchy of controls at the Y-12 complex. In addition to the use of building ventilation systems designed to pull air through High Efficiency Particulate Air filtration and the use of gloveboxes to separate hazards from the workers, the Team observed several other controls. B&W Y-12 connected wood cutting equipment in the carpenter shop to a Cyclotron Dust Collection System that collected dust and woodcuttings during operations. In some onsite facilities, where workers routinely move heavy loads throughout the facility during processing, B&W Y-12 purchased electric-powered Extra Load Movers to reduce worker strain. The movers also provide the workers better control over the load during the operation.

The Team observed an interesting device during a glovebox glove change out. Instead of opening the glovebox portal to remove the damaged glove, B&W Y-12 identified a new type of glove that when damaged, is replaced by pressing a new glove (and gasket seal) over and through the damaged glove. The new glove presses the damaged glove through and into the glovebox when the new glove seats into place. The damaged glove is then disposed of in the glovebox waste stream. The process takes no longer than 2 minutes to perform and the glovebox seal is never broken, minimizing worker exposure to any potential hazards.

A good example of an administrative control is the use of the Construction Employee Handbook by the B&W Y-12 construction group. B&W Y-12 provides the handbook to all construction employees. It is an excellent reference for knowledge that workers should bring to the worksite (See Safety and Health Training).

Team observations determined that plan-of-the-day meetings routinely included quality, safety, and health content. They were effective in identifying potential hazards and hazard controls/mitigation and communicating them to the workers. The meetings frequently addressed lessons learned, which discussed relevant safety messages for the craft workers and their supervisors.

The B&W Y-12 program for PPE, Y73-116, *PPE Program*, properly defines the requirements, guidelines, and responsibilities to address the selection, use, maintenance, storage, care, and disposal of PPE. The *PPE Program* also directs them to conduct hazard evaluations, training, and recordkeeping as required by OSHA. B&W Y-12 excludes Fire Department/Emergency response PPE from this procedure as they have a separate PPE protocol. B&W Y-12 incorporates subcontractors in this program through its contract documents. B&W Y-12 stresses engineering controls as the first line of defense within the program.

The procedure identifies specific guidelines, standards, and selection criteria for all required elements of PPE in 15 appendices and tables. The tables are a useful tool that captures the various industry standards and tailors them to the work performed at the Y-12 complex. The tables provide selection criteria ranging from proper glove selection for chemical or material handling to requirements for high visibility outerwear use.

B&W Y-12 developed UCN-20860, *PPE Summary Form*, which is a worksheet that facilitates the responsible organization in reconciling inconsistencies or conflicts in the PPE prescribed. This worksheet is very good with respect to content and is required only where there are inconsistencies or conflicts in the SME-recommended PPE.

During this assessment, it was apparent to the Team that workers understood and properly used PPE. However, observations of work did identify several instances in which the crafts were using the appropriate PPE but the work package did not specify that type of PPE. When interviewed, the workers explained they knew the appropriate PPE to use from previous AJHAs. A discussion with the maintenance manager and the planning manager revealed the rollout of the new work control process is in its infancy, and B&W Y-12 continues to address these inconsistencies with the work package preparers and SMEs.

B&W Y-12 recently dealt with a significant concern related to full-face air purifying respirators. A worker identified contamination in the breathing tube of a respirator provided as "clean." The subsequent investigation determined that approximately 10 percent of the respirators returned from the cleaning contractor had similar contamination. The contamination did not originate from Y-12. Bioassay results did not identify any personnel exposure from the contamination. B&W Y-12 formed a respirator task force that included the represented unions to make recommendations on the path forward. As a result, B&W Y-12 will switch to lower cost respirators that can be disposed and no longer clean full-face air purifying respirators.

The safety organization recently performed an independent assessment on the PPE program in June 2011. The assessment identified two significant issues regarding procurement controls for fire retardant clothing and control of the laundering method for fire retardant clothing. As part of the assessment, the safety group hired an independent laboratory to evaluate the laundry services vendor's process and effectiveness. The assessment found that UniTech Services Group was using peroxide in its cleaning process, which can degrade the effectiveness of the fire retardant clothing over time. B&W Y-12 is currently working with the vendor to address this issue. The assessment also identified that PPE was readily available with the exception of gloves and selected sizes of fire retardant coveralls. B&W Y-12 needs to continue evaluating the fire retardant clothing issue and address the vendor's use of peroxide in conjunction with fire retardant clothing. B&W Y-12 should perform surveillance verifications to ensure the laundering practices of UniTech Services Group and the Y-12 laundry service meet specifications and recommendations of the independent laboratory.

Opportunity for Improvement: B&W Y-12 needs to continue evaluating the fire retardant clothing issue and address the vendor's use of peroxide in conjunction with fire retardant clothing. B&W Y-12 should perform surveillance verifications to ensure the laundering practices of UniTech Services Group and the Y-12 laundry service meet specifications and recommendations of the independent laboratory.

The Team observed numerous cases throughout production areas of the plant where machinists were wearing short sleeve coveralls in potentially contaminated areas, exposing unprotected skin to potential radiological contamination. This practice has developed within Y-12 to prevent machinist's exposure to hazards of rotating equipment. B&W Y-12 should carefully review the work processes and procedures using rotating equipment to identify engineered controls that eliminate the exposure of the worker to rotating equipment, permitting workers to wear the appropriate protective clothing to reduce the risk of skin contamination.

Opportunity for Improvement: B&W Y-12 should carefully review the work processes and procedures using rotating equipment to identify engineered controls that eliminate the exposure of the worker to rotating equipment, permitting workers to wear the appropriate protective clothing to reduce the risk of skin contamination.

The maintenance group has established tool cribs located throughout the complex to facilitate the availability of PPE and equipment to the crafts. The equipment is computer inventoried and tracked to ensure availability.

In 2006, the stack breakthrough monitors on multiple stacks in the Y-12 complex were determined to contain beryllium materials. Specifically, the monitoring pump contains a beryllium glass port window encased in a sealant. The cabinet door gasket to the cabinet was also made of beryllium copper material used to reduce electromagnetic interference. Based on interviews, B&W Y-12 immediately surveyed the active stacks' monitoring systems and identified beryllium contamination within the monitoring cabinets. Subsequent cleaning of those active stack cabinets removed the beryllium contamination. In addition, B&W Y-12 removed and replaced the beryllium copper gaskets in the active stack monitor cabinets with standard copper gaskets. However, it did not survey the inactive stack monitoring systems for beryllium material or contamination. The previous site contractor placed the inactive stack monitoring cabinets out of service in 1996 prior to the issuance of 10 CFR 850. Because the cabinets were located on the roofs and in locked cabinets, B&W Y-12 deemed them inaccessible to workers, so it performed no further action. B&W Y-12 never surveyed the inactive cabinets, did not identify or label the cabinets as beryllium-containing equipment, and did not include the cabinets in the beryllium surveillance program. Interviews with several workers indicated the active and inactive cabinets are identical. The same manufacturer built all the cabinets at approximately the same time, so it is reasonable to assume the inactive monitoring cabinets contain the same beryllium items with the same potential for contamination. Initial interviews with the IH group demonstrated that they believed that all stack-monitoring systems had been remediated and that no beryllium materials remained apart from the beryllium port window that is encased in a sealant and labeled as a beryllium-containing material. As a result, the inactive stack monitoring cabinets represent a potential unidentified hazard to the workforce. In the event any activities are performed on this equipment, the work package would not identify this equipment as requiring beryllium-trained personnel or PPE and might result in improper waste disposal. B&W Y-12 should address the potential for beryllium hazards for the inactive stack monitoring cabinets.

Opportunity for Improvement: B&W Y-12 should address the potential for beryllium hazards for the inactive stack monitoring cabinets.

The Maintenance Execution Organization has a very effective program of preventtive maintenance, which uses numerous schedules and data collection metrics. These metrics focus on Job Package Quality – measuring the quality of a completed work package. Each work center performs reviews using a checklist that focuses on the major components of ISMS. Questions asked during the reviews include:

- Are the hazards, significant safety, and environmental aspects identified and evaluated?
- Are identified controls in place and operational?
- Are delays or issues due to incomplete work package information (work permits, signatures, etc) identified?
- Did workers/supervisors provide feedback on the improvement sheet?

The focus on job package quality is in conjunction with the development of the new work controls process (See Worksite Analysis section).

Preventive maintenance is a concern due to the age of the facilities at the Y-12 site. As the facilities age, a strong preventive maintenance program is necessary, but many of the systems eventually require corrective maintenance. As a result, the Y-12 facilities have a significant backlog (approx 6,000 work packages overall in the system), but that backlog is manageable. B&W Y-12 uses a priority ranking system to ensure critical systems are functioning properly in support of their mission.

Another potential concern arising from the age of the facilities is work habits and skills that have developed within the workforce to compensate for inaccurate configuration information or facility condition. For example, an incident occurred prior to this assessment when workers in the new HEUMF were repairing a heater on a diesel generator. Their standard work practice from working in old facilities to confirm electrical configuration and proper isolation points was to find the energized portion of the heater, and then cycle circuit breakers in the panel until they identified the correct breaker. In this case, the work package called for the entire panel to be deenergized. Workers followed their normal practice of cycling breakers, rather than the controls specified in the work package, and incorrectly removed cooling water from the heater before deenergizing the heater. The result was a small fire when the components overheated. B&W Y-12 should be diligent in training workers, supervisors, and planners to be aware of changes to work methods and standard practices that compensated for old facilities and uncertain configurations as it brings new facilities into service.

The Team performed a walkthrough of the Y-12 medical facility led by the Y-12 Medical Director. The mission of OHS is to provide occupational medicine services to promote a safe, healthy, and secure work environment in a responsive, innovative, and cost-effective manner. The main roles and responsibilities include:

- Direct and supervise onsite OHS;
- Develop and communicate OHS advice, consultation, and recommendations to senior site management;
- Direct, review, and ensure adequacy of site-level policies, procedures, and technical instructions for OHS execution;
- Establish, direct, and ensure quality standards and risk management for all onsite OHS; and

- Interface with OHS personnel from other DOE sites, Federal Agencies, and local medical personnel.

The facility has approximately 100-120 employee encounters per day. Medical staff participates in a worksite visit program, accident investigations, and OSHA determinations. All MSDSs for chemicals used are online so that OHS has access to this information.

B&W Y-12 uses the Electronic Medical Business Operations System (EMBOS). This is a state-of-the-art, Web-enabled, electronic medical record system. It captures all patient data and the medical workflow. B&W Y-12 occupational health and mental health professionals designed EMBOS, and the information technology staff completed program development. EMBOS has been in place for the past 3 years.

One interesting improvement to the medical center was installation of white noise makers around the hallways of the medical facility. The white noise masks conversations about sensitive medical information and ensures compliance with the standards for privacy of individually identifiable health information.

B&W Y-12 is in the early stages of defining an Automated External Defibrillator (AED) program. The site has had success with the Fire Department's response time and did not consider AEDs necessary. However, employee teams raised the concern, and the site is now evaluating locating AEDs throughout the site where time is of the essence.

B&W Y-12 has a well-organized and well-funded employee wellness program called the "LiveWise" program. It has three state-of- the-art exercise facilities open 24 hours and available to the employees for use under the guidance of a physical trainer. A wellness coordinator has assistance from a registered dietician, a registered nurse, a physical therapist, and a medical doctor available to consult with employees. Monthly health lectures are given and B&W Y-12 has conducted several programs, such as weight and blood pressure reduction programs. The Team attended a Diabetes Management Group Meeting conducted by the registered dietician, which was both informative and engaging.

In the spring of 2010, B&W Y-12 expanded the wellness program to include voluntary health risk assessments. The assessments allow the health and wellness staff to determine what each person needs specifically to improve his or her health or wellness. B&W Y-12 has incentivized the program by awarding $300 to each employee who completes the assessment. To date, approximately 50 percent of the workforce has taken advantage of the assessments. Employees then meet with a staff member for wellness coaching. Integrated services promote employee health or assist with injury, illness, or work/life balance. B&W Y-12 is self-insured and significantly reduced its insurance reserves because of its health and wellness efforts.

B&W has undergone two HSS Independent Oversight Emergency Management Reviews in the past year. The latest review was a Targeted Review of Site Preparedness for Severe Natural Phenomena Events at the Y-12 National Security Complex conducted in February 2012. The review focused on a detailed assessment of selected emergency management programmatic elements with an emphasis placed on the B&W Y-12 processes for identifying emergency response capabilities and maintaining them in a state of readiness to respond to a severe natural phenomena event. Independent Oversight identified no findings that indicate specific emergency

management requirements are not being met; however, several opportunities for improvement were noted, which would further strengthen the emergency management program. At the time of this review, B&W Y-12 had just received the formal transmission of those reports from YSO so no formal improvement plans had been prepared.

The HSS report stated that B&W Y-12 has developed a formal, clearly defined, and well-documented process for developing the site hazards surveys and Emergency Planning Hazards assessments. The report did not identify any deficient elements of the Emergency Management program.

Team interviews found that with respect to Emergency Preparedness, employees are knowledgeable of evacuation and rally points for assembly in the event of an emergency and the routes are clearly marked and maintained.

The Team reviewed documents, performed field walkthroughs and conducted interviews to evaluate the effectiveness of the RADCON program at Y-12. The RADCON program has a Fiscal Year (FY) 2012 Radiological Control Compliance and Assessment Schedule that identifies three levels of assessments to evaluate effectiveness and implementation: Management Assessment, Independent Assessment, and Assessment Report. The Team reviewed one of each type for FY 2012 including:

- Management Assessment External Dosimetry Pre-DOE Laboratory Accreditation Program Assessment (3-27-12);
- Assessment of Radiological Awareness Report (1-9-12); and
- RADCON Internal and External Dosimetry Independent Assessment (12-20-11).

All three assessments noted issues for improvement of the RADCON program. The Radiological Awareness Report (RAR) identified management intervention as warranted to ensure personnel exhibit disciplined behavior when working in radiological areas and properly monitor when exiting radiological areas. However, the Team did not observe these weaknesses during walkdowns and observations.

B&W Y-12 uses a quarterly status report to evaluate program implementation using data from the RAR process to identify problem areas. The RAR process is a method to document, report, track, and trend deficiencies noted when actions, practices, or conditions might compromise radiological controls. The process categorizes deficiencies into Control of Boundaries, Radiological Work Permits, Radiological Work Practices, Management of Radioactive Material, Protective Clothing, General Housekeeping, and Quality Performance Leading Indicators.

B&W Y-12 has an As Low As Reasonably Achievable (ALARA) Committee representing 13 organizations across the Y-12 complex. This committee meets quarterly and reviews the previous year's data and goals for the current year. The committee also discusses improvement actions across Y-12. For example, the Team observed a very effective crew briefing where RADCON personnel demonstrated frisking and work practices based on the ALARA committee analysis. Success stories are also discussed in the crew briefings and minutes are posted on the RADCON Web site. The B&W Y-12 President approves the goals each year and issues a yearly report.

The RADCON Manager recently implemented a bulletin to discuss RADCON issues across the Y-12 complex. This information includes procedural requirements, how to enter an area that requires a Radiological Work Permit, frisking, PPE, and recent events. Crews are expected to discuss this information in crew briefs as a refresher.

Conclusion

B&W Y-12 demonstrated an effective hazard control process. The effective use of substitution and engineered controls was evident. While the Team identified one issue regarding adherence to its beryllium procedure, the majority of observations indicated an effective hazard control process. B&W Y-12 is effectively addressing aging facility issues through its maintenance program while awaiting construction of newer facilities. B&W Y-12 has implemented an effective wellness program that has achieved measureable results and significant cost savings. B&W Y-12 meets the Hazard Prevention and Control expectations for participation in DOE-VPP at the Star level.

VII. SAFETY AND HEALTH TRAINING

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

Based on a review of learning plans, compliance training matrix, qualification reports, personnel interviews, and work observations, the Team concluded that B&W Y-12 has an effective training and qualification program. Personnel told the Team that they generally understand the hazards they face on a daily basis and are capable of implementing appropriate controls.

B&W Y-12 senior managers provide direction for the B&W Y-12 training and qualification program. Managers are accountable for implementing training commensurate with the hazard levels associated with a respective employee's job assignment. The responsible organization manager must approve all new or added compliance-training requirements for B&W Y-12 personnel.

The B&W Y-12 training program is a mature program that satisfies a variety of training objectives. The program delivers training through several different methods, including formal classroom instruction, computer-based training (CBT), and Web-based training, that resides on an SAP Database Learning Management System. Personnel may also receive on-the-job training (OJT), as well as training through informal means (i.e., employee team meetings, newsletters), including required and suggested videos and safety meetings.

Safety and health training derives from programmatic requirements, such as 10 CFR 851 requirements, DOE Orders, and corporate initiatives. New employees receive initial General Employee Training (GET), which is extensive and includes general safety and health training topics, including Integrated Safety Management and Hazard Communication (HAZCOM), among other topics. GET is required every 2 years thereafter. HAZCOM training can also be tailored for specific work locations as required on a case-by-case basis. The Team reviewed training manuals for both GET and HAZCOM and found them to be well organized and comprehensive. GET included a discussion of both, VPP and ISMS.

OJT covering risks specific to the job takes place at the departmental level. Employees must complete required training prior to exposure to a specific hazard. Before employees transfer to new assignments with different training requirements, they must receive the pertinent training prior to assuming their new responsibilities. The new line manager is responsible for ensuring the transferred employee meets the training requirements.

Managers and employees receive training commensurate with their level of responsibility. The SAP training system identifies the training requirements for each individual job or position, and documents course completion. This is done both manually by designated training representatives who administer the training database, and automatically when personnel log on to online CBT. The SAP training system is capable of managing training requirements, training courses, training schedules, booking training events, training notifications, qualification status of individuals or groups, and many other useful tools. The SAP training system is accessible to anyone with a valid B&W Y-12 computer user identification. Integration with other systems, such as badge

readers, medical system, and qualification checks in key areas, are also in place to control access. The Team verified that B&W Y-12 had a 99.56 percent training completion rate for its employees.

B&W Y-12 managers share the responsibility with their employees to understand and mitigate the potential hazards related to an activity. The SAP training system contains qualification and training requirements for each manager. Managers receive much of the same safety and health training as the workers. If there is a recognized need for training that goes beyond the boundaries of the course for employees, managers receive an expanded version of the course. Managers become familiar with the specific hazards of a job by being directly involved in the planning of tasks and work instructions, by assisting in the development and updates of JHAs, and by performing departmental self-assessments.

The Team witnessed an instructor-led Radiation Worker II Practical Refresher training, including classroom review of pertinent topics required by 10 CFR 835, *Occupational Radiation Protection*, which was well organized and presented. The practical component of the training included assessing the ability to don PPE, review a radiological work permit, perform, or simulate performance of a task in a contamination zone with multiple levels of fixed contamination and radioactive sources using ALARA concepts to minimize exposure, respond to alarms, and safely remove the PPE without spreading contamination. The testing facility provided a well-designed, realistic training environment and effective training aids. The instructor supplemented the exercise with relevant questions that helped the student avoid making mistakes, and encouraged the student to be thorough in his demonstration. The course included both classroom training and hands-on demonstration and required passing an examination with a score of at least 80 percent.

The Team also attended a portion of the hoisting and rigging training class. The instructor has worked for many years as a rigger at various sites on the Oak Ridge Reservation, including Y-12, and was knowledgeable. The course manual had good coverage of the subject and was written at a level appropriate for an average worker. The students participated by asking questions. The course included both classroom training and hands-on demonstration and required passing an examination with a score of at least 80 percent.

B&W Y-12 issues a handbook for its direct-hire construction personnel that includes an acknowledgement/signature page in the front of the booklet stating they have received, read, and understand their obligation to comply with the safety requirements contained in the handbook. The handbook is small enough for workers to carry conveniently for quick reference in the field. It contains brief discussions of important safety topics, such as general safety information, JHAs, daily job briefs, safety practices, PPE, tools, IH, fire prevention and protection, signs, boundary markers, barricades and barriers work performance, and special requirements for some projects.

B&W Y12 has an ongoing training initiative resulting from a January 2012 DNFSB assessment that included Conduct of Operations training. In response to the assessment, B&W Y-12 is revising the Conduct of Operations training methodology that incorporates craft skill levels into procedures and is formalizing the use of SMEs.

Workers interviewed during observations of randomly selected activities found that the workers had adequate training and were knowledgeable of the hazards for the work they were

performing. For example, one work activity observed involved a relatively new approach to clearing trees from around power lines. B&W Y-12 leased new equipment that changed the approach from using a bucket truck and manlifts to an electrician working on the ground from an enclosed cab. The equipment, specially designed for this purpose, uses an extendable insulated boom with a 24-inch saw blade. When queried, the workers quickly and easily demonstrated a significant depth of knowledge about the equipment, its operation, and the hazards presented by its use. In addition to the training provided onsite, the equipment operators received equipment-specific training from the equipment vendor.
The maintenance group has adopted a new process to provide greater emphasis on supervisor qualification and knowledge. The maintenance supervisors are now required to complete an oral board review that includes tabletop activities to demonstrate appropriate knowledge in various situations. This change was in response to an event where individuals, including a supervisor, did not respond effectively when an electrical short caused a fire during a maintenance activity. FIS uses the oral board either to confirm an individual has the requisite knowledge and skills or to identify additional areas where a supervisor needs additional training. For example, a supervisor was required to pass an oral board when his manager recognized that his walkdowns and surveillances were not identifying any issues. The focus of the oral board review was used to test the supervisor's knowledge of the surveillance process, not as a disciplinary measure.

The maintenance organization has recently revised the work control process in an attempt to streamline and increase the workability of the packages for the crafts. The new process only came online in March of this year. In support of the implementation of the new work control process, planners and direct supervisors received an 8-hour training course that described the new expectations of the revised work control process, and gave examples of the new work packages format. The first line supervisors received a 4-hour training session with emphasis on how to evaluate the new work packages prior to approval to perform work.

Conclusion

B&W Y-12 has a systematic approach to training that appropriately prepares and qualifies employees prior to performing work. The employees believe they are well prepared to perform their job safely. B&W Y-12 maintains electronic training records that are accessible to the employees, supervisors, and managers. All of the employees' records examined were current. B&W Y-12 meets the requirement of the Safety and Health Training tenet of DOE-VPP at the Star level.

VIII. CONCLUSIONS

B&W Y-12 has established a strong safety and health program. Since winning the contract in 2000, it has steadily implemented a series of program improvements that resulted in excellent safety performance and strong support and trust of the workforce. The strength of the management team and commitment to safety and health excellence, in some cases, mask more active worker involvement. However, workers interviewed by the Team were equally committed. Improvements in work planning and control and hazard analysis, particularly in the R&D processes, address weaknesses commonly seen elsewhere in the DOE complex and provide excellent examples for others. B&W Y-12 has established itself as a strong community member and is reaching out to the surrounding areas to expand safety awareness and safe work practices to work and home. The commitment to reinvest cost savings from process improvements has produced additional savings and improvements in worker health and morale. Although the Team identified some opportunities for improvement, it is confident in its recommendation that B&W Y-12 be admitted to DOE-VPP at the Star level.

APPENDIX A

Onsite VPP Assessment Team Roster

Management

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