Nuclear Waste Partnership, LLC
Waste Isolation Pilot Plant

Report from the Department of Energy
Voluntary Protection Program
Onsite Review
March 17-27, 2015

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

The Department of Energy (DOE) recognizes that true excellence can be encouraged and guided but not standardized. For this reason, on January 26, 1994, the Department initiated the DOE Voluntary Protection Program (VPP) to encourage and recognize excellence in occupational safety and health protection. This program closely parallels the Occupational Safety and Health Administration (OSHA) VPP. Since its creation by OSHA in 1982 and DOE in 1994, VPP has demonstrated that cooperative action among Government, industry, and labor can achieve excellence in worker safety and health. The Office of Environment, Health, Safety and Security (AU) is responsible for managing DOE-VPP. AU intends to expand contractor participation complex-wide and coordinate DOE-VPP efforts with other Department functions and initiatives, especially Integrated Safety Management (ISM).

DOE-VPP focuses on areas where DOE contractors and subcontractors, using ISM, 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, including production facilities, laboratories, subcontractors, and support organizations.

DOE contractors are not required to participate in DOE-VPP. In keeping with OSHA and DOE-VPP philosophy, *participation is strictly voluntary*. Additionally, participants may withdraw from the program at any time. DOE-VPP consists of three programs with designations 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 need time and DOE guidance to achieve Star status. The Demonstration program, used rarely by the Department, allows DOE to obtain additional information 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 to participate in DOE-VPP, DOE recognizes that the applicant exceeds the basic requirements for systematic protection of employees at the site. As the symbols of such recognition, DOE provides certificates of approval and the right to use DOE-VPP flags for the program in which the site is participating. The participants may also choose to use the DOE-VPP logo on its letterheads and/or on award items for employee incentive programs.

This report summarizes the results from the evaluation of Nuclear Waste Partnership, LLC (NWP) at the Waste Isolation Pilot Plant in Carlsbad, New Mexico, during the period of March 17-27, 2015, and provides the Associate Under Secretary for Environment, Health, Safety and Security with the necessary information to make the final decision regarding NWP's continued participation in DOE-VPP.

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS

AA	Authorization Agreement
AHJ	Authority Having Jurisdiction
ALARA	As Low As Reasonably Achievable
AR	Action Request
AU	Office of Environment, Health, Safety and Security
BLS	Bureau of Labor Statistics
CBFO	Carlsbad Field Office
CBT	Computer-Based Training
DART	Days Away, Restricted or Transferred
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
ESQRB	Executive Safety and Quality Review Board
ESS	Evaluations of the Safety Situation
FMA	Field Management Assessment
FY	Fiscal Year
GHA	General Hazard Analysis
I&C	Instrument and Controls
IH	Industrial Hygiene
INPO	Institute for Nuclear Power Operations
ISM	Integrated Safety Management
ISMS	Integrated Safety Management System
JHA	Job Hazard Analysis
MSHA	Mine Safety and Health Administration
MWO	Model Work Order
NAICS	North American Industry Classification System
NMED	New Mexico Environment Department
NWP	Nuclear Waste Partnership, LLC
ORR	Operational Readiness Review
OSHA	Occupational Safety and Health Administration
OST	Operations Safety Team
PID	Photo Ionization Detector
PM	Preventive Maintenance
PPE	Personal Protective Equipment
RP	Radiation Protection
SAC	Safety Awareness Committee
SMC	Surface Management Council
SME	Subject Matter Expert
Team	Office of Environment, Health, Safety and Security DOE-VPP Team
TP	Technical Procedure
TRC	Total Recordable Case
TRU	Transuranic
USW	United Steel Workers
VOC	Volatile Organic Compound
VPP	Voluntary Protection Program

WBGT	Wet Bulb Globe Thermometer
WH	Waste Handler
WHRC	WIPP Hoisting and Rigging Committee
WIPP	Waste Isolation Pilot Plant

EXECUTIVE SUMMARY

The Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico, has been a Department of Energy (DOE) Voluntary Protection Program (VPP) Star site since September 1994. Six recertification reviews have occurred since its admission into the program. In 2009, the Office of Environment, Health, Safety and Security (AU) DOE-VPP Team (Team) identified that Washington TRU Services (WTS), the former operating contractor had been subjected to increasing production pressures, and workers perceived that the safety culture at the Waste Isolation Pilot Plant (WIPP) had deteriorated. Additionally, events in the preceding 3 years demonstrated breakdowns in the integrated safety management (ISM) process, particularly related to identifying and removing hazards. The Team recommended that WTS continue to participate in DOE-VPP on a conditional basis while WTS addressed those issues.

In March 2010, the Team reviewed improvements at WIPP, and determined that since the 2009 triennial recertification, WTS had demonstrated improvement in communication, processes for accountability, rewards, recognition, management and worker cooperation, hazard analysis, hazard controls, and training. The Team cautioned that WTS needed to remain vigilant to ensure improvements made in the past year did not lose momentum.

In 2012, DOE awarded Nuclear Waste Partnership, LLC (NWP), the operating contract to manage and operate WIPP. NWP took over site operations effective October 1, 2012. NWP is an AECOM (formerly URS)-led partnership that includes B&W Technical Services Group and major subcontractor AREVA Federal Services. In accordance with the VPP documents for contractor changes, NWP requested transitional status. Under the transitional guidance, NWP was planning to submit its revised application in February 2014, but a fire occurred in the mine, then a radioactive release a week later. AU agreed to extend the transitional status while multiple investigations and corrective actions were in progress. AU, the DOE Carlsbad Field Office (CBFO), and NWP agreed that NWP would submit its application to support an onsite assessment prior to July 1, 2015. AU received the revised application in November 2014 and performed the assessment in March 2015.

As a result of these events and actions, waste handling operations at WIPP remain shutdown. The work at WIPP currently involves training of workers, revision of processes and procedures, and limited entries to the mine for the purposes of isolating suspect containers, closing sections of the mine to prevent further releases, decontaminating open areas of the mine, and preparing WIPP to resume operation. The Team focused on NWP's implementation of ISM while processes and procedures are under revision and the use of the VPP tenets to safely conduct those activities.

NWP experienced a significant increase in injuries in 2014. Five of the twelve injuries for 2014 resulted from the fire in the mine in February 2014. Seven more injuries (including subcontractors) occurred, not related to the fire or radiological release. Other than the fire, the most significant injuries resulted from slips, trips, and falls. NWP is taking action to reduce and prevent those injuries. A CBFO review of the injury/illness program in August 2014 identified minor discrepancies that NWP corrected. Despite the rise in injury rates in 2014, the NWP injury incidence rates remain below its comparison industry average and meets the expectations for DOE-VPP participation.

NWP managers are fully committed to resumption of normal operations at WIPP, but in their zeal to make rapid improvements, address necessary actions from the February 2014 events, and meet challenging schedules, have not effectively included the workforce in creating changes in response to the February 2014 events. Many workers remain skeptical of the long-term commitment and do not yet accept the changes as "the right thing to do." NWP has realized these omissions from its initial approach and is working diligently to restore workers' trust, engage the workforce in improvements, and implement effective management systems.

The extensive changes (policies, procedures, programs) that have been made and continue to occur across the site in the wake of the 2014 events, continue to affect the workforce's ability to effectively establish a cohesive, sustainable safety culture. Employees at all levels must continue to be involved in the development and operation of the safety and health program and in decisions that affect employees health and safety. The Team's field observations and interviews indicate that WIPP employees remain committed to their personal safety, as well as the safety of their coworkers and facility visitors.

NWP is revising and improving the procedures and processes to institute better worksite analysis. NWP expects revisions to work planning and control to facilitate the identification and analysis of hazards for improved control selection. Worker, planner, and subject matter expert's participation is critical during this transition to question existing work control processes to improve the safety of the site. Safety and health personnel support the mine recovery effort by completing mine inspections and chemical and physical stress monitoring as the conditions change in the mine.

NWP follows the hierarchy of controls to eliminate, mitigate, and protect employees from the hazards associated with the operation of the WIPP site. NWP must guard against complacency to hazards above ground while recovery efforts are underway in the mine. The medical and wellness programs are effective and providing the necessary support to the site recovery efforts. The radiation protection program is improving and changes in management and training have resulted in better-qualified and trained technicians, visible management support in the workspaces, and improved communications with the workers. The emergency management program is in a state of flux as NWP develops and implements changes.

The NWP training organization is adapting to the new training needs for the WIPP site. Changes across the spectrum of programs and procedures are challenging the organization. To date, NWP has been able to maintain effective training programs to address recovery actions. Training classes observed by the Team are effective and provide a setting for open discussions. The training department is actively searching for computer-based training software and support to relieve the burden of classroom-only training for requalification or renewals.

The February 2014 fire in the underground was a traumatic experience for workers, both for those in the mine and those above ground. Many workers exhibited extreme calm despite the stressful situation and assisted other workers that struggled during the event, thereby ensuring no workers were left in the underground - a source of great pride to the workers. The radiological release demonstrated the ability of the facility to mitigate a release from the waste despite human errors and response delays. Both events exposed unrecognized vulnerabilities and deterioration in facility operations and conditions that had developed over several years. The urgency to correct the problems and resume waste handling is creating tension between NWP workers and managers. Managers have not effectively included workers in many of the urgent changes to

procedures, processes, and programs, and workers perceive NWP may be intentionally excluding or ignoring them. NWP managers have recognized the breakdowns in communication and are working to repair the gaps that have developed, but those efforts are going to take time to demonstrate effectiveness and restore workers' trust. NWP is safely executing the current work to upgrade WIPP systems, establish better controls on combustible materials in the mine, and train workers. The transitional process from the previous contractor is complete. On its own, NWP demonstrates the commitment to excellence that warrants continued participation in DOE-VPP as a new participant, but the programs and processes need time to demonstrate the excellence that warrants recognition at the Star level. As such, the Team recommends NWP be admitted to DOE-VPP as a new participant at the Merit level while it continues to address the necessary improvements already identified by other investigations and assessments.

TABLE 1

OPPORTUNITIES FOR IMPROVEMENT

Opportunity for Improvement	Page
NWP should consider assisting the local union president in preparing similar letters or regular articles in "2150" as a means of improving communication from the workers.	**6**
NWP managers should reinforce the message that "NWP will resume handling waste only when it is ready," and reinforce the message to the workforce that NWP will insist on learning how to accomplish the mission safely and "do it right, every time."	**8**
NWP should accelerate and implement its change management program to help it more efficiently and effectively navigate the extensive changes it is making to resume operations.	**8**
NWP needs to communicate effectively to workers that managers understand and appropriately balance risks of both nuclear and mine hazards and help workers be sensitive to both at all times.	**9**
The NWP president and/or vice president, and the local USW president should begin making joint walking tours of the site on a weekly basis.	**9**
NWP must stabilize its stop-work process, eliminate conflicting terms and practices, and allow the process to mature.	**10**
NWP should consider reviewing the overall approach to involving employees in solving safety-related issues and consolidate the overlapping committee function, if appropriate, to eliminate redundancy and improve efficiency.	**12**
NWP should consider assigning a union safety representative to the third shift.	**13**
NWP should consider engaging outside resources to mitigate the effects of organizational change.	**13**
NWP must increase its vigilance in authorizing work, train workers to expect errors in the procedures, and stop work to resolve discrepancies.	**17**
NWP should ensure it adequately trains workers to use and interpret WBGT readings and to implement appropriate heat stress control actions when required.	**18**
NWP should ensure that all safety programs and policies receive attention to eliminate complacency around above ground hazards.	**21**

I. INTRODUCTION

WIPP has been a Department of Energy (DOE) Voluntary Protection Program (VPP) Star site since September 1994. Six recertification reviews have occurred since its admission into the program. In 2009, the Office of Environment, Health, Safety and Security (AU) DOE-VPP Team (Team) identified that Washington TRU Services (WTS) had been subjected to increasing production pressures. It had responded to those production pressures, for the most part, by increasing the pace of operations and tried to maintain its focus on safe, compliant operations. In some cases, however, those production pressures had resulted in some decisions that appeared to some workers as detrimental to workers. Those decisions, however well-intentioned by managers and supervisors at the time, had contributed to perceptions by some workers that the safety culture at the Waste Isolation Pilot Plant (WIPP) has deteriorated. Additionally, events in the preceding 3 years demonstrated breakdowns in the integrated safety management (ISM) process, particularly related to identifying and removing hazards. The Team recommended that WTS continue to participate in DOE-VPP on a conditional basis while WTS addressed those issues.

In March 2010, the Team reviewed improvements at WIPP, and determined that since the 2009 triennial recertification, WTS had demonstrated significant improvement in its safety culture. Improved communication, better processes for accountability, rewards, recognition, increased management and worker cooperation, more effective analysis, improved hazard controls, and more effective training were all evident to the Team. The Team cautioned that WTS needed to remain vigilant to ensure improvements made in the past year did not lose momentum.

In 2012, DOE awarded Nuclear Waste Partnership, LLC (NWP) the operating contract to manage and operate WIPP, 26 miles outside of Carlsbad, New Mexico. NWP took over site operations effective October 1, 2012. NWP is an AECOM (formerly URS)-led partnership that includes B&W Technical Services Group and major subcontractor AREVA Federal Services.

In accordance with the VPP documents for contractor changes at DOE-VPP sites, NWP requested transitional status. AU approved that request. Under the transitional guidance, NWP was planning to submit its revised application in February 2014 when a fire occurred in the mine and then a radioactive release the following week. AU agreed to extend the transitional status. AU, the DOE Carlsbad Field Office (CBFO), and NWP agreed that NWP would submit its application to support an onsite assessment prior to July 1, 2015. AU received the revised application in November 2014, and the Team performed the assessment in March 2015. This report presents the results of that assessment.

WIPP began waste disposal operations in 1999. The DOE CBFO has line management and oversight responsibilities related to WIPP. WIPP's mission is to safely isolate transuranic (TRU) waste generated by atomic energy defense activities from the public and the environment. TRU waste temporarily stored at sites around the country is shipped to WIPP and placed in rooms mined out of an ancient salt formation 2,150 feet below the surface for final disposal.

TRU waste generated by atomic energy defense activities is a by-product of nuclear weapons research and production, facility dismantlement, and site cleanup. This waste consists primarily of tools, gloves, clothing, and other such items contaminated with trace amounts of radioactive material, primarily plutonium. Legacy TRU waste inventory is located at four remaining large-quantity sites: Hanford Site (Washington State), Idaho National Laboratory (Idaho),

Los Alamos National Laboratory (New Mexico), and Savannah River Site (South Carolina), and at over 20 small-quantity sites throughout the Nation.

Multiple Federal and State entities oversee WIPP. WIPP must meet applicable Federal and State requirements for worker safety, nuclear safety, radiological safety, mine safety, chemicals controlled under the Resource Conservation and Recovery Act, security, and transportation, packaging, and shipping. The primary regulators are the Environmental Protection Agency for long-term repository certification, and the New Mexico Environment Department (NMED) with regard to the disposal of hazardous waste constituents and other items. New Mexico State University's Carlsbad Environmental Monitoring and Research Center conducts site and environmental monitoring and has an internal dosimetry program that area residents may use. Pursuant to the Waste Isolation Pilot Plant Land Withdrawal Act, the Mine Safety and Health Administration (MSHA) conducts periodic inspections. The Nuclear Regulatory Commission and the Department of Transportation regulate various aspects of the shipment of waste to the facility. The Defense Nuclear Facilities Safety Board (DNFSB) issues periodic reviews of activities at the WIPP site in accordance with its statutory mandate.

DOE and its cleanup contractors, including NWP and the previous WIPP operating contractor, have made significant progress in TRU characterization, transportation, and disposal over the past 15 years. As of February 2014, DOE had safely removed approximately 90,800 cubic meters of TRU waste from 22 generator sites throughout the country, disposing of the waste at WIPP, greatly reducing the environmental risk resulting from continued TRU waste storage to workers at, and the public in the vicinity of, generator sites.

On February 5, 2014, an underground mine fire involving a salt haul truck occurred at the WIPP site. A second event on February 14, 2014, caused an underground radioactive release of americium and plutonium from a TRU waste drum. In response to these events, DOE performed several reviews to evaluate the strengths and weaknesses of WIPP's safety programs. The subsequent Accident Investigation Board reports identified a number of deficiencies in the WIPP programs. In response, NWP developed two Corrective Action Plans and a resource-loaded WIPP Recovery Plan.

As a result of these events and actions, waste handling operations at WIPP remain shutdown. The work at WIPP currently involves training of workers, revision of processes and procedures, and limited entries to the mine for the purpose of isolating suspect containers, closing sections of the mine to prevent further releases, decontaminating open areas of the mine, and preparing WIPP to resume operation. The Team focused on NWP's implementation of ISM while processes and procedures are under revision and the use of the VPP tenets to safely conduct those activities.

The standard for DOE-VPP is not perfection, but rather that in addition to an excellent safety record, managers and workers are dedicated to, and effectively pursuing excellence in safety performance. Consistent with that goal, the Team identified a number of opportunities for improvement. These opportunities reflect those areas where NWP can further improve its performance and are listed in Table 1. While no formal corrective action plan is required to address these opportunities, NWP is expected to consider and specifically address them as it pursues DOE-VPP Star status.

II. INJURY INCIDENCE/LOST WORKDAYS CASE RATE

Table 2.1 Injury Incidence/Lost Workdays Case Rate (NWP)					
Calendar Year	Hours Worked	Total Recordable Cases (TRC)	TRC Rate	Days Away, Restricted or Transferred (DART) Cases	DART Case Rate
2012	1,127,596	1	0.18	0	0
2013	1,148,397	1	0.17	0	0
2014	1,318,543	11	1.67	3	0.46
3-Year Total	3,594,536	13	0.72	3	0.17
Bureau of Labor Statistics (BLS-2013) average for NAICS * Code 562211, hazardous waste treatment and disposal.			1.7		1.3
Table 2.2 Injury Incidence/Lost Workdays Case Rate (Subcontractor)					
Calendar Year	Hours Worked	TRC	TRC Incidence Rate	DART Cases	DART Case Rate
2012	184,326	1	1.09	0	0
2013	185,163	0	0	0	0
2014	249,635	1	0.80	0	0
3-Year Total	619,124	2	0.65	0	0
Bureau of Labor Statistics (BLS 2013) average for NAICS * Code # 562211, hazardous waste treatment and disposal.			1.7		1.3

*North American Industry Classification System

TRC Incidence Rates, including subcontractors: 0.71
DART Rates, including subcontractors: 0.14

Conclusion

NWP experienced a significant increase in injuries in 2014. Five of the twelve injuries for 2014 occurred due to the fire in the mine in February. Seven more injuries (including subcontractors) occurred that were not related to the fire or radiological release. Other than the fire, the most significant injuries resulted from slips, trips, and falls. NWP is working to address inattention, distraction, and other causes of these injuries. A CBFO review of the injury/illness program in August 2014 identified minor discrepancies that NWP corrected. The Team reviewed several first-aid cases and found no clerical discrepancies or disincentives to reporting injuries. Despite the rise in injury rates in 2014, the NWP injury incidence rates remain below its comparison industry average and meet the expectations for DOE-VPP participation.

III. MANAGEMENT LEADERSHIP

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

After the fire and radiological release events in February 2014, NWP began making significant changes to the senior management team. The new president/project manager arrived in March 2014; since then, he has reassigned several managers and brought in outside expertise. He has reassigned or selected personnel based on their demonstrated strengths and abilities to effect necessary changes quickly and help the WIPP workforce return to its primary mission as quickly as possible.

Shortly after arriving onsite, the new company president initiated weekly all-hands meetings. As recovery efforts have progressed, all-hands meetings now occur every 2 weeks. In order to reach all employees, the meetings occur on Wednesday, and are scheduled at 6:15 AM for Day Shift and at 3:00 PM for the Evening Shift. During these meetings, the company president recognizes workers who have demonstrated actions to prevent problems by stopping or pausing work. That recognition from the company president is typically a thank you, a certificate, and a large candy bar. The meetings also provide updates to workers on key program improvements, and affords workers an opportunity to ask questions directly of the company president. This process is helping NWP improve communications with workers. NWP is fully aware that some workers may not feel comfortable asking questions in these meetings and is trying to find methods to encourage more worker participation.

To monitor progress, ensure managers understand the appropriate priorities, and ensure corrective actions are effective, NWP initiated an Executive Safety and Quality Review Board (ESQRB). This board consists of the senior management team and focuses on effectiveness of corrective actions, new processes and procedures, and provides a forum for managers to integrate actions across functional lines. The Team observed an ESQRB meeting where managers conducted constructive, open discussions. Managers willingly expressed concerns, problems, and plans, and suggested additional improvements.

As a means of improving the firstline supervisors' and managers' leadership skills, NWP is developing a "Leadership Academy." The first group of 13 firstline supervisors was approximately halfway through the course during this assessment. NWP selected personnel for this first class that demonstrated an ability to communicate with workers and effectively implement changes. NWP plans to hold additional classes with all current firstline supervisors completing the course by September 2015. Future managers will either have to complete the

course before taking a supervisory position or complete it within 3 months of taking a position. Although still subject to change, the course currently includes training for supervisors in conflict resolution, human performance improvement, change management, and "The Seven Habits of Highly Effective People." NWP intends for this course to better prepare highly capable technical staff to be effective supervisors and managers. NWP's plans also include identifying potential supervisors and managers in order to have a ready cadre of personnel for promotion from within the company.

NWP recognized early in the resumption process the need to effectively and continuously communicate with workers. For example, NWP continues to publish a regular newsletter to the workforce, called "2150," named for the depth of the mine. Several months ago, it formed a new communication committee known as "Barrier Busters." This group consists of volunteers from the workforce and meets regularly with the communications manager to discuss topics of interest, identify effective communication strategies, and report on communication effectiveness. When the group identifies a particularly important topic, it will produce a "Red Hot Topic letter." These letters are printed on red paper and hand distributed to workers as they enter the gate at the beginning of their shift. Other communication tools include periodic letters from the company president known as "Bobs Straight Talk." The communications staff prepares these letters based on the company president's direction. NWP should consider assisting the local union president in preparing similar letters or regular articles in "2150" as a means of improving communication from the workers. The union president should establish the topic, and have final approval of the letter, but take advantage of the professional communications staff's abilities.

Opportunity for Improvement: NWP should consider assisting the local union president in preparing similar letters or regular articles in "2150" as a means of improving communication from the workers.

NWP is working to improve worker accountability both by implementing an effective reward and recognition process, and by ensuring that it fairly and appropriately administers discipline. Reward and recognition programs over the past few years consisted almost solely of "VPP Star" awards, but those awards have been infrequently used. As previously mentioned, the new company president began giving out candy bars, but has tasked the management team to identify more systematic and formal means of reward and recognition. In connection with the desire to improve accountability, NWP is beginning to introduce workers to fundamentals of human performance improvement. NWP hopes this initiative will make workers more effective in identifying conditions and weaknesses that could lead to human error or permit accidents to occur. By removing these latent weaknesses, NWP hopes to help workers and avoid disciplining them for systemic failures.

NWP is developing a set of performance indicators that incorporates both leading and lagging indicators. Leading indicators include: number of grievances filed; number of issues identified on WIPP forms; number of field monitoring assessments; training and qualification status; drills and exercises scheduled and completed; facility system condition metrics; and internal versus external issues identified. These indicators have been in use for a few months, and NWP is still identifying the appropriate limits or control bands for the indicators. The ESQRB reviews discuss these indicators frequently. NWP is also planning to share the entire suite of indicators

with CBFO on a regular basis. Its next challenge will be working with CBFO to incorporate those indicators into contract performance objectives and measures.

Unfortunately, in some cases the workforce has perceived these changes negatively. Some workers are concerned that NWP is minimizing their experience and knowledge; they believe that many of the outside investigations and inspections are blaming them for their actions and not sufficiently assigning responsibility to the line managers, including DOE, for the conditions and practices that led to the events. In some cases, this assumption results in workers misunderstanding managers' actions and statements no matter how well intentioned.

The senior management team understands this dynamic and continues to work toward a mutually beneficial relationship with workers. Those efforts are often overshadowed by schedule pressure from DOE, NMED, and other stakeholders. For example, the president/project manager has emphasized to the senior management team the importance of managers' presence in the field. To that end, NWP instituted a field management assessment (FMA) process. This process requires all managers to conduct at least two field observations a month and document the results of those assessments. The company president was unequivocal in his expectations for FMAs during the ESQRB meeting when he told all the senior managers that unless they were out in the field watching work and talking to workers, they were not helping improve the safety posture. Although some managers have met the expectations easily, others have not. Some managers have not yet embraced the president/project manager's expectations, or believe that other schedule pressures take priority. People working extensive overtime to modify procedures, complete training, and conduct other recovery actions further amplify those schedule pressures. Often, in their desire to implement needed changes quickly, managers have not adequately included workers in developing or identifying the necessary changes, contributing further to the perception of schedule pressures. Another contributor to this perception has been references by managers to preparation for the Operational Readiness Review (ORR) or other inspections required to resume waste handling operations. A recent safety culture assessment by an independent consultant using the Institute for Nuclear Power Operations (INPO) safety culture model revealed this schedule pressure as an issue, and senior managers are aware of the schedule pressures. In response, NWP is seeking ways to shield the workforce from this pressure.

NWP is also emphasizing to workers the need for them to stop work when they have questions or issues. Many workers are taking that message to heart, but segments of the workforce remain that do not yet believe NWP really wants them to stop work. NWP continues to seek ways to convince those workers that it is willing to stop work corporately if conditions, processes, and practices drift from expectations in the future due to resource constraints.

In order to help shield workers from the many sources of schedule pressures and to reinforce the corporate commitment to stopping work when issues or questions arise, NWP should consider several approaches. First, when speaking with the workers, managers should reinforce the message that "NWP will resume waste handling operations only when it is ready." Further, managers should avoid referring to "preparing for the ORR" or any other inspection or assessment required prior to resumption. Instead, NWP should reinforce the message to the workforce that it will insist on learning how to accomplish the mission safely and "do it right, every time." Managers must effectively communicate this message through both their words and actions.

Opportunity for Improvement: NWP managers should reinforce the message that "NWP will resume handling waste only when it is ready," and reinforce the message to the workforce that NWP will insist on learning how to accomplish the mission safely and "do it right, every time."

The pace and degree of change at WIPP has stressed the workforce. NWP has done an excellent job of identifying necessary changes and identifying the right people to implement those changes, but it has not adequately identified the tools to help workers cope with and accept the changes. An INPO Assist Visit in January 2015 also identified this problem. NWP prepared a Nuclear Safety Culture Improvement Plan to address the findings from a root cause analysis. One action from that plan is to develop a formal change management process and program to promote successful development, planning, communications, implementation, and evaluation of change. NWP planned to complete this action by December 1, 2014, but has not done so. NWP has a draft program plan, but it has delayed implementation. Although NWP has effectively identified the process and procedure changes, it should accelerate implementation of the change management program plan, be proactive in identifying those workers who are not accepting the changes, and identify strategies to help those workers move through the change process. Those strategies may include joint training for workers and managers, modification of FMAs to include looking for worker resistance to change, and seeking outside expertise and coaching for managers and workers. NWP should accelerate and implement its change management program to help it more efficiently and effectively navigate the extensive changes it is making to prepare it to resume operations.

Opportunity for Improvement: NWP should accelerate and implement its change management program to help it more efficiently and effectively navigate the extensive changes it is making to resume operations.

Two contributors to workers' dissatisfaction with managers are determinations by the accident investigation board relating to nuclear safety culture degradation, and operation of a Category 2 nuclear facility. Other organizations echoed those determinations, and workers perceive this as degrading to their expertise. Workers firmly believe their safety culture and expertise prevented any workers from dying because of the fire, and that the radioactive release and subsequent errors in the response were not their fault. Workers understand that on any given day mine-related hazards could kill them. Reviewing the accident investigation board report and other root cause analyses of the safety culture degradation reveals those findings are not directed at the workers, but at the line management chain that created the overemphasis on production. NWP needs to communicate effectively to workers that managers understand and appropriately balance risks of both nuclear and mine hazards and help workers be sensitive to both at all times.

Opportunity for Improvement: NWP needs to communicate effectively to workers that managers understand and appropriately balance risks of both nuclear and mine hazards and help workers be sensitive to both at all times.

The fire, radioactive release, and subsequent management changes have strained NWP's relationship with the United Steel Workers (USW) local. Workers appreciate NWP's efforts to

keep workers employed without layoffs during the resumption, but managers remain concerned about several issues. For example, the USW local is concerned that NWP is not adequately training workers to implement heat stress controls that have become necessary due to reduced ventilation and increased personal protective equipment (PPE) requirements in the mine. Workers believe NWP has not effectively communicated to workers the basis for controls and is not following its own requirements. For example, NWP requires workers to have their heart rate checked immediately before entering the radiological zones in the mine and prior to leaving the site after exiting the mine. Workers do not understand why NWP waits to perform that check long after workers exit the mine. The NWP president/project manager is also aware that the USW local president may not yet completely trust NWP's motives and objectives. Upcoming contract negotiations will magnify these issues. As a means of building trust and effectively addressing both company and union issues, the NWP president and/or vice president and the local USW president should begin making joint walking tours of the site on a weekly basis. Those tours should be done on Wednesdays when two shifts of workers are onsite (family day) and should rotate to all areas of the site over a period of weeks. These walking tours can provide an opportunity to discuss safety issues and give NWP the opportunity not only to understand union concerns, but also to communicate the basis for various actions, as well as identify joint solutions.

Opportunity for Improvement: The NWP president and/or vice president, and the local USW president should begin making joint walking tours of the site on a weekly basis.

Conclusion

NWP managers are fully committed to resumption of normal operations at WIPP, but in their zeal to make rapid improvements, address necessary actions from the February 2014 events, and meet challenging schedules, they have not effectively included the workforce in implementing changes. Many workers remain skeptical of managers' long-term commitment and have not accepted the changes as "the right thing to do." NWP has realized these omissions from its initial approach and is working diligently to restore workers' trust, engage the workforce in improvements, and implement effective management systems. The extent of changes in the past 12 months demonstrates improvement, but those changes need time to stabilize and mature to demonstrate DOE-VPP performance expectations.

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 is 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.

The Team interviewed employees across the NWP organization, including workers, engineers, trainers, miners, waste handlers, supervisors, and managers. The Team members attended safety committee meetings, prejob briefings, and training classes. Interviews indicated workers felt confident stopping work if they felt uncomfortable or saw something that could turn into a hazardous condition. Some spoke highly of their participation in the safety fairs and awareness campaigns, stating that they were often able to take several lessons home. Other workers were ambivalent about participation in safety-related activities, but were adamant that they would protect themselves or their coworkers.

NWP has implemented numerous changes in response to the 2014 incidents, and workers perceived that some of those changes resulted in conflicting directions. This continuous change has been difficult, according to some workers. For example, the procedures implementing workers' right to stop work have been revised several times using different terms, such as "stop work," time out, or pause. Since February 2014, NWP has had three different environment, safety and health managers. Each new manager brought a new "stop work" policy from his or her last assignment, but none was fully implemented before being replaced by a newer procedure. The current "stop work" procedure, called the Step-Back Program, is in development. NWP must stabilize its stop work process, eliminate conflicting terms and practices, and allow the process to mature.

Opportunity for Improvement: NWP must stabilize its stop work process, eliminate conflicting terms and practices, and allow the process to mature.

NWP offers the workers several opportunities to actively participate in the safety and health program. In general, employees stated they participate in safety fairs, awareness campaigns, safety and health training activities, walkthroughs of their workplace, and on safety committees.

NWP has several safety committees, including:

- The radiological As Low As Reasonably Achievable (ALARA) committee reviews the radiological activities at the NWP site to ensure that NWP takes the appropriate measures to maintain exposure to radiation and radiological materials ALARA.

- The Safety Awareness Committee (SAC) provides support for activities that promote and encourage employee safety awareness. These activities may include development of program goals, objectives, and performance measures, as well as the identification and control of hazards in the workplace.

- The Surface Management Council (SMC) coordinates and maintains the Landlord Program (see Hazard Prevention and Control) and addresses surface facility safety issues. The SMC meets at least quarterly.

- The WIPP Hoisting and Rigging Committee (WHRC) serves as an advisory body to help ensure the safe performance of hoisting and rigging activities at WIPP. The WHRC maintains a single hoisting and rigging program manual and provides technical advice to WIPP departments and subcontractors.

- The Electrical Safety Committee provides management and subcontractors with a competent technical resource for identifying, communicating, and recommending resolution of electrical safety issues as authorized by the CBFO Electrical Safety Authority Having Jurisdiction (AHJ). The Electrical Safety Committee enhances electrical safety and performs certain AHJ duties as specified in National Fire Protection Association and Occupational Safety and Health Administration (OSHA) codes without prior review and approval of the AHJ.

- The Executive Safety Committee includes representatives of CBFO and NWP. NWP participants include managers, the Ombudsman, and union members. The Executive Safety Committee's focus is to improve the safety environment at WIPP, the safety performance of personnel working at WIPP, and the central characterization program sites. The CBFO manager and the NWP project manager co-chair the Executive Safety Committee. The committee serves as a steering committee for safety that includes oversight of other safety committees, employee involvement, and the roles and responsibilities of safety committees.

- The Operations Safety Team (OST) provides a resource for identifying, communicating, and recommending the resolution of issues associated with improving safety in WIPP work environment. The team members also conduct inspections on the surface and underground to meet the VPP expectations. The OST includes bargaining unit employees from each of the various bargaining units and is jointly sponsored by the Site Operations Manager and USW local.

- The Barrier Busters Communications Team provides a communication resource for identifying communication issues raised by team members or provided to team members by employees. This team includes exempt, nonexempt, and bargaining unit employees.

The Team reviewed the charters for the safety committees to evaluate each committee's scope and focus. The charters contain guidelines on membership, operation, and processes to address identified safety issues. After the 2014 events, some committees did not meet for several months because the mine was under restricted access and waste handling was suspended. Recent membership changes, in conjunction with changes in workscope and renewed interest by management and workers, are revitalizing committee efforts to become part of the recovery efforts. The NWP safety committee charters demonstrate overlap among some committees.

Several committees are the collection points for worker concerns and safety issues and provide a forum for discussion and resolution of those concerns. The OST, SMC, and SAC are examples of those types of activities. Additional mechanisms for workers to communicate safety-related issues include the Ombudsman, safety representatives, and Barrier Busters. All these avenues are available for use by employees. NWP should consider reviewing the overall approach to involving employees in solving safety-related issues and consolidate the overlapping committee functions, if appropriate, to eliminate redundancy and improve efficiency.

Opportunity for Improvement: NWP should consider reviewing the overall approach to involving employees in solving safety-related issues and consolidate the overlapping committee function, if appropriate, to eliminate redundancy and improve efficiency.

The Team attended an OST meeting during this review. Most bargaining unit groups attended and participated in this meeting. Participants discussed past activities and updated the status of identified safety concerns. Operations managers in the meeting supported the OST conversations by committing to address corrective actions or check on the status of additional support. Although invited to attend, representatives from the day shift miners, security forces, and the landlord organization did not attend. Discussions with other members of the workforce and other Team observations indicated these groups frequently opt not to participate in OST meetings or other safety activities. Although the Team could not adequately determine why these workers are not participating, it is essential that NWP actively reach out to these workers; encourage their participation; and ensure their experience, knowledge, and concerns are included in improvement initiatives.

The position of an Ombudsman from the bargaining unit as a safety advocate and communication link between managers and workers is a carryover from the previous contractor. This position provides a unique communication link between employees and management. Its past and present successes stem from an honest and straightforward approach to bridging the communication gap between managers and workers who do not feel comfortable going to managers with issues. The Team discussed the function with the current Ombudsman, who talked about the ability to communicate workers' concerns and effectively engage managers' support for necessary corrective actions. To date, the Ombudsman has the trust and support from both managers and workers.

NWP initiated several changes since the last VPP assessment to facilitate employee-manager communication relating to safety interests. NWP appointed four WIPP Employee Health Care Advocates to assist employees with questions about their health and welfare. Employees indicated through interviews that the advocates and union safety representatives were effective. However, when the Team asked workers what they would improve, the common theme was "communication and feedback." As described in the Management Leadership section, NWP has implemented several initiatives to address these issues. NWP hired union safety representatives to ensure employees have adequate means to have their safety and health issues addressed. There are three shifts but only two union safety representatives. NWP should consider assigning a union safety representative to the third shift.

Opportunity for Improvement: NWP should consider assigning a union safety representative to the third shift.

In most cases, employees indicated they are encouraged to report safety concerns to their supervisors, and identify concerns during job planning activities, daily job briefings, or whenever the need arises. Workers can document safety concerns, issues, or noncompliances on a Web-based form (WIPP Form). The form allows the originator to describe the issue, any immediate remedial actions taken, and any potential or proposed solution. The worker may submit the form anonymously in a drop box or submit it directly to the WIPP Form Coordinator. A WIPP Form Committee evaluates the concern and assigns actions to address the concern, and NWP tracks the issue to closure. For example, if a concern needs further research or a root cause analysis, the committee ensures that that action is assigned and tracked. During the course of this review, interviews and discussions with bargaining unit employees indicate union workers do not use the form. However, the union workers were all satisfied with raising any issue to their supervisor or union safety representative with the confidence that NWP would correct the issue.

Some work groups have meetings prior to the shift turnover. The Team observed the waste handlers (WH) preshift turnover that begins at 6:15 a.m. The WH team works on the surface to process TRU waste from the delivery trucks into the mines and places the waste in the underground. Since the radiological accident, the WH team is decontaminating areas in the mine. The WH team preshift meeting is an open forum for workers to discuss what went well and to discuss improving their work. The discussions were constructive, effective, and fostered a free flow of information.

The Team interviewed some workers within the emergency management organization who are willing to participate in safety improvements. However, these workers perceive that their manager did not consider their input and dismissed their suggestions without any constructive feedback. Workers indicated that they have not been included in the review or validation of procedural or policy changes in over a year. Workers' perceptions are that NWP is using a top-down approach to change emergency management, and workers have been told that if they do not like it, to find another job. One worker described the workplace as a "hostile work environment." The Team alerted NWP managers about these workers' perceptions to provide NWP the opportunity to begin formulating corrective actions. Some miners also expressed concern that their work environment was not conducive to a free flow of ideas and information. These situations are probably the result of rapid organizational and management changes to correct deficiencies identified by outside experts. These rapid changes have not effectively engaged the workers to accept those changes. NWP should consider engaging outside expertise in change management techniques to help engage workers in the change process and mitigate the effects of organizational change.

Opportunity for Improvement: NWP should consider engaging outside resources to mitigate the effects of organizational change.

Conclusion

The extensive changes (policies, procedures, programs, and managers) that have occurred and continue to occur across the site in the wake of the 2014 events continue to restrict the workforce's ability to effectively establish a cohesive, sustainable safety culture. Employees at all levels must continue to be involved in the development and operation of the safety and health program and in decisions that affect employees' health and safety. Field observations and interviews indicate that NWP employees generally remain committed to their personal safety, as well as the safety of their coworkers and facility visitors. As a result of extensive changes currently underway, NWP needs more time to allow programs to mature; build trusting relationships; and develop the worker-owned, management-supported safety culture that is indicative of a sustainable DOE-VPP Star site.

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. Implementation of the first two core functions of ISMS, defining the scope of work and identifying and analyzing hazards, form the basis for a systematic approach to identifying and analyzing all hazards encountered during the course of work. 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 fire and radiological release accidents in February 2014 revealed significant changes from the original nuclear safety basis for the facility, including over 300 suspect drums already emplaced in the mine. These changes resulted in a potential inadequacy of the safety analysis. Consequently, NWP is preparing a significant revision to the Documented Safety Analysis (DSA) using the most recent DOE Standard 3009-2014, *Preparation of Nonreactor Nuclear Facility DSA*. In the interim, to enter the mine and assess the extent of contamination, NWP issued nine evaluations of the safety situation (ESS). These ESSs, approved by DOE, permit limited operations within the mine, including decontamination, ground control, ventilation system repair and modification.

As reflected in the contract, DOE and NWP agreed to the conditions and requirements to operate the WIPP site, including the Environmental Protection Agency and the Hazardous Waste Facility Permit requirements summarized in the Authorization Agreement (AA). DOE requires an amendment to the AA when the scope of work or the authorization basis changes; therefore, NWP amended the AA to incorporate the recovery plan activities before the work began.

NWP has an ISMS defined in *Integrated Safety Management System Description*, WP 15-GM.03, Rev 8, February 24, 2015, but that system is undergoing significant change in response to the February 2014 events and has not been verified and approved by DOE. DOE has established verification and approval of the ISMS as a precondition to resuming waste handling activities. NWP is using the existing system as it makes changes and is subjecting all activities to increased review and oversight to ensure the effective identification and analysis of hazards.

Work planning and control follows the process described in *Work Control Process*, WP 10-WC3011, Draft Revision 34. Although NWP is revising this document, this process retains many features from the previous system, including the action request (AR) and its categorization process. An AR is the work request that initiates a work activity. The categorization of the AR involves several steps, including review by an AR committee that assigns a final category. The Team observed the AR committee effectively reviewing and assigning categories to ARs. The work-planning manager believes the various categories are necessary to differentiate the issues, help managers understand the conditions of the site, and allow NWP to make informed decisions on the allocation of resources.

Once NWP categorizes and accepts an AR, it uses the complexity and hazards associated with the work to determine the level of detail required for work planning. Type 4 work is defined as the simplest of work tasks. The hazards of the work fall within the general hazard analysis (GHA) or a standing job hazard analysis (JHA), and the worker implements required controls through general training, postings, or routine PPE, such as safety shoes, safety glasses, hardhats, and work gloves. An example of a Type 4 task is fixing a leaking sink. A cover sheet documents the accomplishment of the task. Type 3 work is within the skill of the worker and has a bounded scope of work. For example, to repair a fender on a trailer has several potential hazards that were analyzed with a standing JHA. A GHA may cover other hazards not specific to the activity. Type 2 work can be preventive maintenance (PM) or model work order (MWO). PMs are preapproved procedures, like a maintenance check on a forklift. MWOs are repeat performance of work, like the decontamination of equipment and physical areas in the mine. The hazards analysis may include a GHA, a standing JHA, or a JHA. Finally, Type 1 work is complex work that requires detailed work instructions to deal with specialized hazards. The hazards analysis may include a GHA, standing JHA, or a JHA. This categorization system effectively allows for the identification and analysis of the hazards for different work types.

NWP is significantly revising its *Job Hazard Analysis (JHA) Performance and Development*, WP 12-IS3002. Changes to the processes include a new JHA checklist that will provide a comprehensive list of potential hazards that the planning team will use during walkdowns and tabletop reviews of work. The checklist will require concurrence of all personnel participating in the planning team. The revised process will also require the fieldwork supervisor and a safety subject matter expert (SME) to concur on any work covered by an existing hazard analysis, such as the GHA or a standing JHA. This process will prevent overreliance on craft skill work, but permit craft skill work when justified. NWP expects the changes to this procedure and the other hazard analysis procedures to improve the effectiveness and efficiency of its work control process. These changes will require time to mature and demonstrate the performance expected of a DOE-VPP Star participant.

The work control manager implemented several additional initiatives to improve work control. For example, NWP developed a new newsletter, *WIPP Work Control Minute,* to occasionally address aspects of the work control program. In the first issue, the work control manager wrote an article clarifying for all personnel the responsibilities associated with a signature. Another improvement to the work control program includes the development of a list of skills and duties that define the skill of the craft. Once published, the skill of the craft procedure will define the training required to maintain those skills and duties. NWP currently has 21 planners, 14 of whom it hired in the past 2 years. Many of the new planners are not fully qualified, but they are in training and gaining more experience. Another initiative reduced the planning workload by consolidating the hazard analysis for PM procedures. For example, forklifts require a check at 100-hour, 500-hour, and 1000-hour operating intervals. Each of these intervals had its own work package and PM procedures, but the hazards were similar. Working together, the planners and craft developed a standardized PM document that analyzed and controlled the hazards associated with all three tasks. At the maintenance interval, the planner inserts a card with the required maintenance into the work package for the craft to perform. This process shortens the planning cycle for PM, reduces the workload on procedure writers, and allows maintenance personnel to spend more time performing maintenance. Another initiative included the work control manager briefing the changes to the work control process to all site personnel in August/September 2014.

NWP expects all these initiatives to improve work control significantly, but the changes require time for personnel to gain familiarity and proficiency with the processes.

The Team observed technical procedure (TP) WP 12-FP5113, revision 3, which annually tests the electrical systems supporting a water pump for the site fire suppression system. The Instrument and Controls (I&C) workers performed the Type 2 work package. After completion of the work, the Team identified a discrepancy between the procedure and the equipment regarding arc flash protection. The procedure required using arc flash protection for 3.2 calories/cm^2 whereas the panel cover identified 7.7 calories/cm^2 as the potential hazard. Workers neither identified the discrepancy during performance of the work nor performed any walkdowns prior to authorizing the work. NWP has not revised or reviewed the TP, originally developed in 2009, using the new work planning processes. Recognizing that old procedures may not have been reviewed using current expectations, NWP must increase its vigilance in authorizing work, train workers to expect errors in the procedures, and stop work to resolve discrepancies.

Opportunity for Improvement: NWP must increase its vigilance in authorizing work, train workers to expect errors in the procedures, and stop work to resolve discrepancies.

The industrial hygiene (IH) staff maintains the baseline hazard evaluations. The IH sampling and monitoring matrix lists the chemical and physical hazards identified on the site. Since the reduction of ventilation in the mine, volatile organic compound (VOC) concentrations have increased, particularly carbon tetrachloride. Work groups entering the mine use a photo ionization detector (PID) to monitor the air concentrations where they are working. The IH presets the PIDs to a concentration limit and if the monitor alarms, workers immediately move upstream to a clean area until the alarm shuts off. If workers have any questions, they can contact safety personnel in the mine or call to safety personnel on the surface. Another area where VOCs emerge from waste containers is the Waste Handling facility. NWP has staged drums of mixed waste in the Waste Handling facility since the mine is not accepting new waste. The drums can ventilate VOCs into the area. NWP has placed preset PID detectors in the storage area to set off alarms at a prescribed concentration. The shift manager in the WH facility contacts IH if a detector alarms, and then works with IH to reduce VOC levels in the area.

Since the February 2014 event, workers must wear additional PPE, consisting of single or double layer anti-contamination clothing and powered air purifying respirators. The additional PPE, combined with reduced ventilation, causes elevated temperatures in the PPE, contributing to heat stress concerns. In response, NWP increased its heat stress monitoring by using Wet Bulb Globe Thermometer (WBGT) measurements. NWP expects workers to use these measurements to evaluate heat stress potential and implement work/rest cycles. Since NWP does not have enough industrial hygienists on staff to continuously monitor temperatures in the mine, it has asked workers, primarily radiation control technicians, to take the WBGT measurements. Some of those workers expressed their discomfort taking those readings because they do not understand how to interpret the measurements. NWP should ensure it adequately trains workers to use and interpret WBGT readings, and to implement appropriate heat stress control actions when required.

Opportunity for Improvement: NWP should ensure it adequately trains workers to use and interpret WBGT readings and to implement appropriate heat stress control actions when required.

The safety department also performs safety inspections and documents results either on a field monitoring form or in a format that describes the deficiency, cites the requirement, and includes pictures of the deficiency. The information from the inspections feeds into the Contractor Assurance System for tracking and trending purposes. Several staff members have acquired: (1) certifications in safety or industrial hygiene; (2) have many years of field experience; or (3) have acquired knowledge of Occupational Safety and Health Administration (OSHA) and MSHA requirements. Knowledge of both MSHA and OSHA standards, combined with extensive field experience, is helping NWP self-identify noncompliant conditions and develop solutions prior to outside reviews or inspections.

Since February 2014 and by agreement with DOE, MSHA has also been performing onsite inspections. These random, unannounced inspections have identified many issues, primarily noncompliances with MSHA standards. Since initiating these inspections, the number of findings has dropped significantly as NWP becomes more proficient in self-identifying these issues. Comparisons of Fiscal Year (FY) 2013 and 2015 performance dashboards indicate there has been a significant improvement since 2013. NWP expanded the current dashboard to include additional leading indicators and improved trending. One area of interest is the number of NWP's self-identified MSHA issues versus issues identified by MSHA. During the first quarter FY 2015, MSHA identified 31 issues. In the second quarter, MSHA identified 15 issues while NWP self-identified 176 MSHA issues (data collected from safety inspections, field monitoring and OST reports). Thus, the MSHA identified issues fell by 52 percent.

NWP makes relevant information available to workers when accidents or injuries occur. Interviews conducted with various surface employees across the site revealed that NWP provides injury information to most personnel. When questioned, almost all personnel knew about the last two injuries, and all personnel knew of avenues to elevate safety concerns. No personnel expressed a fear of raising issues. One group of entry-level workers, the plant helpers, is assigned various jobs, and is not part of any specific workgroup. Some plant helpers indicated that they are rarely at their desks and rely on rumors to hear about injuries. These positions are temporary and last at most 3 months before workers receive permanent job assignments. In the interim, NWP must ensure it adequately communicates relevant information and lessons learned to these workers.

Accident investigations follow *Event Investigation*, WP 15-MD3102, but NWP is also revising this procedure. The manager for this program is integrating three investigation processes into one system to eliminate redundancies and increase the speed of investigations. Two new hires will lead this effort in the future and develop the procedure for the new investigation process.

Conclusion

NWP is revising and improving the procedures and processes to institute better worksite analysis. Revisions to work planning and control will facilitate the identification and analysis of hazards for improved control selection. The involvement of workers, planners, and SMEs is

critical during this transition to identify and question existing work control documents to improve the safety of the site. Safety and health professionals support the mine recovery effort by completing mine inspections and chemical and physical stress monitoring as the conditions change in the mine. NWP needs to stabilize its work planning and control processes, complete worker training on the new processes, and give those processes time to mature and demonstrate effectiveness to meet the expectations for a DOE-VPP participant.

VI. HAZARD PREVENTION AND CONTROL

The second and third core functions of ISMS, identify and implement controls and perform work in accordance with controls, ensure that once hazards have been identified and analyzed, they are eliminated (by substitution or changing work methods) or addressed by the implementation of effective controls (engineered controls, administrative controls, or PPE). Equipment maintenance processes to ensure compliance with requirements and emergency preparedness must also be implemented where necessary. Safety rules and work procedures must be developed, communicated, and understood by supervisors and employees. These rules and procedures must also be followed by everyone in the workplace to prevent, control the frequency of, and reduce the severity of mishaps.

NWP manages the selection of hazard controls by considering the type of hazard, the magnitude of the hazard, the type of work, and the life cycle of the facility. NWP integrates the hierarchy of controls through design, procurement, procedure development, JHAs, and work plans/packages. Elimination, substitution, or engineered controls are most desirable. If NWP cannot eliminate or mitigate the hazard by substitution or engineered controls, it uses administrative controls, such as signs, procedures, or access restrictions. Finally, NWP relies upon PPE to mitigate exposure to the identified hazards.

NWP has instituted several efforts to actively improve the hazard prevention program. For example, NWP is currently eliminating combustibles within an area of the mine to establish a combustible-free zone. This effort will establish a safer area free of combustible material as a refuge for miners and underground workers. In addition, NWP is replacing many liquid fuel vehicles as feasible to reduce the amount of liquid fuel (diesel) in the mine.

Because of the fire event, NWP is reengineering the mine ventilation system. Investigation of the fire exposed unrecognized vulnerabilities in the system that caused smoke to fill the mine and hinder escape. Some of the vulnerabilities identified included inoperative dampers and the inability to effectively manage airflow during events.

Administrative controls at NWP are changing rapidly. Many programs are in a state of change, such as Emergency Management and Radiation Protection. NWP is revising many procedures. For example, NWP has identified approximately 120 operational procedures that it needs to change. NWP is attempting to manage the administrative changes through new training (see Safety and Health Training) and temporary compensatory controls through ESS.

NWP workers are spending long hours working to resume operations, which may contribute to workers' inattention to minor hazards. NWP initiated a poster campaign to emphasize attention to common hazards, such as uneven sidewalks, curved surfaces, dirt patches, and curbs around the site. Posters include pictures of WIPP workers with mock injuries, a description of the accident, and the result of the injury. One poster mentioned the worker being on disability and not being able to play with his children. NWP hopes the message causes workers to refocus their efforts and pay greater attention to simple movements around the site. A recent injury in 2015 occurred when a person tripped on a parking lot stop block and broke both wrists. Since that accident, NWP improved the lighting in the parking lots and is planning to remove all the parking stop blocks and redesign the traffic patterns. NWP is also emphasizing "White Space"

awareness training to highlight hazards that workers may encounter between jobs, such as when they are walking around the worksite.

The Team observed miners wearing appropriate PPE in the mine and above ground. Additional PPE is mandatory in the mine because of the contamination event. Recovery actions in some sections require respiratory protection. Reflective clothing, hardhats with lamps, self-rescuers, and gloves are the normal attire underground in noncontaminated areas. Above ground, workers wear reflective vests, eye protection, hardhats, fall protection, and gloves, dependent on the work task. In addition to the control hierarchy, NWP uses prejob briefs and reverse prejob briefs to remind workers of the hazards and controls.

NWP is making improvements to hazard controls that address the results of many assessments performed by outside experts. Externally identified issues are declining. However, since NWP is heavily focusing on the underground recovery and improvements, above ground controls may not receive the attention needed to maintain the rigor for safety expected at WIPP. For example, the Team observed several people performing a roofing inspection on one of the buildings. The Team observed one of the individuals walk to the edge and look down contrary to NWP rules for roof access. NWP has documented clear expectations for personnel working on elevated platforms and roofs. NWP suspended roof work, performed an investigation, convened a meeting with affected personnel, and instituted corrective actions. Another example of where NWP needs additional effort is the above ground walking paths. Most crosswalks and walkway paint have deteriorated to the point where they are, in some places, not discernible. Currently, vehicular traffic is minimal (mostly golf carts), but when waste handling resumes, truck traffic will increase significantly. In the interim, workers may become complacent about where they walk and develop unsafe habits. NWP should ensure that all safety programs and policies receive attention to eliminate complacency around above ground hazards.

Opportunity for Improvement: NWP should ensure that all safety programs and policies receive attention to eliminate complacency around above ground hazards.

NWP medical and health and wellness programs are evolving and improving. Since the last VPP assessment, NWP added an additional registered nurse to support the medical program; there are now three Radiation Emergency Assistance Center/Training Site (REAC/TS)-trained nurses. NWP invested in new, upgraded medical equipment to include spirometers, blood pressure monitors, carbon dioxide blood monitors, along with portable instruments to support the expanded radiation protection technicians' roles and responsibilities to control surface and airborne contamination. NWP added additional IH support to evaluate hazards that dictate medical program requirements, such as respiratory protection or the beryllium programs. Ergonomic support is also available through the NWP medical program to evaluate workstations or areas. The wellness activities supported by the medical program include flu shots, free cholesterol screening, and monitoring employees' blood glucose over a 90-day period. NWP is planning a new fitness center for employees, which will require renovating an existing building to house new equipment and provide enough space for multiple employees to use the facility at one time. This new fitness center will also enable the guards and firefighters to maintain fitness qualifications.

The radiation protection (RP) program has experienced significant change since the release event in 2014. NWP hired a new radiation protection manager and deputy manager to address the increased radiological hazards. Previous contractors trained radiation protection technicians with the assumption that WIPP would operate as a clean facility with no radiological, airborne or removable contamination. The radiological release from the drum in 2014 altered that assumption, and NWP now requires personnel to be prepared to address a completely new set of hazards.

In an effort to better communicate and manage his work group, the RP manager moved his office into the same location as his technicians, brought in seasoned technicians from other sites that were familiar with TRU issues, and trained local technicians to meet the new challenges of dealing with alpha contamination. In addition to colocating his resources, the RP manager frequently entered the mine so he was visible, supportive of the recovery efforts, and available to mentor or assist if there were questions that arose. NWP brought in outside trainers to train local staff on contamination control and other radiological techniques. Currently, NWP has three inhouse radiological trainers to meet the training needs of the health physics organization. The technicians interviewed readily support the RP management team. Technicians are frequently present in the offices of managers discussing issues and problems. The RP managers have earned the trust and respect of the technicians as they solve those issues and keep the technicians informed of progress.

The Emergency Management program at NWP is in a state of flux. As the events of 2014 unfolded, it became apparent that the existing emergency management program needed to change to be able to respond to upset events. Addressing vulnerabilities in activating the Emergency Operating Center, evaluation of changing emergency conditions, and the control of surface and airborne contamination were just a few of the programmatic improvements identified by outside sources. NWP hired a new manager to institute those changes. In addition to his emergency management responsibilities, the new manager is responsible for the security forces. Currently, the fire department is transitioning from a fire brigade to a fire department with additional employees. Firefighters will be required to maintain national certifications, meet new physical requirements, and meet DOE requirements for a fire department versus the lesser requirements required for a fire brigade. It will be some time before NWP fully staffs the fire department and firefighters are fully qualified. The existing staff is performing required inspections, rounds, and maintaining equipment, in conjunction with providing support to underground medical monitoring for personnel wearing respiratory protection. As discussed in the Employee Involvement tenet, there is significant room for improvement in the emergency management organization related to employee involvement.

Conclusion

NWP follows the hierarchy of controls to eliminate, mitigate, and protect employees from the hazards associated with the operation of the WIPP site. NWP must guard against complacency and inattention to hazards above ground while recovery efforts are underway in the mine. The medical and wellness programs are effective and providing the support necessary for the site's efforts toward recovery. The RP program is improving and changes in management and training have resulted in better-qualified and better-trained technicians, visible management support in the workspaces, and improved communication with the workers. The emergency management

program is in a state of flux as changes are developed and implemented. NWP needs more time to allow programmatic changes to mature and achieve DOE-VPP Star status.

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

The NWP training program is in the process of instituting the new training associated with the corrective actions-related improvements. Procedural and policy changes are numerous. NWP expends approximately 40 man-hours to develop each hour of classroom instruction. Whether the upcoming changes, such as those affecting DSA, Technical Safety Requirements, operational procedures, will overwhelm the limited number of trainers remains an issue that has not yet been resolved. Most of the trainers have been with the training department since its inception. In 2002, there were 22 trainers at the site; by 2012, that number had diminished to 11 trainers and remained at that level with three managers and three administrative specialists.

The Team attended two training classes during this assessment, the Hazardous Waste Responder class and the Mine Entry training. The Team observed dialog between students and instructors to be informative and casual. It was clear that the students felt comfortable asking questions or giving examples to supplement the discussions. There were many instances where questions and discussions enhanced the completion of training objectives. The instructor for the Hazardous Waste Responder class has been at the site for 27 years and has extensive knowledge of the historical events at the site. His historical knowledge helped further enhance discussions on topics, such as spill response, where he had first-hand experience at the WIPP laboratory when it was operational.

Training at WIPP is classroom-only at this time. The training department is attempting to acquire software that will enable it to use computer-based training (CBT) for some courses, such as general employee requalification. Training for procedural/policy changes may occur through changes to classroom curriculum (approximately 20 percent) or through required reading/department briefings (approximately 80 percent). The procedure group created a form to help evaluate the magnitude of procedural changes and determine if classroom retraining or required reading was the most efficient way to convey the change.

In addition to worker training, NWP launched a new training course for supervisory and leadership positions. Similar to other courses across the DOE complex, this course will enhance leadership skills, develop individual communication techniques, and break down barriers between supervisors and workers. In the realm of health and safety training, this course may enhance or reinforce the positive safety dialogue between workers and supervisors. The course has limited space and many candidates were anxious to participate in the first class. (See discussion in the Management Leadership tenet.)

The emergency management organization is engaged in extensive qualification and training of firefighters. Currently, firefighters and emergency service technicians are state-licensed and qualified up to the paramedic level. Changing from a fire brigade to a fire department will require current firefighters to meet qualifications required by DOE and nationally recognized

organizations (see discussion in Hazard Prevention and Control). New employees will need more time to become trained and qualified to meet NWP expectations. During this assessment, the Team observed a training drill for the fire department involving a fire at the fueling station with an injury. The simulated event allowed the participants to respond to the site's emergency plan and allowed controllers and responders to interact and discuss actions rather than waiting till the end of the simulated exercise. Participants discussed several different options for improvements, such as fire truck location and different ways to shut off fuel, and the drill was declared successful.

Conclusion

The NWP training organization is adapting to the new training needs of the WIPP site. Changes across the spectrum of programs and procedures are challenging the organization. To date, they are able to maintain effective training programs to address recovery actions. Training classes observed by the Team were effective and provided a setting for open discussion. The training department is actively searching for CBT software and support to relieve the burden of classroom-only training for requalification or renewals. NWP's Safety and Health Training meets the expectations for a DOE-VPP participant.

VIII. CONCLUSIONS

The February 2014 fire in the underground was a traumatic experience for workers, both those in the mine and those above ground. From the time the fire began until the last persons exited the mine, workers were in doubt regarding their fate and that of friends and family that might be involved. Many workers exhibited extreme calm despite the stressful situation and assisted other workers that struggled during the event, thereby ensuring no workers were left in the underground - a source of great pride to the workers. The radiological release demonstrated the ability of the facility to mitigate a release from the waste despite human errors and response delays. Both events exposed unrecognized vulnerabilities and deterioration in facility operations and conditions that had developed over several years. The causes for those conditions are extensive, and go beyond any single individual or organization.

The subsequent suspension of waste handling at WIPP created extensive issues throughout the DOE complex, including tension between DOE, States, and other stakeholders. DOE has been working to resolve those issues and to reassure concerned parties that it will resume handling waste in a timely manner, and do so safely.

The subsequent urgency to correct the problems and resume waste handling is creating tension between NWP workers and managers. Managers have not effectively included workers in many of the urgent changes, and workers perceive NWP may be intentionally excluding or ignoring them. NWP managers have recognized the breakdowns in communication and are working to repair the gaps that have developed, but those efforts are going to take time to demonstrate effectiveness and restore workers' trust. NWP is safely executing the current work to upgrade WIPP systems, establish better controls on combustible materials in the mine, and train workers.

The transitional process from the previous contractor is complete. On its own, NWP demonstrates the commitment to excellence that warrants continued participation in DOE-VPP as a new participant, but the programs and processes need time to demonstrate the excellence that warrants recognition at the Star level. In particular, NWP needs to complete implementation of its ISMS. As such, the Team recommends admission of NWP into DOE-VPP as a new participant at the Merit level while it continues to address the necessary improvements already identified by other investigations and assessments.

APPENDIX A

Management

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