Bechtel National Incorporated Waste Treatment and Immobilization Plant Construction Site

Report from the Department of Energy
Voluntary Protection Program
Onsite Review
November 12-22, 2013

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 DOE in 1994, VPP has demonstrated that cooperative action among Government, industry, and labor can achieve excellence in worker safety and health. The Office of Health, Safety and Security (HSS) assumed responsibility for DOE-VPP in October 2006. Assessments are now more performance based and are enhancing the viability of the program. Furthermore, HSS is expanding complex-wide contractor participation and coordinating DOE-VPP efforts with other Department functions and initiatives, such as Enforcement, Independent Oversight, and the Integrated Safety Management System.

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

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

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

By approving an applicant for participation in DOE-VPP, DOE recognizes that the applicant exceeds the basic elements of ongoing, systematic protection of employees at the site. The symbols of this recognition provided by DOE are certificates of approval and the privilege to display 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 Bechtel National Incorporated, Waste Treatment Plant construction site during the period of November 12-22, 2013, and provides the Chief Health, Safety and Security Officer with the necessary information to make the final decision regarding its continued participation in DOE-VPP as a Star site.

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ABBREVIATIONS AND ACRONYMS

AHA	Activity Hazard Analysis
AJHA	Automated Job Hazard Analysis
BLS	Bureau of Labor Statistics
BNI	Bechtel National Incorporated
CSR	Craft Safety Representative
CSA	Construction Safety Alliance
DART	Days Away, Restricted or Transferred
dBA	Decibel
DOE	Department of Energy
GFCI	Ground Fault Circuit Interrupter
HSS	Office of Health, Safety and Security
LMS	Learning Management System
LSC	Lift Safety Committee
NAICS	North American Industry Classification System
OBT	On Board Training
OM	Occupational Medical
ORP	Office of River Protection
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
POMC	Performance Objectives, Milestones, and Commitments
POD	Plan-of-the-Day
PPE	Personal Protective Equipment
SETO	Safety Education Through Observation
SIP	Safety Implementation Plan
SME	Subject Matter Expert
STARRT	Safety Task Analysis Risk Reduction Talk
STS	Safety Trained Supervisor
Team	Office of Health, Safety and Security DOE-VPP Team
TRC	Total Recordable Case
VPP	Voluntary Protection Program
WBGT	Wet Bulb Globe Temperature
WTP	Waste Treatment Plant
ZAC	Zero Accident Council

EXECUTIVE SUMMARY

The Hanford Site Waste Treatment and Immobilization Plant (WTP) is the largest construction project being conducted for the Department of Energy (DOE). Bechtel National Incorporated (BNI) is engaged in designing, building, and commissioning the vast plant complex, which will cover 65 acres. URS is a partner with BNI. Together, these two companies comprise the WTP construction project. The scope of this DOE VPP review does not cover the entire project organization, but only covers the physical construction site and the material receipt and warehousing areas in Richland, and activities directly related to construction. It does not include the engineering, design, and operations activities. The Central Washington Building and Construction Trades Council (Building Trades Council) represents workers at the site collectively. Incorporating technology successfully employed in France and England, the West Valley Demonstration Project in New York, and the Savannah River Site in South Carolina, the WTP construction project will consist of three main facilities: Pretreatment, Low-Activity Waste Vitrification, and High-Level Waste Vitrification, as well as a large Analytical Laboratory, and 20 support facilities. These facilities will treat more than 53 million gallons of radioactive and chemical wastes stored in 177 underground tanks and vitrify the waste for safe and secure disposal, thereby reducing the risks and exposure to the adjacent Columbia Valley region and the Columbia River. Started in 2001, DOE originally expected WTP to be operational in 2019. The organization for WTP construction site located on the Hanford Site is comprised primarily of manual workers, foremen, supervisors, and subcontractors, and their managers, administrative support, and field engineering personnel (collectively known as "nonmanual" employees at the project).

The work performed by this construction organization is typical of any large-scale site within the construction industry. These work activities include developing construction strategies, identifying apparent hazards within all work activities, performing constructability reviews, developing construction schedules, managing material receipt, installing and maintaining permanent plant equipment, and executing complex civil, electrical, and mechanical construction activities.

BNI began the Voluntary Protection Program (VPP) process as a Merit participant in 2008, and achieved Star recognition in 2010. Since then, technical design issues and budget constraints have slowed construction progress. Work on the Pretreatment facility, the largest of the four main buildings on the project, has halted. Work on the High Level Waste building has slowed significantly. Construction emphasis is on the Low Activity Waste building anticipating a revised treatment strategy that would permit direct feed of some tank wastes, bypassing the Pretreatment facility. The Laboratory building, the fourth of the major buildings is approximately 80 percent construction complete, and BNI is working toward completion of construction by June 2014. The current construction workforce consists of approximately 700 skilled crafts and laborers.

The number of BNI construction workers peaked in 2011, as did the number of BNI Total Recordable Case (TRC) and Days Away, Restricted or Transferred (DART) cases after a low point in 2010. The TRC and DART rates from 2010 through 2012 show a rising trend. The Office of Health, Safety and Security DOE-VPP Team (Team) believes this rise is at least partially due to workers' increased willingness to report injuries. The increased reporting of injuries or illnesses is a sign that workers are comfortable with the culture and they are gaining

trust in the system. BNI's TRC and DART rates continue to be well below the comparison industry average and meet the expectations for continued participation in DOE-VPP.

BNI managers at the WTP Construction Site demonstrate effective leadership and commitment to workers' safety and health. Improvements in supervisor training, additional emphasis on safety and quality as a means to achieve cost and schedule performance, and a willingness to accept and encourage workers' suggestions were evident across the site.

Employee involvement at the construction site has matured significantly since 2010. Most of the workers exhibit ownership of their coworkers' safety through the *My Brother's Keeper* concept. Craft workers interviewed by the team freely and without prompting identify and report issues, process improvements, work package issues, and participate in safety committees and programs.

BNI has processes in place to identify and analyze hazards associated with work performed at the WTP construction site. The hazard baseline is current and industrial hygienists regularly sample for hazardous material. BNI built upon previous VPP opportunities for improvement by enhancing the Safety Task Analysis Risk Reduction Talk cards' role in hazard analysis, enhanced employee involvement in prejobs and hazard walkdowns, and a continued focus on behavioral-based safety, and leading indicators.

BNI effectively uses engineered, administrative, and personal protective equipment, while also identifying materials, methods, and products that eliminate or minimize hazards. Engineering controls are available for use during welding, cutting, grinding, and confined space entry. The improvement to the flying loads/hoisting and rigging administrative controls were evident. In addition, continuous improvement of controls was observed during the assessment with the color-coded confined space ducting, and individual water bottles provided and available throughout the construction site. Craft workers were vigilant in performing safety inspections of various tools and systems.

Safety and Health Training is effective in ensuring workers are trained and qualified to address the hazards associated with working at the WTP construction site. BNI has developed several new training initiatives since the 2010 review in an effort to improve communications between supervisors and foremen to ensure continued improvement and to broaden their experience.

In the 3 years since the last DOE-VPP assessment, BNI has made great strides in expanding construction workers involvement and participation in the safety program. Despite challenges related to design, budget, and schedule, the workforce expressed their personal desire to do the job safely. Likewise, managers demonstrated their belief that safety and quality contributed to BNI's success. BNI needs to continue evaluating its processes for actions or expectations that weaken workers' trust, particularly related to accountability, injury investigation, and medical case management. BNI's improvements over the preceding 3 years demonstrate the continuous improvements expected for DOE-VPP participation. Therefore, the Team recommends that BNI at the Waste Treatment Plant construction site retain its Star status.

TABLE 1
OPPORTUNITIES FOR IMPROVEMENT

Opportunity for Improvement	Page
BNI should train and mentor supervisors and managers, and provide them with effective mechanisms to frequently and consistently reward workers for working safely and efficiently, not simply when they take actions considered *above and beyond*.	4
BNI should ensure injury investigations by safety personnel or supervisors do not take place within the confines of the medical clinic.	7
BNI should revise the case management procedure to ensure discussions between the case manager, safety personnel, and the medical provider related to type and necessity of care is limited to specific case management meetings between BNI and Medcor, or in specifically called meetings at a location other than the OM clinic.	7
BNI should train the union stewards in the Washington Department of Labor and Industries' claims process, including worker rights and responsibilities, company responsibilities, specific forms, the claims management process, and processes to ensure workers can access medical treatment while minimizing lost time from work, and subsequent lost pay.	7
BNI should ensure employees returning to work from offsite medical appointments related to injuries should report to the OM clinic in conjunction with the case manager to ensure identified restrictions are appropriate, can be accommodated, and appropriate medical record entries are filed.	7
BNI should work with ORP to identify alternative POMCs and eliminate annual TRC and DART rate goals in connection with award fee payments.	7
BNI SETO should consider including nonmanual employees in its safety observation process.	10
BNI should modify the CSA charter to clearly indicate that the CSA is a joint labor management committee on safety and health, document within the charter that the bargaining unit and managers negotiated the member selection process, and that the nomination of candidates constitutes approval by the bargaining unit.	11
BNI should ensure work planners determine the validity of a preexisting AJHA prior to including that AJHA in a work package.	14
BNI should label equipment relied on to protect worker safety and health with critical service information such as the due date for its next inspection, flow measurement results, and filter changeout date.	18
BNI should evaluate the effect the constant pressure switch grinder will have on the soft tissue of the wrist, hand, and forearm and identify means to mitigate the potential for ergonomic injuries.	19
BNI should consider covering invalid warnings posted on permanent equipment until	20

the postings are valid.	
BNI should consider adopting the practice of labeling the date a worker begins using a hardhat, and then requiring, at a minimum, replacement within the manufacturer's recommendation, or earlier based on its condition.	21
BNI should review its footwear policy and consider purchasing safety-rated footwear for craft that historically experience foot injuries.	21

I. INTRODUCTION

The Hanford Site Waste Treatment and Immobilization Plant (WTP) is the largest construction project being conducted for the Department of Energy (DOE). Bechtel National Incorporated (BNI) is engaged in designing, building, and commissioning the vast plant complex, which will cover 65 acres. URS is a partner with BNI. Together, these two companies comprise the WTP construction project. The scope of this DOE VPP review does not cover the entire project organization, but only covers the physical construction site and the material receipt and warehousing areas in Richland, and activities directly related to construction. It does not include the engineering, design, and operations activities. The Central Washington Building and Construction Trades Council (Building Trades Council) represents workers at the site collectively. Incorporating technology successfully employed in France and England, the West Valley Demonstration Project in New York, and the Savannah River Site in South Carolina, WTP construction project will consist of three main facilities: Pretreatment, Low-Activity Waste Vitrification, and High-Level Waste Vitrification, as well as a large Analytical Laboratory, and 20 support facilities. These facilities will treat more than 53 million gallons of radioactive and chemical wastes stored in 177 underground tanks and vitrify the waste for safe and secure disposal, thereby reducing the risks and exposure to the adjacent Columbia Valley region and the Columbia River. Started in 2001, DOE originally expected WTP to be operational in 2019.

The organization for WTP construction site located on the Hanford Site is comprised primarily of manual workers, foremen, supervisors, and subcontractors, and their managers, administrative support, and field engineering personnel (collectively known as “nonmanual” employees at the project). The work performed by this construction organization is typical of any large-scale construction site within the construction industry. These work activities include developing construction strategies, identifying apparent hazards within all work activities, performing constructability reviews, developing construction schedules, managing material receipt, installing and maintaining permanent plant equipment, and executing complex civil, electrical, and mechanical construction activities.

BNI began the Voluntary Protection Program (VPP) process as a Merit participant in 2008, and achieved Star recognition in 2010. Since then, technical design issues and budget constraints have slowed construction progress. Work on the Pretreatment facility, the largest of the four main buildings on the project, has halted. Work on the High-Level Waste building has slowed significantly. Construction emphasis is on the Low-Activity Waste building anticipating a revised treatment strategy that would permit direct feed of some tank wastes, bypassing the Pretreatment facility. The Laboratory building, the fourth of the major buildings is approximately 80 percent construction complete, and BNI is working toward completion of construction by June 2014. The current construction workforce consists of approximately 700 skilled crafts and laborers. Trades employed at the construction site include insulators, boilermakers, carpenters, cement finishers, electricians, ironworkers, laborers, millwrights, operating engineers, painters, pipefitters, sheet metal workers, sprinkler fitters, and teamsters.

The standard for DOE-VPP is not perfection, but continuous improvement. As such, this report identifies additional opportunities for improvement. BNI should evaluate these opportunities and address them as it deems appropriate through its safety improvement processes and include them in its annual self-assessment.

II. INJURY INCIDENCE CASE RATE

Injury Incidence Case Rate (BNI)					
Calendar Year	Hours Worked	Total Recordable Cases (TRC)	TRC Incidence Rate	DART* Cases	DART* Case Rate
2010	2,833,000	23	1.62	5	0.35
2011	3,398,000	37	2.18	12	0.71
2012	2,336,000	26	2.23	12	1.03
Three Years	8,567,000	86	2.01	29	0.67
Bureau of Labor Statistics (BLS-2012) average for NAICS** Code #236 Nonresidential Construction			3.4		1.8
Injury Incidence Case Rate (BNI subcontractors)					
Calendar Year	Hours Worked	TRC	TRC Incidence Rate	DART* Cases	DART* Case Rate
2010	600,000	1	0.33	0	0
2011	379,000	2	1.06	0	0
2012	278,000	0	0	0	0
3-Year Total	1,257,000	3	0.48	0	0
Bureau of Labor Statistics (BLS-2012) average for NAICS** Code #236 Nonresidential Construction			3.4		1.8

* Days Away, Restricted or Transferred

** North American Industry Classification System

TRC Incidence Rate, including subcontractors: 1.81
DART Case Rate, including subcontractors: 0.59

The number of the BNI construction workers peaked in 2011, as did the number of BNI TRC and DART cases after a low point in 2010. The TRC and DART rates from 2010 through 2012 show a rising trend but are significantly lower in 2013, with only 10 recordable injuries through October 2013. All three years remained well below the National averages for the comparison industry. The rise is probably attributable to several causes, including worker distractions and uncertainty surrounding the project, as well as workers becoming more willing to report injuries. Many of BNI's improvement efforts discussed throughout the report are contributing to the positive results in 2013 as those efforts mature. However, BNI's aggressive injury case management practices could reduce trust with the workers (see Management Leadership). BNI's TRC and DART rates continue to be well below the comparison industry average and meet the expectations for continued participation in DOE-VPP.

III. MANAGEMENT LEADERSHIP

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

In 2010, the Office of Health, Safety and Security (HSS) DOE-VPP Team (Team) determined that the BNI managers had successfully demonstrated to the workforce their commitment to safe, efficient work. Many workers still considered the safety improvement initiatives as a corporate program, but others were cooperating with managers to drive improvements. Middle managers were participating, but some foremen and general foremen continued to resist making improvements. Process improvements made by BNI in some cases represented best practices.

The 2010 assessment identified several opportunities for improvement related to management leadership. Those opportunities included greater participation by workers in preparation of the annual safety implementation plan (SIP); coaching and mentoring for foreman, general foreman, and superintendents; increased focus on specific goals in the SIP; improved procurement practices to ensure safety equipment was available to workers; and increased manager and supervisory attention to cranes and flying loads.

Since 2010, BNI has effectively addressed those opportunities, and the results were apparent during this evaluation. Communications between workers, foremen, general foremen, superintendents, and managers were demonstrably more frequent. During observations of managers and supervisory personnel in the work areas, workers and supervisors spoke freely with their managers, identified potential issues with safety and construction, and managers responded positively to those conversations. It was evident that workers and supervisors were comfortable discussing issues, reporting problems, and proposing solutions to managers, and managers, in turn, welcomed the workers' and supervisors' opinions and ideas.

As in 2008, safety and quality continue to be core values at BNI with maintaining cost and schedule performance baselines as a high priority. Senior managers are committed to maintaining a safe working environment while providing their customer a top quality product. Since 2008, many issues have arisen related to quality, design, and cost of the project that have challenged BNI and caused BNI managers to revise their approach to the project. While cost and schedule remain important, BNI managers now clearly demonstrate that quality and safety are prerequisites, and even enablers for effective cost and schedule performance. BNI's stated policy on safe and healthy working conditions is communicated to employees at all levels through daily reinforcement during plan-of-the-day (POD) meetings, safety meetings, prejob briefings, and during the completion of the Safety Task Analysis Risk Reduction Talk (STARRT) cards. BNI posts these policies within the buildings at the BNI construction site where both manual and nonmanual employees can view them easily.

A strong disciplinary process that defines clear consequences for specific actions backs up the safety policies. The process grades the discipline depending on the level of infraction and previous discipline history. In the 2 years prior to this assessment, BNI has recorded over 350 disciplinary actions, many of which resulted from errors by workers related to safety. Although those disciplinary actions were in accordance with the procedure, BNI does not effectively balance that disciplinary process with effective reward and recognition processes. BNI has several mechanisms to reward workers, but the preponderance of those programs relies on workers' names being put into a random drawing process for a cash award. The cash awards are popular, but have not proven effective in inducing workers to alter behaviors that might put them at-risk, or encouraged workers to identify or intervene in at-risk or errant behaviors. Rewards that do not rely on a drawing are only used by supervisors and managers for acts considered to be *above and beyond*. The heavy reliance on a disciplinary model to correct errors without a balanced reward system for normal, error-free behavior has the unintended consequence of discouraging workers from self-identifying errors, or the precursors that lead to the error (latent organizational and procedural weaknesses, perceived schedule pressures, normalized deviations, or other cultural factors).

BNI is training foremen, general foremen, and superintendents in supervisory leadership skills through a Safety Leadership Workshop, training in *Forthright Conversations*, and Safety Conscious Work Environment training. BNI could expand that training, along with mentoring and coaching, to help supervisors learn to recognize everyday effective performance, not just *above and beyond* performance. Such reward and recognition programs should emphasize the intrinsic value to the worker based on his or her relationship to peers and supervisors rather than the cash value of the reward. The training should encourage supervisors and managers to use human performance improvement principals so supervisors can thoroughly evaluate procedural errors to identify organizational and cultural causes of the error, rather than continually focusing on punishing workers for the error. This would better equip supervisors to limit disciplinary actions to workers that continue to demonstrate indifference or an intentional refusal to comply. In order to drive further cultural improvement and trust, BNI should train and mentor supervisors and managers, and provide them with effective mechanisms to frequently and consistently reward workers for working safely and efficiently, not simply when they take actions considered *above and beyond*.

Opportunity for Improvement: BNI should train and mentor supervisors and managers, and provide them with effective mechanisms to frequently and consistently reward workers for working safely and efficiently, not simply when they take actions considered *above and beyond*.

In addition to training supervisors, BNI recognized that the structure of the various committees, while inclusive of workers and senior managers, excluded middle managers and supervisors. Recognizing that exclusion, BNI recently chartered a Supervisor Safety Committee. This unique approach holds significant promise in helping supervisors recognize issues, recommend corrective actions, ensure they contribute effectively to a safety conscious work environment, and become an effective forum to address workers' issues in combination with the other safety committees.

Despite improved visibility, training, and responsiveness to workers' issues, BNI continues to struggle with earning the trust of a segment of the population. The strong disciplinary model

previously discussed, as well as some well-intentioned practices that have developed may slow or even erode workers' trust in managers' actions and intentions. In particular, several workers cited the policies and practices for injury response and medical treatment, which have been problematic since 2008, as cause for distrust. Bechtel corporate policies require that an injured worker's superintendent accompany the worker to the medical clinic. The corporate policies also implement a requirement for rapid investigation and corrective actions to injuries. In addition, BNI follows a very aggressive case management process to ensure nonwork related injuries do not become work-related.

The onsite medical clinic is operated and managed through a subcontract with MedCor, and provides initial first aid to workers. 24590-WTP-PL-SA-06-0006, *WTP Occupational Medicine Program (OMP,)* establishes the medical program roles, responsibilities, and authorities. 24590-WTP-GPG-SIND-0037, *WTP Injury/Illness Initial Response Guide*, addresses the initial steps to take when responding to an injured or ill employee requiring prompt medical attention. 24590-WTP-GPG-SIND-0019, *WTP Medical Case Management*, provides instructions for case management and treatment of work related injury or illness, and personal injury or illness that may affect an employee's ability to perform their required functions. BNI also uses this guide to ensure that in the event an employee is placed off-work, the attending medical provider is provided with work availability information to help return the employee back to work as soon as possible. In implementing these instructions, safety personnel and the case manager must interface with the medical provider, exchange information, and work together to achieve the optimal outcome.

In 2008, several workers expressed concern to the Team about BNI reclassifying injuries from work-related to nonwork-related without the worker's knowledge. The 2008 Team recommended that BNI might consider the assignment of an advocate to the worker that understands both the case and the Washington Department of Labor and Industries' policies and procedures. The advocate could work directly with the individual and help ensure the worker seeks appropriate medical advice and treatment, as well as help ensure the correct forms are accurately completed. Rather than assigning a specific advocate, the BNI case manager has attempted to fulfill that role. The case manager, in many instances, works directly with injured employees, helps them fill out the appropriate forms, schedules offsite medical appointments, provides transportation to and from offsite medical appointments, and assists workers with time and attendance reporting forms. The case manager also has the duty of overseeing the medical case files with the medical provider to manage reporting and recording of injuries. Most employees perceive this dual role of the case manager as a conflict of interest.

Most employees interviewed by the Team expressed concern that the case manager's sole concern was keeping injuries from becoming recordable. Employees witnessed conversations within the medical clinic where the case manager or a safety person asked the medical provider if a specific treatment or medication was necessary to treat the injury. In addition to the employees' concerns, medical staff reported they sometimes felt pressure from BNI personnel to provide lesser treatment to prevent an injury from becoming recordable (e.g., adhesive closures rather than stitches, nonprescription versus prescription pain medication). Employees and medical personnel alike shared a concern that the process of questioning employees or medical personnel either during or immediately following treatment compromised the injured employees' right to privacy under the Health Information Portability and Privacy Act (HIPPA). The Site Occupational Medical Director, also a MedCor employee, was adamant that he expected his staff

to provide the correct treatment for the diagnosis without regard to reportability or recordability, as long as they properly documented diagnosis and treatment in the medical record.

Safety personnel responsible for rapidly investigating injuries and taking corrective action to address safety hazards begin their investigation as soon as they can interview the workers, often while the worker is still in the medical clinic. Workers often perceive this approach as *getting the third degree* even for minor injuries. Several workers expressed this approach as a deterrent influence on their willingness to report minor injuries to the medical clinic.

Finally, there is a conflict between the Occupational Medical (OM) program procedure and the case management procedure. The OM program instruction requires that all return-to-work evaluations after injury or extended absence for health reasons be processed through the medical clinic before the worker returns to work. The case management procedure requires workers returning from offsite medical appointments, including appointments for work-related injuries/illness, to report to the case manager, not the occupational medical provider. The case manager, not the medical provider, reviews the medical status paperwork with the employees' discipline superintendent and safety assurance representative to determine if the worker can return to work. If the employee does not bring the medical record from the offsite medical appointment, the case management procedure directs the employee to leave the site. According to personnel in the medical clinic, BNI does not always provide medical records from offsite medical treatment or appointments to MedCor contrary to the medical program procedure and the medical provider contract.

The workers' trust in the medical clinic is critical in ensuring they are comfortable reporting any injury, no matter how minor, so BNI can address those hazards. In order to build workers' trust in the medical clinic and the investigation process, BNI should modify its injury investigation and case management practices. First, BNI should ensure the injury investigations by safety personnel or supervisors do not take place within the confines of the medical clinic. BNI should revise its process to conduct fact-finding meetings with the worker, any witnesses, and supervisors in a separate location after the worker has received treatment and been released from the medical clinic. Second, BNI should revise the case management procedure to ensure discussions between the case manager, safety personnel, and the medical provider related to type and necessity of care is limited to specific case management meetings between BNI and Medcor, or in specifically called meetings at a location other than the OM clinic. Third, in order to help workers understand and navigate the Washington Department of Labor and Industries' claims process, BNI should train the union stewards in the process, including worker rights and responsibilities, company responsibilities, specific forms, the claims management process, and the processes to ensure workers can access medical treatment while minimizing lost time from work, and subsequent lost pay. Fourth, BNI should ensure employees returning to work from offsite medical appointments related to injuries should report to the OM clinic, in conjunction with the case manager, to ensure identified restrictions are appropriate and can be accommodated. These improvements will help BNI and workers establish realistic expectations for medical treatment and claims processing, and restore workers' trust.

Opportunity for Improvement: BNI should ensure injury investigations by safety personnel or supervisors do not take place within the confines of the medical clinic.

Opportunity for Improvement: BNI should revise the case management procedure to ensure discussions between the case manager, safety personnel, and the medical provider related to type and necessity of care is limited to specific case management meetings between BNI and Medcor, or in specifically called meetings at a location other than the OM clinic.

Opportunity for Improvement: BNI should train the union stewards in the Washington Department of Labor and Industries' claims process, including worker rights and responsibilities, company responsibilities, specific forms, the claims management process, and processes to ensure workers can access medical treatment while minimizing lost time from work, and subsequent lost pay.

Opportunity for Improvement: BNI should ensure employees returning to work from offsite medical appointments related to injuries should report to the OM clinic in conjunction with the case manager to ensure identified restrictions are appropriate, can be accommodated, and appropriate medical record entries are filed.

The aggressive case management practices followed by BNI stem, at least in part, from contract incentives put in place by DOE. Annual Performance Objectives, Milestones, and Commitments (POMC) establish specific TRC and DART rate goals for BNI. Exceeding those established rates may be cause for DOE to reduce award fee payments. BNI translates those POMC goals into performance criteria for managers. This practice creates pressure on managers to classify injuries as not work-related or attempt to ensure medical care does not exceed recordable thresholds. The DOE Office of River Protection (ORP) frequently reviews and audits injury case records, including medical record entries, Occupational Safety and Health Administration (OSHA) 300 logs, and in some cases may interview the worker and medical provider in connection with those reviews. These reviews are generally effective in ensuring BNI accurately reports TRC and DART rates, but workers do not consistently see those reports. BNI should work with ORP to identify alternative POMCs related to leading rather than lagging indicators, such as manager time on-the-job-site, number of management observations conducted, average length of management observations, or percentage of workers participating in safety improvement initiatives, and eliminate annual TRC and DART rate goals in connection with award fee payments.

Opportunity for Improvement: BNI should work with ORP to identify alternative POMCs and eliminate annual TRC and DART rate goals in connection with award fee payments.

BNI effectively controls and directs subcontractor activities at the construction site. Subcontractors are managed and controlled by three different personnel that work as a team to ensure the contract is properly administered, that daily activities are conducted in compliance with BNI expectations, and that the delivered product meets the technical requirements. These roles are performed by a subcontract manager (payment and delivery), a subcontractor coordinator (daily oversight, scheduling, coordination, and safety), and a subcontractor technical

representative (technical oversight). These three people work together with the subcontractor to ensure a subcontractor meets contractual requirements in a safe, compliant manner.

Conclusion

BNI managers at the WTP construction site demonstrate effective leadership and commitment to workers' safety and health. Improvements in supervisor training, additional emphasis on safety and quality as a means to achieve cost and schedule performance, and a willingness to accept and encourage workers' suggestions were evident across the site. Managers are building trust with most of the workforce, but need to address continuing worker distrust of the injury case management process. BNI continues to demonstrate the Management Leadership necessary for continued participation at the Star level in DOE-VPP.

IV. EMPLOYEE INVOLVEMENT

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

In its 2010 review, the Team observed a significant improvement in the workers' attitude toward participation in safety initiatives. Since 2010, BNI is continuing to build on that success and is empowering the workforce to go over and above requirements. During interviews, employees indicated that they believe that participation in DOE-VPP enhances their safety, and most workers fully appreciate and support these efforts. BNI encourages employees to participate using the safety logbook, bringing up issues to Craft Safety Representatives or foremen, participating in presentations at *Safely Speaking* safety meetings, performing behavior-based safety observations, attending conferences, participating in prejob briefings, identifying work sequences to prevent rework, and submitting suggestions that improve safety.

Craft employees effectively engage in all levels of safety and health programs, promoting a just safety culture and continuously promoting the *My Brother's Keeper* concept, and look out for each other at the BNI construction site. Employees developed a presentation for the Voluntary Protection Programs Participants Association national conference explaining the *My Brother's Keeper* concept at the site. The presentation provides information about work, different crafts, active lifts, fall protection, numbers of STARRT cards, and numbers of work packages on a typical day. One slide shows how the reduction in reportable events over time correlated with safety programs' maturity and increased employee involvement. Employees have also developed many videos for presentation to the workforce and at safety conferences. These worker-produced videos exhibit a very professional production quality, cover topics that are immediately applicable to the workers, and communicate effective safety messages in an entertaining and engaging way.

The Construction Manager chairs the Zero Accident Council (ZAC), which guides and manages safety improvements at the site by bringing together available resources and coordinating the efforts of other safety committees, organizations, and individuals. The council consists of managers, standing safety committee chairs, a craft safety representative (CSR), and a craft site steward representative. Each month, ZAC publishes a combined safety newsletter that incorporates input from the several standing safety organizations including the Construction Safety Alliance (CSA), Safety Education Through Observation (SETO) committee, Electrical Safety Committee, Lift Safety Committee (LSC), CSRs, and the Craft Site Stewards. To encourage employees to read the newsletters, the ZAC embeds employee numbers within the text of safety articles. Employees that identify their numbers in the newsletter may make a selection from the company catalog as a reward. Examples of items include mag-light flashlights, lunchboxes, keychain lights, or laser pointers.

In 2010, the BNI's behavior-based safety program SETO made significant improvements by documenting a charter, training most employees, and continuing to encourage observations. The 2010 Team recommended that BNI should ensure crafts are *proportionally represented* in the SETO program. BNI has subsequently tried to encourage additional craft participation in SETO with several actions. For example, each month, the Area Vice Chair nominates an individual who, through observation, involvement, and leadership in the program, demonstrated behaviors that go above and beyond the safety of the individual to include looking out for the safety of coworkers. In addition to the nomination from the Area Vice Chair, the SETO Area Champion must also concur with the award. The majority of the awards go to craft employees; however, nonmanual employees who are proactively involved in SETO receive recognition for their leadership and support to the program. SETO awardees can select from the catalog described above in the ZAC discussion. In 2013, some employees remain uncomfortable with the prospect of another worker observing them performing work. Continued SETO training, reinforcement, and maturation of the workforce will improve workers' perceptions and participation. During interviews and meetings with nonmanual workers (salaried employees, engineers, safety specialists, and administrative support personnel), the workers indicated they were not actively engaged in a people-based safety process. Encouraging nonmanual workers to participate in these programs might help BNI use them as a fresh set of eyes at construction site activities, and more effectively eliminate unsafe or at-risk behaviors. BNI SETO should consider including nonmanual employees in its safety observation process.

Opportunity for Improvement: BNI SETO should consider including nonmanual employees in its safety observation process.

In 2010, BNI formed CSA to promote alignment, communication, and encourage employee involvement. The CSA drives and leads continuous improvement across the site. It strives for two-way communication to build a strong safety and quality culture. It promotes employee involvement and addresses programmatic issues across the site. Its goal is to provide the ZAC with employee concerns and suggestions that the ZAC can address.

The CSA charter requires that at least 50 percent of the CSA members be manual employees, with the remainder being nonmanual workers and a management champion. To fill openings on CSA, labor leaders recommend craft personnel that exhibit positive attributes, energy, and have their peers' respect. The Construction Site Manager and the Labor Relations Manager review these candidates to ensure their performance record does not indicate any problems with their participation. The other members of the CSA then interview the candidates and vote for a final selection. The bargaining unit agreed to and accepted this process to ensure the CSA meets the requirements for a joint labor management committee on safety and health. The DOE-VPP program requires that the bargaining unit members select, elect, or approve the bargaining unit members of the joint labor management committee. Although the original nomination might imply bargaining unit approval, BNI should modify the CSA charter to indicate clearly that the CSA is a joint labor management committee on safety and health, document within the charter that the bargaining unit and managers negotiated the member selection process, and that the nomination of candidates constitutes approval by the bargaining unit.

Opportunity for Improvement: BNI should modify the CSA charter to clearly indicate that the CSA is a joint labor management committee on safety and health, document within the charter that the bargaining unit and managers negotiated the member selection process, and that the nomination of candidates constitutes approval by the bargaining unit.

Safely Speaking is a forum where managers and employees present safety topics and other useful information to the workforce. Topics may include winter driving, recent event investigation results, and new processes. The *Safely Speaking* safety meeting occurs once a week and addresses 100 percent of the working population. The Team attended one of the meetings and the forum and presentations were very good. The managers were present, but not intimidating. Employees presented safety topics and managers provided opportunities for the craft to ask questions or solicit clarification from presenters. In this case, the most interesting topic presented was a video explaining changes to ventilation of confined spaces. The craft workers developed the video to explain changes to ensure positive control of life safety equipment. After the video, several craft asked questions for clarification and the exchanges between workers, managers, and subject matter experts (SME) were very professional (see Hazard Prevention and Control).

The 2010 Team suggested that BNI could improve its CSR program by coaching and mentoring CSRs in communicating craft safety concerns to managers and communicating solutions back to workers. During this assessment, the Team observed CSRs openly and effectively communicating with craft workers and supervisors. CSRs provide a conduit for information flowing down to the workers and up to management. During interviews, CSRs informed the Team that they can engage in discussions with managers at any time and managers openly solicit information from them.

The Operation Zero program is a program geared towards employee involvement. Employees participate in the Operation Zero program by completing safety-related activities on a monthly basis. In developing each monthly Operation Zero activity, every effort is made to ensure that employees are learning something useful and are reminded of their safety roles and responsibilities. Employees are encouraged to participate in up to three activities per quarter to be eligible for the random $500 drawing, which is awarded to several employees each quarter. Managers and superintendents can also award employees with on-the-spot- awards for safety performance

In addition to the BNI committees discussed above, BNI has craft or task-specific committees. These include LSC that addresses operation of aerial manlifts into and onto buildings, and the Electrical Safety Committee that addresses any electrical safety issue, and the Supervisor Safety Team (see Management Leadership).

The Team attended a POD meeting where the upcoming days' work is coordinated with superintendents and foremen. There was good interaction between the superintendents and foremen, ensuring everyone was aware of activities and potential work conflicts. At the worker level, the Team observed good interaction and engagement at prejob briefings by workers. Several workers asked questions for clarification. Prejob meetings also offered an opportunity for workers to provide input to sequencing and installation of equipment to field engineers. Some workers described an example involving the installation of hangers that workers would have to remove later to accommodate installation of another component, and then reinstall the

hangers. An employee pointed out to his manager that installing the hangers would require that significant rework. BNI delayed installation of the hangers thereby avoiding the cost of rework.

BNI experienced a period recently when items fell from elevated work areas. From October 2-15, 2013, 8 items fell from elevated work areas. Items included a spud wrench, pipe hangers, swivel clamps, hammers, and a rigging softener. The spud wrench dropped 60 feet and a 3-pound rigging softener dropped 40 feet. In response, BNI initiated a campaign called *Stop the Drop* to focus on preventing injuries caused by falling objects. The actions included focused prejob discussions on elevated work, not taking material up to work platforms if not needed, tying off (lanyard) tools when working on elevated platforms, and ensuring spotters and other personnel were not near areas when falling objects are possible. BNI attributes a significant reduction in near-misses from falling objects to this effort.

BNI employees are involved in suggesting, testing, and selecting new tools and personal protective equipment (PPE) that reduce or eliminate employee exposures to hazards. Examples include new types of welding machines, types of gloves used for a variety of situations, concrete anchor installation machines, and safety eyewear.

The Team observed a few indications of complacency. For example, the Team observed equipment hung in inappropriate locations, trash in wrong bins, electrical cords running on the floor or coiled and left on the floor, equipment stored in toolboxes rather than turned in, and respirators stored incorrectly. The CSA members understood some workers continue to take shortcuts to be productive, rather than take the time to do it correctly. BNI continues to be proactive in these areas. CSRs are frequently walking through workspaces, encouraging workers to take the time to do the job safely and correctly the first time. CSRs provide an effective conduit for workers to voice their concerns and suggestions. Foremen, general foremen, and superintendents are in the work areas performing walkdowns, monitoring work, and making themselves available to workers. The *Safely Speaking* meeting observed by the Team included a discussion of a housekeeping walkdown performed by safety personnel. These actions demonstrated BNI's commitment to continuously look for and eliminate complacency related to safety.

Conclusion

Employee involvement at WTP has matured significantly since 2010. Most of the construction workers exhibit ownership of their coworkers' safety through the *My Brother's Keeper* concept. Workers freely and without prompting identify and report issues, process improvements, work package issues, and participate in safety committees and programs. BNI meets the expectations for continued participation in DOE-VPP at the Star level in the Employee Involvement tenet.

V. WORKSITE ANALYSIS

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

The Team reviewed the processes that BNI has employed to identify and analyze hazards. BNI established a hazard baseline for its facilities and operations so work planners and procedure developers can easily reference retrievable data relative to the identified hazards and controls for tasks. Qualified safety and health professionals documented a comprehensive baseline survey in 2010. BNI has annually updated the hazard baseline document since 2010. Industrial hygienists conduct regular personnel monitoring the first time workers use a hazardous substance, or validate control selection for a hazardous substance. Discussions with employees indicate that depending on the work performed, industrial hygienists monitor them for beryllium, lead, asbestos, chromium, and other hazardous materials exposures. As situations change or new sampling data becomes available, industrial hygienists update the hazard baseline database to reflect the new information.

The Team reviewed work plans, Automated Job Hazard Analyses (AJHA), and hazard analysis documents that indicate workers, supervisors, and planners perform preuse and prestartup activities at the BNI worksite. For example, prior to using aerial lifts, workers, supervisors, and safety personnel walk down the area to identify hazards, obstructions, and potential interference with other ongoing work. They also consider floor-loading, diesel or gas powered engines inside buildings, and any energized electrical equipment in the vicinity. Prior to initiating the lift to perform work, they complete an analysis of these hazards. In addition, BNI requires extensive training and qualification to operate certain types of aerial lifts due to the lift's ability to articulate and access spaces normally requiring scaffolding.

BNI involves workers in all aspects of worksite analysis. Prior to performing work, planners, SMEs, and workers walk down the work location using an Activity Hazard Analysis (AHA) checklist to identify hazards. Using the identified hazards from the AHA, the AJHA process begins. The AJHA either populates the hazard selections with questions to focus the control selection, or identifies controls found in regulations. For example, if the checklist identifies a confined space hazard, the process provides questions to determine if it is permit-required or non-permit required. If the checklist identifies the confined space as permit-required, the process identifies the controls necessary to access that space. The AJHA also has a section that allows the safety professional to develop and document controls not addressed in regulations. The Team interviewed craftsmen that had participated in identifying and developing control selection, and most agreed that the process helped them work more safely. The 2010 Team identified generic descriptors (e.g., appropriate, proper, required) as an issue in that the final determination for control often rested with the worker. The 2013 Team's review of AJHAs indicated improvement in this area but the Team recommends continued focus due to the number of legacy documents within the BNI system.

BNI includes AJHA in the work package and foremen use it to brief the workers at the prejob briefing. The Team observed a prejob briefing to pressure-test bonded schedule 80 Polyvinyl Chloride (PVC) pipe joints. The work was located in the basement of the Low-Activity Waste Vitrification facility surrounded by concrete walls. The workers identified several discrepancies in the work package. The AJHA was prepared in 2010, and the work description and location were not current. The workers also identified that the controls were not applicable to the proposed work. For example, a control stated that the erection of danger tape must be 25 feet from the test zone. The test zone was behind concrete walls with doorways. Another control required that while the pipe was pressurized, there would be no entry into the Conex. There was no Conex used. The workers and their supervisor suspended the job pending resolution of the issues and completion of a new job walkdown. BNI should ensure work planners determine the validity of a preexisting AJHA prior to including that AJHA in a work package.

Opportunity for Improvement: BNI should ensure work planners determine the validity of a preexisting AJHA prior to including that AJHA in a work package.

The 2010 Team found BNI improved the STARRT process by using the STARRT card as a prestart situational hazard analysis to help the worker identify new or situational hazards that may not have been identified (or even been present) in the formal hazard analysis prepared for the task. BNI has further improved the process by integrating STARRT cards into a larger process that includes AHAs and AJHAs. The STARRT card helps workers confirm conditions have not changed since planners prepared the work package. Employees used the STARRT cards extensively at the worksite prior to commencing work. The Team interviewed several craftsmen about work packages, AJHAs, and STARRT cards and they believed the STARRT card encouraged them to take ownership for safety and quality. The card includes the work package number the worker will be using for the day, specific tasks to be performed, proper controls from the AJHA they will be using, likely error precursors, actions the worker will take to avoid errors, and work activities in the area that might impact the worker. Other information on the card is specific to the types of hazards that may exist such as lifts, chemical usage, barricades needed, PPE, hot work, excavation, body hazards, ergonomic hazards, and weather. The card also allows workers to document feedback and improvement suggestions, and includes a section for supervisors to discuss any feedback with the work crew. Supervisors and safety personnel review STARRT cards daily and document that review by signing the card.

Discussions with employees indicate BNI encourages the workforce to exercise a questioning attitude with no fear of reprisal for pausing work for clarification or questions. Every employee was aware of his/her responsibility to stop or delay work for safety and/or job sequencing issues or concerns. They were reminded of this responsibility during *Safely Speaking* meetings, prejob briefs, STARRT card reviews, and POD meetings.

BNI provides all workers with the WTP Construction Toolbox, a small spiral pad containing useful information for employees. To encourage employees' questioning attitude, BNI included several reminders for evaluating the worksite from the worker level. For example, one tool, *Am I Ready to Perform the Work,* helps the worker determine if he or she is ready to perform the task by asking themselves *Am I qualified to perform the work, can I do the work safely, what are the safety errors, mitigation of safety errors,* and *what would stop this work?* The toolbox includes self-checking steps workers ask themselves before performing critical activities. One section discusses conservative decisions while performing work. Other sections in the toolbox

focus on uncertainty, unexpected results, and critical steps. The construction toolbox explains the use of these tools and others to foster and enhance the questioning attitude that supports the basis for hazard analysis.

Craft employees acknowledged awareness of accident/incident investigations and their roles in these processes. BNI has a documented process to evaluate incidents and develop corrective actions to preclude repeat occurrences. Employees interviewed by the Team were aware of the BNI discipline program. Although some employees expressed their apprehension related to incidents resulting in disciplinary actions, others believed that the disciplinary system is clear. BNI has a lessons learned program in place and includes pertinent lessons in work packages. BNI encourages employees to offer past work experiences during prejob briefs.

BNI tracks and trends a variety of information throughout the year. TRC and DART rates are typically the most obvious to the workers. Sampling data from the workplace are also trended for action levels and the need for additional and/or reduction of controls. BNI tracks and trends behavioral observations and discusses trends in SETO meetings. These observations are leading indicators and serve as data points for the SETO members to focus on during upcoming observations. BNI's analysis of these observations indicates that observing and recognizing safe behaviors helps reduce at-risk behaviors. Discussions with craftsmen indicate that some manual workers support the people-based safety process and volunteer to perform observations. Others are less willing to allow another worker to observe them during work. In January 2013, BNI introduced *It's Ok* as an approach to encourage employees to accept fellow workers' help. This approach fosters the message that I am open to receiving help, comments, suggestions, feedback from any person at any time to reduce my risk of injury. SETO members are hoping this initiative will influence more workers to accept behavioral observations as a positive experience.

BNI publishes a quarterly report using the guidance from DOE Guide 231.1-1, *Occurrence Reporting and Performance Analysis Guide, and Performance Management Handbook, volume 5,* Occurrence Reporting and Processing System (ORPS) events, and BNI reporting processes. The Team reviewed *the Quarterly Performance and Recurring Event Analysis Report – Third Quarter Fiscal Year 2013* (24590-WTP-RPT-SA-13-013, Rev. 0). The trend data indicates that there were 20 ORPS reportable events during the rolling year. The analysis of both ORPS and non-ORPS events shows that human performance continues to be the leading cause of these events. Compliance with WTP project processes and procedures continues to be a challenge, and managers are engaged in examining the actions that are being taken to improve this condition (Section 2.2, Trends). Since worker behavior is such a significant contributor to all of these events, Construction Management is using *It's OK*, the SETO team, LSC, and the Construction Management Safety Committee to improve expectations for supervision and oversight to reinforce positive behaviors.

Conclusion

BNI has processes in place to identify and analyze hazards associated with work performed at the WTP construction site. The hazard baseline is current and industrial hygienists regularly sample for hazardous material. BNI built upon previous VPP opportunities for improvement by enhancing the STARRT cards role in hazard analysis, enhanced employee involvement in prejob and hazard walkdowns, continued focus on behavioral-based safety, and leading indicators. BNI meets the expectations for continued participation in DOE-VPP at the Star level in the Worksite Analysis tenet.

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/procedures must also be followed by everyone in the workplace to prevent mishaps or control their frequency/severity.

The WTP construction site continues to improve controls since the 2010 VPP assessment. Workers stated they use stop or pause work to improve unsafe conditions. Overall, workers take pride in maintaining their work areas by sweeping work areas and removing clutter.

BNI continuously searches for hazard elimination alternatives at WTP and works with craft supervisors to gain their approval for subsequent use. For example, BNI eliminated noise and ergonomic hazards from jack hammering concrete by using expanding grout. Workers drill holes into the concrete then pour the grout into the holes. As the grout cures, it expands and breaks the concrete, avoiding the exposures to noise, vibration and dust from jack hammering. BNI also uses a variety of dust collection tools, from small dust collectors used in shops, to much larger systems integrated into concrete grinding and surfacing tools that replace impact scabblers and needle guns. In one case, BNI identified that workers, in the interest of safety, were using a 10-ton gantry shop crane as a fall protection anchor point. The manufacturer did not approve the A-frame for fall protection. The Safety Assurance personnel recognized this condition, and prohibited workers from using the A-frame as an anchor point, but also began an engineering analysis to determine if the A-frame could be used in the future for that purpose.

BNI effectively controls hazards associated with various manlifts throughout WTP. Those controls include engineering review of floor loading limits, posting of zones, restrictions on movement and storage of manlifts, and the use of spotters when moving or positioning the basket. In some cases, BNI installed steel plates and rails to limit movement of manlifts in certain areas. The Team observed "NOTICE" signs posted in areas that indicated the slab thickness and lifts that could operate on that slab floor. Engineers also provide guidance to superintendents on specific equipment that can safely operate on the various slab thicknesses, and upon request, engineering can evaluate equipment weights to floor load design specifications.

BNI procedure MGT-073, *System and Equipment Lockout/Tagout*, provides program procedures and forms for deenergizing systems and keeping them under control while work is performed. Per the partnership agreement, URS manages the lockout/tagout program. The BNI training program provides necessary lockout/tagout courses for authorized employees and URS verifies training prior to issuing a permit. The Team reviewed a lockout/tagout established in 2009 for two switches in a panel box and verified it as locked out, and the tag on the switches matched office records.

Over the past few years, BNI has suffered recurring problems with procedural compliance, particularly with lockout/tagout. Typical corrective actions to those incidents have included procedural revisions to the lockout/tagout instruction. Recently, BNI performed a detailed review of the lockout/tagout procedure, and identified the length and complexity of the

instruction as contributing to procedural errors. In response to that review, BNI is revising MGT-073 with the goal of simplifying the instruction while ensuring it meets regulatory requirements and incorporates human performance improvement principles.

BNI has an established confined space program. The program effectively classifies spaces, evaluates entries, identifies hazards, and controls hazards. Safety Assurance uses 24590-WTP-GPP-SAIH-006, *Evaluating Confined Space*, and records classifications of confining spaces on form SIND-F0003, *Confined Space Classification*. BNI assigns a unique identifier to the confined space and posts the entry point. Nonpermit confined spaces have a yellow caution sign to indicate that work can introduce hazards into the space, such as welding or painting, and requires contacting a superintendent prior to starting work. Permit-required confined spaces have a red danger sign, indicating the space is a permit-required space and entry is by permit only.

The entry supervisor, with assistance from field safety assurance personnel, must evaluate any confined space entry, and implement the confined space entry process. The evaluation includes a review of the work scheduled in the space and the identified hazards. The entry supervisor and field safety personnel document applicable hazards using a computer-based electronic form, and then select applicable controls for that hazard, such as local exhaust ventilation. The electronic form provides the potential hazards in confined spaces including atmospheric hazards. Atmospheric hazards may require additional ventilation controls. General supply and exhaust ventilation is used when the atmospheric hazards can be continuously monitored by a multi-gas air monitor. When the work might create a potential toxic atmosphere or the industrial hygienist cannot continuously monitor with a multi-gas air monitor, safety assurance personnel calculate the required forced air ventilation rate to refresh the air in the space every 5 minutes.

In addition to identified confined spaces, spaces with limited access and ventilation emerge as construction progresses and may become permit-required confined spaces. The Field Safety Assurance team frequently walks down the worksite and keeps an electronic record, including pictures, of the confined spaces. Although not required, the pictures enhance the record of the space and its history.

Several months ago, workers identified concerns that they could not easily distinguish between yellow collapsible ducts providing positive ventilation to confined spaces from yellow ducting providing general ventilation. The workers recommended that BNI use a different distinct color for ducts to confined spaces. In response to that recommendation, BNI implemented a new policy requiring red ducting for supply ventilation for confined spaces. To introduce this new policy, craft personnel created a training video, and presented it during *Safely Speaking* sessions. Since ventilation to confined spaces is critical, the new red ducting policy prohibits unauthorized workers from moving, disturbing, or changing the red ducting or its associated blower. In addition, workers label the supply blower and power cord with tags indicating that only authorized staff can unplug or power down supply air blowers. This policy change addressed worker concerns, improved safety by easy identification, and did not incur additional costs since BNI only had to change the color of ducting it purchases.

BNI uses portable local exhaust blowers or hoods throughout WTP to provide local exhaust ventilation for welding, cutting, and grinding work. Depending on the work and location, an AJHA may identify the use of an exhaust hood as an engineering control. For example, the AJHA for carbon arc gouging (plasma cutting) of stainless steel, hastelloy, or Inconel requires local exhaust ventilation to prevent exposure to hexavalent chromium. The AJHA specifies the

use of the Lincoln Electric Mobiflex fume extractor with a capacity of 100 linear feet per minute for plasma cutting operations. Workers at the T-15 fabrication shop maintain the Mobiflex fume extractors per manufacturer's recommendations, but the fume extractor is not labeled with its next maintenance due date, whether it is functioning to manufacturer's specifications, or that it has been verified to provide the required airflow. In one case, a worker had labeled a Mobiflex fume extractor in the Low-Activity Waste Vitrification building with blue tape, and had written "filters changed - October 16, 2013."

In its 2012 self-assessment, BNI identified labeling of construction tools to indicate required maintenance as an opportunity for improvement. Although BNI evaluated and closed this opportunity based on existing process to label construction tools, it did not include portable equipment, such as the local exhaust blowers, in that evaluation. In order to provide workers with assurance that engineering controls are functioning properly, BNI should label equipment relied on to protect worker safety and health with critical service information such as the due date for its next inspection, flow measurement results, and filter changeout date.

Opportunity for Improvement: BNI should label equipment relied on to protect worker safety and health with critical service information such as the due date for its next inspection, flow measurement results, and filter changeout date.

BNI has an effective and extensive hearing conservation program. Noise hazards exist throughout the construction site, from portable tools, operating equipment, or other sources. The industrial hygiene field team worked closely with craft personnel to identify noise controls in the AJHA by measuring noise from equipment used on the construction site. When the planner identifies tools or machines in AJHA, the planner uses the noise measurements to identify yellow (caution) barricades for levels above 85 decibels (dBA), and red (danger) barricades for levels above 100 dBA. Yellow barricades require single hearing protection while red barricades require double (earplugs and muffs) hearing protection. The industrial hygienist has selected specific hearing protection devices for BNI to ensure the device affords the appropriate noise reduction. The procurement office only purchases devices approved by the industrial hygienist and each purchase for hearing protection devices requires the industrial hygienist's approval. Additionally, the industrial hygienist has begun working with the medical facility staff to implement an earplug validation system. The system directly measures noise reduction within the ear using a replica of each of the earplugs approved for use on the site. The replica has a small tube inserted that connects to a microphone. The validation program will help workers understand how to wear an earplug properly and increase user confidence in wearing the plug.

A series of incidents occurred in 2012 involving workers and the use of grinders with trigger locks. One incident resulted in an individual seriously injuring a tendon in his hand after the switch remained locked, and kicked the spinning grinder wheel back onto his hand as he was setting the tool down. The investigation of the injury identified *Bechtel Environmental, Safety and Health, General Safety Working Requirements, Core Process* 200, document prohibited the use of grinders with lock-on switches. Specifically, Core Process 200 stipulates *Grinders must be equipped with a constant pressure switch.* As a result of this internal noncompliance, BNI initiated the removal of all lock-on switch equipped grinders from WTP. The removal of these grinders is ongoing with nearly 80 percent of them being replaced.

BNI adopted this policy without evaluating additional hazards caused by the constant pressure switch. Since workers have to maintain constant pressure on the switch, they cannot adjust their

hand position as they could with the trigger lock tool, which may lead to awkward hand positioning and increase the potential for soft tissue injuries to the hand, wrist, or even the forearm. Based on interviews with managers, they have considered alternating workers during grinding operations, but they have not evaluated rotation schedules based on body positioning or other considerations. The STARRT card includes a section related to body hazards associated with tool vibration greater than 4 hours, but this does not include consideration of body position. BNI should evaluate the effect the constant pressure switch grinder will have on the soft tissue of the wrist, hand, and forearm and identify means to mitigate the potential for ergonomic injuries.

Opportunity for Improvement: BNI should evaluate the effect the constant pressure switch grinder will have on the soft tissue of the wrist, hand, and forearm and identify means to mitigate the potential for ergonomic injuries.

BNI has an extensive and effective heat stress management program. The program uses monitoring of ambient conditions to determine work rest (breaks) times in cool zone rest areas. In addition, bottled water is widely available. 24590-WTP-GPP-SIND-068, *Heat and Cold Stress Prevention*, identifies four typical work zones that represent worksite conditions: 1) inside a building without air conditioning; 2) outside in the shade; 3) outside in the direct sunlight; and 4) outside in the direct sun with no air movement (cell). As ambient temperatures exceed 85° Fahrenheit, safety assurance personnel set instruments into the zones to measure the wet bulb globe temperature (WBGT). E-mails and text messages provide the WBGT results to superintendants and managers about the current heat stress potential. Foremen and superintendents determine appropriate work rest cycles based on those measurements and a laminated heat stress index card that is provided to the workers. The cards provide the matrix of extended scheduled rest breaks based on layers of clothing and metabolic work rate. Workers take breaks inside a predetermined cool zone. Foremen and superintendents also permit workers to self-regulate breaks during hot conditions.

In 2012, the site began providing individual bottles of water, replacing the water cooler dispensers and cups. BNI provides the water bottles throughout the site and stores them in refrigerators and freezers. Workers prefer individual bottles and are more likely to remain well hydrated, helping reduce heat stress. Switching to individual water bottles had the extra benefit of removing a hazard. In 2010, the Team observed workers moving flatbed trucks of large water bottles around the site. Unsecured bottles fell off the flatbed truck on some occasions. Additionally, workers spent many hours cleaning and sanitizing water coolers with bleach solutions, exposing them to skin hazards. Moving the water bottles exposed workers to additional body positioning and lifting hazards. Using individual water bottles eliminated the unsecured loads, and cleaning of coolers. The cases of water bottles are easier to lift and move with hand trucks.

BNI effectively controls electrical hazards on the construction site through extensive ground fault protection and regular inspections by qualified electricians. Color coded tape on electrical cords indicates a current inspection for the quarter. In some facilities, ground fault circuit interrupters (GFCI) protect the main power source into the facility. Temporary power distribution boxes (Spider boxes) provide a temporary multi-plug receptacle. These boxes are also GFCI protected.

As permanent equipment increases at WTP, conflicts develop between signs posted on permanent equipment and signs related to construction hazards. For example, the Team

observed a deenergized electrical cabinet in the Laboratory building with high voltage postings. The cabinet was open, and electricians were pulling wires and installing cables. No high voltage hazard existed. Workers ignore these postings, but may mistakenly ignore a valid posting as construction progresses. BNI should consider covering invalid warnings posted on permanent equipment until the postings are valid.

Opportunity for Improvement: BNI should consider covering invalid warnings posted on permanent equipment until the postings are valid.

Construction personnel use ladders and scaffolds extensively, and BNI conducts frequent and periodic inspections per OSHA standards. Carpenters inspect all ladders on a quarterly basis, and mark that the ladder passed inspection by applying a colored tape strip. The colored tape indicates the current quarter. They permanently remove ladders that fail inspection. Job-made ladders are inspected daily for temporary locations, or quarterly for fixed locations. The Team did not observe any ladders in use that did not display a current inspection. Carpenters assigned to a facility complete daily and nightly inspections of scaffolds and temporary ladders. BNI uses colored tags tied to the scaffold access ladder to indicate the condition of the scaffold. Green tags indicate that scaffolds comply with Federal OSHA regulations and qualified personnel may use the scaffold. Yellow tags indicate the scaffold is structurally sound, but an obstruction exists that requires fall protection and an anchor point. Scaffolds not in service have red tags, but authorized employees can access it.

BNI conducts frequent and periodic inspections of other equipment, tools, and PPE. Riggers perform required inspections of rigging equipment, and dispose of equipment that fails inspection. BNI recycles nylon rigging that fails inspection by cutting the straps and using the cut pieces to cover sharp edges and corners. Laborers perform monthly fire extinguisher inspections. Tool crib personnel inspect portable tools, fall protection harnesses, and lanyards prior to issue, and periodically as required. Again, color-coded tape indicates the current quarterly inspection.

In the 2010 VPP report, the assessment Team drew attention to unsafe behaviors related to flying loads. BNI managers immediately responded by developing a three-step improvement process that included: 1) a review of procedures, i.e., questioning whether whistles were still effective; 2) raising worker awareness through safety pauses and briefings; and 3) making flying loads an area of focus of Senior Supervisory Watches and a topic for SETO. As part of that action, BNI suspended the qualifications for all flagmen, reduced the number of qualified flagmen by half to ensure proficiency, and revised and increased the rigor of the flagman qualifications and training program. Flagmen must complete the *Crane Interference and Boom Swing Coordination Test, Qualified Signal Person* online exam, *Radio Signal Practical*, and the *Hand Signal Evaluation.* BNI raised awareness of rigging hazards through *Safely Speaking* and validated implementation through a focused observation checklist and SETO behavior observation and feedback. During this assessment, flagmen were visible with the crane operators when moving loads, blew a whistle as the load rose and moved to the new location, and moved as necessary to remain visible to the crane operator and away from the load. Other personnel were alert to the crane operation.

OSHA requires head protection that meets American National Standards Institute, Z89.1, *Safety Requirements for Industrial Head Protection.* To meet that standard, manufacturers provide a date of manufacture on head gear, and establish recommended replacement cycles, typically 5 years. A good industry practice has workers mark the hardhat with the date when they begin

using it, and then periodically replace the hardhat based on manufacturer's recommendations. Although not specifically required, BNI should consider adopting the practice of labeling the date a worker begins using a hardhat, and then requiring, at a minimum, replacement within the manufacturer's recommendation, or earlier based on its condition.

Opportunity for Improvement: BNI should consider adopting the practice of labeling the date a worker begins using a hardhat, and then requiring, at a minimum, replacement within the manufacturer's recommendation, or earlier based on its condition.

BNI requires substantial footwear while working on the construction site. The Team observed many workers wearing steel toe shoes to protect their feet, which exceeds the site requirement. Several craft groups, such as carpenters, have a great potential to injure their feet. Some personnel have experienced injuries that safety shoes might have prevented. Workers generally believed that BNI did not require safety shoes because under current regulations that would obligate BNI to pay for safety shoes. BNI did provide metatarsal protective shoe covers, and required them for particular work. BNI should review its footwear policy and consider purchasing safety-rated footwear for craft that historically experience foot injuries.

Opportunity for Improvement: BNI should review its footwear policy and consider purchasing safety-rated footwear for craft that historically experience foot injuries.

BNI maintains a medical clinic onsite for first aid, as well as periodic physical evaluation and return-to-work evaluations. BNI subcontracts Medcor to run the facility. Medcor provides appropriately trained and qualified staff that includes physicians' assistants, licensed practical nurses, and a licensed physician. The medical staff can also provide more advanced medical treatment if necessary to save a life or stabilize a critically injured patient.

WTP is currently a general purpose facility for emergency planning based on the Hazards Survey, *24590-WTP-RPT-CON-03-001, Rev 4*. The hazards survey was developed using the *Hanford Emergency Management Plan*, DOE/RL-94-02, as well as guidance in Technical Planning Basis, Emergency Management Guide, DOE G 151.1-2. BNI maintains emergency preparedness consistent with DOE/RL094-02, *Hanford Emergency Management Plan*. Public address speakers located on the west and east sides of WTP broadcast emergency sirens or tones to alert BNI. The Hanford Site infrastructure contractor, Mission Support Alliance, LLC, maintains the sirens and the Hanford Site conducts monthly tests on the first Monday of each month. Recently, an alarm sounded from the Hanford Tank Farms and BNI personnel evacuated the construction areas and took shelter in building T1. BNI tests its emergency responses with fire drills, injuries requiring ambulance response, and take cover drills. The onsite medical staff has a crash bag to respond to MAYDAY calls in the field, and maintains a crash cart in the clinic. The Hanford Site Fire Department provides ambulance, fire, and rescue support.

Conclusion

BNI effectively uses engineering, administrative, and PPE, while also identifying materials, methods, and products that eliminate or minimize hazards. Engineering controls are available for use during welding, cutting, grinding, and confined space entry. The improvement to the flying loads/hoisting and rigging administrative controls was evident. In addition, continuous

improvement of controls was observed during the assessment with the color coded confined space ducting and providing workers individual water bottles that were available throughout the construction site. Craft workers were vigilant in performing safety inspections of various tools and systems. BNI meets the expectations for continued participation in DOE-VPP at the Star level in the Hazard Prevention and Control tenet.

VII. SAFETY AND HEALTH TRAINING

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

Safety and health training begins when an individual is hired into the workforce. All employees, managers, and supervisors hired to work onsite are required to attend the 3-day On Board Training (OBT) session at the Project Office North Annex (PONA) located in Richland. The OBT includes several modules over a 3-day period required for Brown Badge issuance. The Brown Badge certifies that the employee is now qualified to access and perform work onsite. The OBT modules include two 4-hour modules related to construction and project-specific safety orientation. On day 2, medical and drug screening tests are completed in addition to a preselected set of computer based training. Day 3 provides instruction related to equipment/spotter requirements, aerial/scissor lift safety course, and fall protection and prevention. The OBT only satisfies the requirements for site access. Upon completion of OBT, the workers report to the construction site and will complete any necessary training based on the needs determined by their job description. The BNI training group, in conjunction with the workers' supervisors, developed a set of job specific training requirements for each job position. The job position training has been continuously refined over the years to ensure workers receive adequate training to perform job tasks.

Interviews with the training coordinator indicated BNI requires line managers and SMEs to review any changes to procedures or the introduction of new procedures to determine if craft employees will need to have their training requirements modified to include the new requirements of the introduced procedures.

BNI records and tracks training for the crafts in the Learning Management System (LMS), and supervisors verify training and qualification prior to assigning work. The training group ensures that all workers' training is maintained current through LMS. LMS automatically sends 30-day notices to the responsible line manager of workers with expiring training requirements. The responsible line manager ensures the workers schedule refresher training within the 30-day period to avoid delinquency.

During the 2013 year, the Team only identified one employee with overdue training for the approximately 1,200 workers employed during the year. Employees are required to carry a personal training card, which documents all required training including the expiration dates for each course required for their job position.

The 2010 VPP report identified that the WTP construction site must continue to monitor worker and supervisor attention to flying loads and ensure the corrective actions remain effective for the long term. The reports' discussion of the opportunity for improvement required that as part of the improvement cited, BNI was to monitor hoisting and rigging practices related to flying loads by making the review of flying loads an area of focus for Senior Supervisory Watches and developing a SETO topic on flying loads. Because of that focus, the Senior Supervisory Watches and Safety Assurance group identified potential weaknesses in the flagman position based on a series of near-misses that indicated that the current training and proficiency exhibited

by some flagmen was insufficient. BNI recognized this weakness, and withdrew all flagmen certification for all personnel, and developed an entirely new flagman training program. The newly developed training revamped the training class curriculum and was expanded to include *hands-on* practical training utilizing an *obstacle course* that allowed for real-time confirmation of proficiency. The new training required a 100 percent passing grade for hand signal training and 80 percent passing grade for radio qualification. In addition, flagman training was limited to personnel with direct responsibility for flagmen duty, greatly reducing (more than 50 percent) the number of qualified flagmen onsite. These changes ensured personnel performing flagmen duties were properly trained to site-required hand and radio signals and were expected to consistently perform this work.

The 2010 VPP report recommended that BNI consider adopting the Board of Certified Safety Professionals (BCSP) Safety Trained Supervisor (STS) certification system for BNI supervisors to improve their safety qualifications. BNI management responded that BNI managers' training exceeded the STS training qualifications through the BNI training and the Bechtel University Training Program. The supervisory training included the Bechtel Safety Leadership Training (8 hours), the Superintendents Workshop (16 hours), People-Based Safety (2 hours), New Hire Orientation (12 hours), Supervisor Safety Orientation (12 hours), various Bechtel University Online Courses in Bechtel University (8 hours), and miscellaneous courses related to fall protection, chromium exposure, etc. (4 hours). The resulting training included 51.5 hours of supervisory training compared to the 40 hours of training provided by the STS training.

In addition to the supervisory training listed above, BNI made several improvements to the supervisory training program since the 2010 VPP Review. For the first time, BNI foremen (manual employees) were allowed to participate in Bechtel University training courses. Typically foreman are exempted from participating in the Bechtel University training programs by Bechtel corporate procedure, BNI allows for those foremen to complete Bechtel supervisory training and credits those foreman with the course completion. If the foremen eventually upgrade to management positions, BNI retroactively credits the previously completed Bechtel University training to their training history. This exemption provides incentives for supervisors to participate in managerial training that they might not have otherwise sought. In addition, it provides them with better operational insights and awareness.

The Forthright Communication Program was an initiative designed by Bechtel to improve a supervisor's verbal communication skills with the crafts. The training focused on communication quality between supervisors (including craft level foremen) and the people they direct. Specifically, the training objectives focused on using simple conversation models, developing conversation skills through practice and feedback, and identifying conversation behaviors necessary to improve quality communication. Because BNI implemented the Forthright Program recently, the value of its improvements could not be measured at this time. However, the initiative indicates a proactive approach by the BNI training organization to pursue methods to improve the effectiveness of its safety and health training program.

Conclusion

Safety and Health Training is effective in ensuring workers are trained and qualified to address the hazards associated with working at the WTP construction site. BNI has developed several new training initiatives since the 2010 review in an effort to improve communication between supervisors and foremen to ensure continued improvement and to broaden their experience.

Based upon interviews and the documents reviewed, BNI continues to meet the expectations for continued DOE-VPP participation at the Star level in the Safety and Health Training tenet.

VIII. CONCLUSIONS

In the 3 years since the last DOE-VPP assessment, BNI has made great strides in expanding employee involvement and participation in the safety program. Despite challenges related to design, budget, and schedule, the workforce expressed their personal desire to do the job safely. Likewise, managers demonstrated their belief that safety and quality contributed to BNI's success. BNI needs to continue evaluating its processes for actions or expectations that weaken workers' trust, particularly related to accountability, injury investigation, and medical case management. BNI's improvements over the preceding 3 years demonstrate the continuous improvements expected for DOE-VPP participation. Therefore, the Team recommends that BNI at the WTP construction site retain its Star status.

Appendix A

Onsite VPP Audit Team Roster

Management

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