North Wind Solutions, LLC
Transuranic Waste Processing Center

Report from the Department of Energy
Voluntary Protection Program
Onsite Review
May 1-10, 2018

U.S. Department of Energy
Office of Environment, 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 excellence can be encouraged and guided, but not standardized. 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's (OSHA) VPP. Since its creation by OSHA in 1982 and implementation by DOE in 1994, VPP has demonstrated that cooperative action among Government, industry, and labor can achieve excellence in worker safety and health.

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

However, 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 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 are certificates of approval and the right to use flags showing the program in which the site is participating. The participant may also choose to use the DOE-VPP logo on letterhead or on award items for employee incentive programs.

This report summarizes the results from the evaluation of North Wind Solutions, LLC (NWSol), conducted May 1-10, 2018, and provides the Associate Under Secretary for Environment, Health, Safety and Security with the necessary information to make the final decision regarding NWSol's continued participation as a DOE-VPP Star site.

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ABBREVIATIONS AND ACRONYMS

ABE	A Brief Exchange
AHA	Activity Hazard Analysis
AU	Office of Environment, Health, Safety and Security
BBA	Box Breakdown Area
BLS	Bureau of Labor Statistics
CONOPS	Conduct of Operations
C.O.R.E	Challenging Ourselves to Reach for Excellence
CTP	Continuous Training Program
DART	Days Away, Restricted or Transferred
DIF	Difficulty, Importance and Frequency
DOE	Department of Energy
EMS	Environmental Management System
EnergX	EnergX, LLC
FMEA	Failure Modes and Effects Analysis
GET	General Employee Training
HPI	Human Performance Improvement
ISMS	Integrated Safety Management System
MTB	Mockup Training Building
NAICS	North American Industry Classification System
NWSol	North Wind Solutions, LLC
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
RH	Remote-Handled
SCIP	Safety Culture Improvement Panel
SME	Subject Matter Expert
Team	Office of Worker Safety and Health Assistance DOE-VPP Team
TRC	Total Recordable Case
TWPC	Transuranic Waste Processing Center
TRUPACT-II	Transuranic Package Transporter, Model II
VPP	Voluntary Protection Program
VPPPA	Voluntary Protection Programs Participants' Association, Inc.
WAI	Wastren Advantage, Incorporated

EXECUTIVE SUMMARY

The Department of Energy's (DOE) Voluntary Protection Program (VPP) Team (Team) from the Office of Environment, Health, Safety and Security (AU) recommends that North Wind Solutions, LLC (NWSol) at the Transuranic Waste Processing Center (TWPC) continue to participate in DOE-VPP as a Star participant.

The TWPC, located adjacent to DOE's Oak Ridge National Laboratory (ORNL) site, began operation in 2004. The facility is designed to treat and repackage Transuranic ("Trans" or "beyond" uranium) and low-level waste from the Melton Valley area within the DOE Oak Ridge Reservation. TWPC became a Star site in 2009. DOE awarded a new contract in June 2015 to NWSol for TWPC operations. NWSol requested to continue in DOE-VPP under the transitional process. Continued participation after the transition requires an onsite assessment by AU's Office of Worker Safety and Health Assistance.

NWSol currently employs about 200 people, including waste operators, material handlers, radiological control technicians, engineers, as well as administrative and training personnel. As a Category 2, Nonreactor Nuclear Facility, TWPC contains radiological, chemical, and industrial hazards. Although some chemical hazards exist from waste processing activities, the majority of the potential chemical hazards are associated with waste sorting and characterization activities.

NWSol experienced four recordable injuries in the previous 3 years. Two of the four cases involved Days Away, Restricted or Transferred (DART) cases. This resulted in a 3-year total recordable case (TRC) rate of 0.67 and DART rate of 0.33, numbers well below the Bureau of Labor Statistics 2016 industry average for Waste Management and Remediation Services. Workers interviewed felt comfortable reporting injuries and illnesses, and the Team did not identify any incentives tied to injury or illness rates that would suppress or discourage reporting.

NWSol managers understand the challenges facing the organization resulting from the hybrid contract. They meet those challenges by promoting worker suggestions, involving workers in solving problems, and carefully managing resources to safely accomplish mission goals. They promote safe work as a means of accomplishing the mission and ensure workers are not subject to undue schedule pressures.

NWSol continues to encourage employee participation through a variety of opportunities. Employee concerns are addressed through the employee safety groups. Safety Committee meetings are well attended with significant employee participation. Employees indicated that their managers support and appreciate workers demonstrating a questioning attitude with regard to employee work pauses/stepbacks.

NWSol's work planning process ensures proper identification and analysis of hazards in the workplace. It use the hierarchy of controls to protect workers, prevent injuries, and minimize workplace hazards. Mockups are used for higher hazard work that allow workers to test, practice, and perfect work methods in a clean (noncontaminated) environment. An Occupational Medical Program provides comprehensive medical services.

NWSol continues to maintain an effective safety and health training program. It has improved several elements of the training program, including an emphasis on conduct of operations mentoring improvements, continuous training program implementation, expanded use of mockup

training, and the development of a required reading evaluation form. These changes have resulted in a more robust safety and health training program.

Since taking over operation of TWPC in 2015, NWSol has successfully maintained the processes, procedures, and practices that enable safe mission completion. NWSol is carefully managing the complex hybrid structure of the contract and shielding workers from schedule pressures that might induce unsafe work practices or shortcuts. Workers exhibited their commitment and skills related to conduct of operations and their willingness to step back, pause, or stop work when questions arose. No workers expressed any fear of retaliation, and most workers were dedicated to the site mission. The opportunities for improvement identified in this report will help NWSol achieve further excellence over the remaining term of its contract.

TABLE 1

OPPORTUNITIES FOR IMPROVEMENT

Opportunity for Improvement	Page
NWSol managers should seek new promotional opportunities for safety excellence, change those activities frequently (e.g., quarterly) to ensure more workers find at least one quarterly activity in which they want to participate, and track participation in those activities as a leading safety indicator.	**4**
NWSol should consider using its annual report as a means of identifying planned safety program improvements for the coming year and establishing goals and objectives to evaluate the improvements.	**5**
NWSol should ensure its work planning processes identify and involve all the appropriate personnel early in the work planning process and that key personnel are not erroneously excluded.	**10**
NWSol should create a matrix to track all the inspections conducted to ensure routine inspections of workplaces for safety and health concerns occur at least monthly and cover the whole worksite at least quarterly.	**11**
NWSol should evaluate the equipment placement used for the TRUPACT-II loading operation to ensure safe working conditions.	**14**
The training group should evaluate the Building Warden training course to ensure it reflects the current roles of building wardens to ensure effective safety inspections are performed as outlined in the NWSol Inspection procedure.	**17**

I. INTRODUCTION

The TWPC, located adjacent to DOE's ORNL site, began operation in 2004. The facility is designed to treat and repackage Transuranic ("Trans" or "beyond" uranium) and low-level waste from the Melton Valley area within the DOE Oak Ridge Reservation. Transuranic waste material is generally associated with the human manipulation of fissionable material dating back to the Manhattan Project. Waste streams processed through the facility include supernate liquids from storage tanks, clothing, tools, rags, residues, soils, and debris. The facility is currently processing higher activity wastes that require remote handling. Once processed, wastes are shipped to permanent disposal sites, including the Waste Isolation Pilot Plant in New Mexico.

TWPC was originally built by Foster Wheeler Environmental Corporation as a private effort. That concept was unsuccessful for a variety of reasons, and DOE purchased the facility and transitioned it to a cost-plus contract with EnergX, LLC (EnergX) to take over operational leadership of the facility. EnergX applied to DOE-VPP in October 2007, and TWPC became a Star site in 2009. DOE awarded a new contract to Wastren Advantage, Incorporated (WAI) in 2010, and the new contractor continued in DOE-VPP with a successful recertification in 2012. DOE awarded another new contract in June 2015 to NWSol. NWSol requested to continue in DOE-VPP under the transitional process. Under that process, the new contractor (NWSol) has 2 years to demonstrate its continued support for DOE-VPP, ensure changes it makes to its safety and health program meet DOE-VPP expectations, and submit its own DOE-VPP application. Continued participation after the transition requires an onsite assessment by the AU DOE-VPP Team (Team).

NWSol currently employs about 200 people, including waste operators, material handlers, radiological control technicians, and engineers, as well as administrative and training personnel. During the review, the Team had contact (in the form of interviews, work observations, document reviews, and meetings) with many employees at all levels of the organization. The contract is a hybrid contract with a fixed-price component for support services, a cost-plus component for waste operating, and an indeterminate date/indeterminate quantity component for material handling. Waste Operations and Waste Handling is primarily performed by Veolia Nuclear Solutions (which purchased WAI) as a dedicated subcontract partner with NWSol.

As a Category 2, Nonreactor Nuclear Facility, TWPC contains radiological, chemical, and industrial hazards. Although some chemical hazards exist from waste processing activities, the majority of the potential chemical hazards are associated with waste sorting and characterization activities. Industrial hazards include: heavy equipment operations, hoisting and rigging, ergonomic hazards, elevated work, and electrical hazards. Radiological hazards include low-level Contact-Handled wastes, to higher-level Remote-Handled (RH) wastes and mixed wastes, and may be in the form of surface or airborne contamination. Activities observed during the review included: glovebox operations, operation of the Box Breakdown Area (BBA), the Cask Processing Enclosure, Hot Cell operation, maintenance and construction activities, radiological surveys, and daily plan-of-the-day meetings. The Team also observed committee meetings related to safety improvements.

II. INJURY INCIDENCE/LOST WORKDAYS CASE RATE

Injury Incidence/Lost Workdays Case Rate (TWPC)					
Calendar Year	Hours Worked	Total Recordable Cases (TRC)	TRC Incidence Rate per 200,000 hours	DART* Cases	DART* Case Rate per 200,000 hours
2015	477,792	0	0.0	0	0.0
2016	365,384	2	1.1	0	0.0
2017	356,784	2	1.1	2	1.1
3-Year Total	1,199,960	4	0.67	2	0.33
Bureau of Labor Statistics (BLS-2016) average for NAICS** 562 (Waste Management and Remediation Services)			4.5		3.0

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

TRC Incidence Rates, including subcontractors: 0.67
DART Rates, including subcontractors: 0.33

Discussion

NWSol experienced four recordable injuries in the previous 3 years. Two of the four cases involved DART cases. This resulted in a 3-year TRC rate of 0.67 and DART rate of 0.33. The injury and illness log, first-aid cases, recordkeeping policies, and procedures were consistent with OSHA and DOE recordkeeping requirements. The NWSol Health and Safety Manager participates in the investigation of injuries and illnesses, determines recordability, and maintains the log and supporting records. The Health and Safety Manager confirmed that his senior managers supported the recordkeeping decisions made for the few cases experienced and did not attempt to influence those decisions. Workers interviewed felt comfortable reporting injuries and illnesses, and the Team did not identify any incentives tied to injury or illness rates that would suppress or discourage reporting. NWSol's injury incidence rates remain significantly below its comparison industry average and meets expectations for DOE-VPP participation.

III. MANAGEMENT LEADERSHIP

Management leadership is a key element of obtaining and sustaining an effective safety culture. The contractor must demonstrate senior-level management commitment to exceeding occupational safety and health requirements and meeting the expectations of DOE-VPP. Management systems for comprehensive planning must address health and safety requirements and initiatives. Elements of the management system include: (1) clearly communicated policies and goals; (2) clearly defined and assigned responsibilities and authority; (3) adequate resources; (4) accountability for both managers and workers; and (5) managers must be visible, accessible, and credible to employees. Authority and responsibility for employee health and safety must be integrated with the management system and must involve employees at all levels.

In 2012, TWPC managers with WAI understood the value of safety as a prerequisite for accomplishing their mission. They showed effective leadership and commitment by providing resources and being visible and accessible to the workforce. Improvement opportunities included establishing specific actionable goals to drive continued safety improvements, further strengthen the existing safety culture, and ensure safety and health resources aligned with managers' expectations.

From the day NWSol took over operation of the site, it has focused on continuing to ensure safe, compliant mission execution. NWSol only replaced a few senior managers. Most of the managers with project execution or safety management responsibilities transferred from the previous contractor and already had several years of experience at TWPC. The previous contractor, WAI, remained on the project as a subcontractor to NWSol, further easing any workforce stress resulting from the contract change.

The program manager is the highest level manager onsite and is responsible for all aspects of TWPC mission execution. Although new to TWPC at the contract change, the NWSol program manager has extensive experience in DOE and the commercial nuclear industry. The program manager places a high value on managers' presence in the work areas as a means of engaging workers, stimulating worker involvement, and identifying and correcting employee concerns and issues. NWSol performed two safety culture surveys, first in 2015, and then again in 2017. NWSol's evaluation of the results identified that workers believed managers needed to be more visible in work areas. In response, the program manager initiated several actions. The program manager began conducting frequent walkarounds, usually on a weekly basis, with direct reports to evaluate work conditions, interact with workers, and establish management leadership and commitment. She also started scheduling monthly brown bag lunches. The program manager's assistant selects and invites personnel to these lunches and rotates personnel to help get a good cross-section of the plant population at the lunches. Attendance is voluntary, but most invitees willingly attend.

NWSol also holds routine safety meetings for all personnel. NWSol uses these meetings to provide workers with project status updates, discuss issues that workers may have, and thank workers for their continued support. Attendance at these meetings is voluntary and NWSol tracks attendance as a leading indicator of worker involvement in safety. NWSol provides lunch for the staff to encourage worker participation. NWSol repeats the presentation and provides lunch for the backshift personnel to ensure all workers get the same opportunity. Most staff members attend these meetings.

Because of managers' extensive experience in DOE and the commercial nuclear power industry, NWSol emphasizes conduct of operations, human performance improvement, and strong nuclear safety culture as keys to meeting contract milestones. Emphasis on these important principles result in a strong worker commitment to following procedures, pausing work when questions arise, stopping work if it cannot be performed safely, and reporting all conditions that might indicate problems. Several workers confirmed their willingness to stop and ask questions during the assessment, including a worker and a shift supervisor that questioned how a sample was packaged in the RH area of the facility. They questioned a longstanding practice that had not been included in a procedure. Because of that question, work was stopped, NWSol evaluated its methods for packaging and handling waste samples and ensured those methods met the complex safety requirements for the facility.

NWSol uses rewards and recognition to encourage workers' contributions to safety excellence (above and beyond compliance) to drive safety improvement. Most NWSol resources for that effort are for the lunches at the safety meetings. It also has a corporate recognition program called the *Spot* program. Individuals are recognized by management and their efforts are documented for upper management review and monetary reward approval. NWSol managers have not found other methods to encourage safety committees to identify and implement safety promotional activities associated with normal work activities. At contract change, NWSol evaluated for continuation the "Challenging Ourselves to Reach for Excellence" (C.O.R.E.) program implemented by the previous contractor in 2012. Identified by an employee that attended the 2010 Voluntary Protection Programs Participants' Association, Inc. (VPPPA) National Conference, that program rewarded employees for performing a variety of safety awareness and improvement activities. Unfortunately, after a few years with little change in the activities or rewards for participating, participation in C.O.R.E. had dwindled to a small fraction of the population. NWSol dropped the program and has not implemented any new efforts. To further encourage employee participation, and prevent potential worker complacency arising from a good safety performance record, NWSol managers should seek new promotional opportunities for safety excellence. Those activities and rewards should be changed frequently (e.g., quarterly) to ensure more workers find at least one quarterly activity in which they want to participate. Similar to the safety meetings, NWSol can track participation in those activities as a leading safety indicator.

Opportunity for Improvement: NWSol managers should seek new promotional opportunities for safety excellence, change those activities frequently (e.g., quarterly) to ensure more workers find at least one quarterly activity in which they want to participate, and track participation in those activities as a leading safety indicator.

NWSol is managing its resources within the hybrid contract structure. Although the contract is firm, fixed-price for much of the company, workers did not express any concerns regarding schedule pressure or performance. The program manager does permit some overtime when it is necessary, but overtime is carefully managed. One concern the Team heard on several occasions related to warehouse staffing during the back shift. Some material used for waste handling, particularly air-fed suits, cannot be easily stored in the waste handling and sorting areas. A few suits are kept ready for use, but there are multiple sizes available. In some cases, backshift personnel changes or limitations result in a worker requiring a different size suit than those available. In 2017, NWSol stopped assigning a person in the warehouse on back shift. The result is that when material is not available for the planned backshift activities, those activities

are delayed or cancelled. NWSol is aware of this issue, and is seeking ways to alleviate the potential problem, including better advanced planning by supervisors, and identifying appropriate storage locations for material.

NWSol has an Executive Work Safe Council that serves as an umbrella committee for the other work safe committees. Members include all the senior managers and key health and safety staff. The Executive Work Safe Council provides senior management access and oversight of ongoing committee and team functions. The charter of the Executive Work Safe Council is to create a culture of excellence in safety, health, and environmental management, which actively involves managers, supervisors, and employees. The overall purpose of the Executive Work Safe Council is to facilitate the exchange of ideas and concerns throughout TWPC and to ensure activities are consistent with the TWPC Strategic Mission Objectives. The Executive Work Safe Council reviews reports and requests from committees and teams and monitors performance indicators (environmental and safety statistics, surveillances, corrective actions). The Executive Work Safe Council meets at least quarterly.

DOE expects all DOE-VPP participants to produce an annual written report that includes recommendations for program improvements, including improving ineffective activities or starting new programs to achieve the overall goal(s). That annual assessment should also be used as an opportunity to establish program goals for the following year. NWSol has performed annual self-assessments following the DOE-VPP tenets, and those reports do a very good job of identifying program accomplishments from the previous year. However, NWSol has not used its annual assessment to identify planned improvement or establish program goals for the following year. Goals identified in the reports are limited to the Performance Objectives, Measures, and Commitments established as part of its contract with DOE. NWSol should consider using its annual report as a means of identifying planned safety program improvements for the coming year and establishing goals and objectives to evaluate the improvements.

Opportunity for Improvement: NWSol should consider using its annual report as a means of identifying planned safety program improvements for the coming year and establishing goals and objectives to evaluate the improvements.

Conclusion

NWSol managers understand the challenges facing the organization resulting from the hybrid contract. They meet those challenges by promoting worker suggestions, involving workers in solving problems, and carefully managing resources to safely accomplish mission goals. They promote safe work as a means of accomplishing the mission and ensure workers are not subject to undue schedule pressure. NWSol demonstrates the management leadership expectations for continued participation in DOE-VPP.

IV. EMPLOYEE INVOLVEMENT

Employees at all levels must continue to be involved in structuring and operating the safety and health program and in decisionmaking that affects employee health and safety. Employee involvement is a major pillar of a strong safety culture. Employee participation is in addition to the right to notify 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 and rewarding workers for their participation and contributions. Employees and managers must communicate and collaborate in open forums to discuss continuing improvements, to recognize and resolve issues, and to learn from their experiences.

In 2012, TWPC employees were extensively involved in the worker safety and health program at TWPC. Managers encouraged them to participate through a wide variety of opportunities. The broader involvement across all layers of the organization was producing significant gains in productivity while simultaneously maintaining and improving a safe work environment.

The NWSol safety committees include the Executive Work Safe Council, Operations and Maintenance Safety Committee, the Support Groups Safety Committee, and the Environmental Management System (EMS) Committee. The Executive Work Safe Council acts as an overarching committee for the other four committees. Representatives from each of the committees are members of the Executive Work Safe Council (See Management Leadership).

The Operations and Maintenance Safety Committee focuses on the safety and improvement of radioactive waste operations and maintenance. The Operations and Maintenance Safety Committee reviews improvement and performance initiatives, provides an opportunity for committee feedback, and encourages participation in safety focused activities. Members include employees from operations, radiological controls, maintenance, and a management sponsor.

The Support Groups Safety Committee addresses functions not encompassed within the industrial work within the processing facility, such as administrative work, engineering, and warehousing. The Support Groups Safety Committee promotes a safe and efficient work environment in the nonproduction facilities at TWPC. Members include employees from various support departments and a management sponsor.

The EMS Committee brings TWPC workers and managers together to evaluate the initiatives and goals of NWSol's EMS. The EMS committee provides cost studies and reviews alternative approaches, and gives that information to the Executive Work Safe Council. Membership of the EMS includes representatives, managers, and site personnel from various organizations throughout TWPC.

Employees stated that involvement in safety committees benefits them by giving them a voice to raise and resolve issues, as well as giving them the opportunity to communicate directly with senior managers about those issues. Many workers interviewed stated that they typically raise safety concerns directly to their supervisors who address and correct those concerns before the next scheduled safety committee meeting.

An Operations and Maintenance Safety Committee meeting during the review was well attended by managers and employee representatives. The meeting covered several topics, including a safety share that included committee members volunteering their similar experiences. Other

topics discussed included updates on issues currently under review and new issues. Worker participation was excellent with several new issues identified that management champions agreed to evaluate. One issue was manning and access to the warehouse during nightshift (see Management Leadership). Another issue was a discussion of new radio headsets for operators in the BBA. Workers use the radios to communicate with each other and with workers outside the BBA. The new headsets incorporated a voice-activated transmit function rather than a push-talk feature. A vendor had presented the new system during the review period, but many operators were attending cardiopulmonary resuscitation training and could not attend the demonstration. Managers agreed to reschedule the vendor demonstration so the majority of workers could try the system and provide recommendations.

Several workers stated that supervisors and senior managers treat stop works and safety pauses as "atta boys." Workers have witnessed managers and supervisors congratulating other workers for calling a safety pause or step back to question/correct issues. Several workers stated that NWSol has the best safety culture they have ever worked in. Three operators interviewed stated that while they knew that other longer-term employment opportunities existed within the ORNL area, they would not pursue other employment until the TWPC site was no longer an option for them.

NWSol continues to provide many opportunities for workers' involvement in work planning. Several workers stated they were involved in the work order development or the development of procedures prior to work approval. Workers also participate in the activity hazard analysis (AHA), work planning, and prejob and postjob briefs.

In 2008, the original TWPC contractor initiated "A brief exchange" (ABE) as a tool to improve communications to all site personnel. ABE is a short (one page or less), written note that focuses on single subjects or related topics, provides late-breaking news, announces new activities/ expectations, and addresses other things workers may be curious about. The ABE publication is not routine; rather, it provides updated information to the workforce on an as-needed basis. The Team reviewed several recent ABEs that were informative and timely.

"Voice Box" is another method employees use for suggestions, safety issues, or process improvements. Workers fill out a form, then drop the form in a collection box. The safety committees and the Executive Work Safe Council review the suggestions for action. NWSol explains the process to all workers, and multiple "Voice Box" collection boxes are located throughout the site for easy access.

NWSol sends workers to both regional and National VPPPA conferences to seek new ideas. The Operations and Maintenance Safety Committee discussed obtaining new glovebox liners identified by an operator who attended the 2017 regional VPPPA conference. The operator suggested the new liners after trying them at the regional conference. Employees selected to attend are expected to provide feedback of their experiences at the conference to the TWPC employees upon their return.

Conclusion

NWSol continues to encourage employee participation through a variety of opportunities. Employee concerns are represented effectively through the employee safety groups. Safety Committee meetings are well attended with significant employee participation. Employees indicated that their managers supported and showed appreciation for the workers demonstrating a

questioning attitude with regard to employee work pauses/step backs. NWSol meets the Employee Involvement expectation for continued participation in DOE-VPP.

V. WORKSITE ANALYSIS

Management of health and safety programs must begin with a thorough understanding of hazards that might be encountered during the course of work and the ability to recognize and control any new hazards. Implementation of the first two core functions of an integrated safety management system (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. Strong 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 hazards.

In 2012, TWPC (under WAI) had significantly improved its work planning and control process by integrating the hazard controls identified in the AHA into its work packages. Documenting the analysis remained an area for improvement. The Radiation Protection Program appropriately evaluated the radiological hazards with some opportunities to improve consistency between technical basis documents, procedures, and postings.

NWSol continues to use an effective process to ensure proper identification and analysis of hazards in the workplace. NWSol uses a traditional approach to identify and control hazards. The hazard analysis process, documented in CM-P-IS-007-R13, *Activity Hazard Analysis*, systematically reviews individual work tasks for potential hazards, analyzes those hazards, and prescribes control measures. The AHA process begins with the use of a Hazards Screening for AHA checklist. The checklist, used during walkdowns, is an aid to identifying general hazard types for the work involved. Subject matter experts (SME), supervisors, workers, and work planners complete an AHA form using a hazard checklist and walkdowns. The AHA procedure specifically incorporates the hierarchy of controls into decisions about hazard controls. NWSol maintains the completed AHA forms in a database for reference and revision when activities change. Work planners integrate the identified control measures from the AHAs into work planning documents.

NWSol initiates, plans, coordinates and performs work using CM-A-AD-030-R5, *Work Control Program*, and procedure CM-P-MT-013-R9, *Work Control.* The procedures incorporate NWSol's Integrated Safety Management Program, documented in CM-A-AD-001-R19, *Integrated Safety Management System Description.* Work planners use a risk-based graded approach, based on the complexity of the work and the potential hazards involved, to categorize work into three, risk-based levels: minor work, standard work, and complex work.

Minor work is work that does not require specific work sequences, the worker has the knowledge and skills required to complete the work successfully, and the identified risks are minimal. Minor work activities present limited potential exposure to hazards when performed in a stable work environment by a competent worker using skill-of-the-craft, or have minimal potential for hazard exposure, low risk of human error, and minimal potential impacts to the environment.

Standard work involves activities that fall within the skill-of-the-craft but require some work sequences. The workscope includes written criteria that workers meet using existing skills or qualifications with minimal work sequences. Like minor work, workers are responsible for implementing safe and compliant work practices based on their training, qualification, or

certification. Standard work includes work in contamination, high contamination, or airborne radioactivity areas.

Complex work involves significantly higher exposure risk from physical, environmental, chemical, or radiological hazards. Safe completion of the work requires more detailed planning and work sequences. Complex work requires more coordination and may include tasks that require multiple levels of personal protective equipment (PPE). Tasks may require extensive coordination of various resources, specialized job-specific training, or work in very high radiation or high contamination areas.

A select sample of work procedures, work packages, and AHAs reviewed by the Team included direct input from employees about the task, the potential hazards, and recommended control measures. Qualified personnel from appropriate disciplines had reviewed and commented on the AHAs, and the applicable work manager and the Health and Safety Manager had formally reviewed and approved the AHAs. Work packages incorporate the hazard controls identified in the AHA. Overall, the process demonstrated an effective hazard identification and analysis approach that adequately integrates hazard controls into work planning documents.

Much of NWSol's work at TWPC involves work on systems described in the Documented Safety Analysis. In these cases, work planning requires additional review to ensure work remains within the safety envelope for the facility. System engineers and safety basis SMEs perform these reviews before work can move forward. The Team heard some conflicting opinions regarding the amount of time these reviews required and whether or not the appropriate personnel were involved in work planning/walkdowns early in the process. System engineers and safety basis personnel expressed concern that work packages sent for review often lacked important details. Work planners expressed concern that system engineers and safety basis personnel missed planning meetings and walkdowns. The reality is that both situations probably occur. NWSol should ensure its work planning processes identify and involve all the appropriate personnel early in the work planning process and that key personnel are not erroneously excluded.

Opportunity for Improvement: NWSol should ensure its work planning processes identify and involve all the appropriate personnel early in the work planning process and that key personnel are not erroneously excluded.

NWSol conducts periodic inspections, assessments, and workplace monitoring of its operations using procedure CM-P-IS-009-R20, *Inspections.* This procedure is used for all health and safety inspections conducted by NWSol, including those conducted by building wardens; Technical Services/Conduct of Operations (CONOPS) Manager; Environment, Safety, Health and Quality Manager; the Safety and Health Manager; warehouse personnel; Senior Supervisory Watch walkdowns; health and safety personnel; cognizant managers, Process Superintendents; and floor supervisors. NWSol tracks inspection results using CM-P-AD-088-R0, *Management Item Tracking System,* and CM-P-AD-083-R3, *Deficiency Reporting and Investigation,* to ensure timely followup and hazard abatement.

The Safety Culture Improvement Panel (SCIP) team identified some improvements to the facility inspection program. The SCIP team recommended that the facility manager assign building wardens to perform inspections on buildings other than their primary assignment. This SCIP team believes the "fresh eyes" approach will identify conditions that building managers have

become accustomed to seeing. The recommendation also included the suggestion that SMEs accompany building wardens and use the interaction as an inspection training opportunity.

The Inspections procedure prescribes many workplace inspections. However, the Team could not identify a systematic, comprehensive program that tracks workplace inspections to ensure monthly workplace inspections take place cover the whole worksite at least quarterly, per the DOE-VPP expectations. NWSol should create a matrix to track all the inspections conducted to ensure routine inspections of workplaces for safety and health concerns occur at least monthly and cover the whole worksite at least quarterly.

Opportunity for Improvement: NWSol should create a matrix to track all the inspections conducted to ensure routine inspections of workplaces for safety and health concerns occur at least monthly and cover the whole worksite at least quarterly.

NWSol provides a monthly report to DOE as part of its Contractor Assurance System. The report includes ISMS goals that include general health and safety goals, as well as programmatic goals. The report also includes incident tracking and trending information. Some of the health and safety goals tracked are rates for TRC, DART, and near-misses.

In 2013, human error caused an inadvertent loss of supplied breathing air to workers in bubble hoods. An investigation revealed a design weakness in the system supplying the air. After identifying this weakness, WAI used a Failure Modes and Effects Analysis (FMEA) that identified other design weaknesses. NWSol has continued the use of FMEA for other systems when designing or modifying systems to improve overall system reliability, particularly for life safety significant systems. For example, NWSol has used FMEA in the Tank W-1A remote operations equipment design and in SWSA-5 metal oxidation equipment design. Using FMEA has helped ensure new equipment does not create unrecognized or unacceptable failure modes that might place workers at risk of injury or death.

NWSol uses a formal process to investigate all incidents and accidents, including near-misses, to prevent recurrence of similar events. Many investigations incorporate human performance improvement (HPI) concepts and principals to determine apparent causes. Additionally, NWSol tracks and trends apparent causes to identify organizational weaknesses and implement proactive corrective measures. NWSol reports and records incidents in accordance with NWSol's formal incident reporting and investigation process, as documented by CM-P-AD-083, *Deficiency Reporting and Investigation.* The NWSol incident reporting and investigation system feeds into the DOE Occurrence Reporting and Processing System, the DOE Computerized Accident/Injury Reporting System, and other DOE reporting mechanisms, as appropriate to the type of event.

Conclusion

NWSol's work planning process is an effective method to ensure proper identification and analysis of hazards in the workplace. A mature, written safety and health program that includes procedures, such as AHAs and workplace inspections provide a safe workplace that has resulted in a safety performance record that is significantly better than that of comparable work in the industry. Improved communications and cooperation between work planning and system engineers and the Safety Basis group will improve safety and productivity. NWSol should create an inspection tracking system to ensure that all TWPC facilities and workplaces are inspected

quarterly. NWSOL satisfies the necessary elements for Worksite Analysis for continued participation in DOE-VPP.

VI. HAZARD PREVENTION AND CONTROL

The third and fourth 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 controlled using engineered controls, administrative controls, or PPE. Equipment maintenance processes must ensure compliance with requirements and emergency preparedness. 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, reduce the frequency of, and reduce the severity of mishaps.

In 2012, TWPC (under WAI) was maintaining an appropriate balance of elimination, engineered controls, administrative controls, and PPE to control worker exposure to hazards associated with facility operation. TWPC was using "mockups" to ensure effective, low hazard, hands-on training to develop quality procedures for critical operational processes. There were some opportunities to improve the medical monitoring program, radiological postings, and integration of controls into procedures.

NWSol successfully uses the hierarchy of controls. The work planning procedure specifically implements the hierarchy of controls and workers are actively using that approach. NWSol provided multiple examples of controls and the Team identified others during workplace walkdowns. Two examples began with worker suggestions that minimized material handling hazards with engineered controls. In one instance, workers identified a 2-inch lip that impeded movement of heavy items. Working the issue through the NWSol Operations and Maintenance Safety Committee, NWSol procured a commercially available ramp that mitigated the lip. In another instance, workers identified the design of compressed gas bottle storage rack that introduced hazards while handling gas bottles. Because the bottle storage rack was built to store four bottles in a square configuration, workers had to remove all four bottles when changing out the two bottles in the rear-most storage positions. Again, working through the NWSol Operations and Maintenance Safety Committee, the storage rack was replaced with a different compressed bottle storage rack design that allows direct access to all four bottles. Other engineered controls used in the Macro Box Remote Drum Opener include a drilling fixture to establish the correct drilling location and depth in wasteboxes to be vented; the use of a nonsparking drill bit; and airline festoons that allow hoses to be hung up, and out of the way, and off the floor to eliminate tripping hazards while dressed in full anti-contamination clothing and bubble hoods.

NWSol frequently uses mockups to develop work planning and operational procedures. The mockups allow workers to test, practice, and perfect work methods in a clean (noncontaminated) environment. NWSol designed and constructed the Mockup Training Building (MTB) that it uses for a variety of mockup configurations. During mockup operations, NWSol conducts interactive pre- and post-job briefings that actively encourage employee input to improve the equipment, process, and procedures. Considered all together, the mockup approach reduces stay times and associated radiation exposure, helps identify and control hazards, and reduces injuries.

CM-P-AD-043-R14, *Work Suspension and Restart*, formally documents NWSol's stop work process. The procedure delineates the conditions requiring a work suspension. Specifically, a work suspension occurs when work would pose an imminent danger to personnel safety, has a potential for major damage to plant equipment, violates regulations, jeopardizes the NWSol

mission, or is an instance of repetitive violation of requirements. Workers indicated they understood the process and that they would not hesitate to stop work should the need arise. They also indicated that they would not be worried about retribution for doing so. Work pauses/step backs are much more common. NWSol procedure CM-P-AD-087-R2, *Work Pause,* defines the process for work pauses. Employees interviewed indicated that they regularly pause work when it is necessary to seek work instruction or procedural clarification from their supervisors. As discussed in the Employee Involvement section, several workers interviewed were personally recognized by senior management for implementing those pauses to ensure the work was performed correctly. Because of those recognitions, many workers interviewed believed that their managers appreciated a questioning attitude. Workers indicated they were familiar with the progressive disciplines process and found it to be fair and consistent.

The Team observed the Transuranic Package Transporter, Model II (TRUPACT-II) loading operations during a facility walkdown. NWSol supports this operation while the Los Alamos National Laboratory's CCP-LANL-CO Mobile Loading Unit loads TRUPACT-II shipping containers. Loading operations demonstrated superior CONOPS techniques between the two groups. NWSol's main support role involves providing an overhead crane operator. Communications were clear, using three-way communication to ensure workers took proper actions. In some cases, hazards during the loading activity may not have been completely addressed. For instance, workers used an unnecessarily long power cord to supply power to the TRUPACT-II platform. The excess was coiled in the general working area. This configuration may create additional hazards from coiling the power cord. Power cords' current-rating assumes the cords are laid out straight. Coiling power cables reduces heat dissipation, posing a fire hazard and necessitating a reduced current rating. In addition to the power cord, workers needed flexible compressed gas hoses for the loading operation. The Team observed two gas hoses routed along the working surface with the power cord. This arrangement risks damage to the hoses and power cords and presents a tripping hazard for workers. A shorter power cord, routed with the gas hoses under a floor cord/hose protector, would improve the safety of this operation. Finally, the removable Adjustable Center of Gravity Lift Fixture lifting legs are currently stored inside the web of a building I-beam, held in place by elastic rubber shipping tie-downs. Improper hooking of the tie-down cord S-hooks, repeated hooking and unhooking of the cords, along with ultraviolet degradation, will eventually cause failure of the tie-down cords. Cord failure will allow the legs to fall, possibly injuring a worker, or damaging the legs or equipment. NWSol should evaluate the equipment placement used for the TRUPACT-II loading operation to ensure safe working conditions.

Opportunity for Improvement: NWSol should evaluate the equipment placement used for the TRUPACT-II loading operation to ensure safe working conditions.

NWSol has contracted with Healthworks - Covenant Medical Group to provide occupational medicine services. Services include medical evaluations, a wellness program, and injury and illness treatment. NWSol staff confirmed that occupational medicine personnel periodically visit the NWSol worksites to familiarize themselves with workplace hazards and the industrial environment. Occupational Medicine personnel are also occasionally involved with AHA development.

The ORNL fire department provides emergency response. CM-M-EM-100-R7, *Local Emergency Manual,* and CM-P-EM100-R15, *Emergency Events,* documents the NWSol emergency management program. The program documents assign specific responsibilities to

managers, supervisors, and site personnel essential to ensuring safe and immediate actions in case of emergencies. NWSol's CM-P-EM-100-R15, *Emergency Events,* procedure covers a wide variety of emergency scenarios and provides customized, local guidance for each. The NWSol plant layout presents some challenges. The plant is built on either side of a single roadway, terminating at the process facility. Some regularly closed access roads connect to ORNL, but normal access is via a single road. The NWSol emergency procedures acknowledge the potential issues due to blocked access from operations and address them in the planning documents.

All employees, including subcontractors receive General Employee Training (GET) during initial site orientation. Visitors receive a briefing and orientation guide, which includes emergency preparedness and response guidance that corresponds with the information provided in GET, and requires full time escorts for some plant areas. Interviews with emergency management personnel confirmed that NWSol conducts annual evacuation drills and participated in an ORNL site-wide "shelter-in-place" exercise in December 2017. TWPC also was the host site for the ORNL Laboratory-Wide Full Scale Exercise held in April 2018 in which a "shelter-in-place" protective action was issued. Workers interviewed consistently revealed an understanding of the expected emergency response actions they should take in the case of both manmade, and natural emergency events.

Conclusion

NWSol uses the hierarchy of controls to protect workers, prevent injuries, and minimize workplace hazards. Mockups are frequently used for higher hazard work that allow workers to test, practice, and perfect work methods in a clean (noncontaminated) environment. Workers' willingness to pause work indicated a strong safety culture and commitment to working safely. An occupational medical program provides comprehensive medical services. Although some potential improvements were identified for some operations, NWSol continues to meet the Hazard Prevention and Control expectations for continued participation in DOE-VPP.

VII. SAFETY AND HEALTH TRAINING

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

In 2012, the TWPC training program under WAI ensured employees, supervisors, and managers understood their roles and responsibilities related to safety. The program ensured timely completion of training, qualification, and requalification, and provided personnel with the knowledge they needed to protect themselves, their coworkers, and the surrounding environs.

NWSol continues to revise and improve its training program. The training program course materials are prepared and available through the site's "InTRUnet" via the "Inquisiq" system. In 2012, the previous contractor had determined that although the existing learning management system was an effective tool, the expense of maintaining the database was not justified for its current needs. Subsequently, NWSol migrated its training management system to a new platform.

NWSol continues to electronically verify workers' training is current before granting them unescorted access to radiological areas, or allowing them to sign a radiation work permit.

Additional training improvements implemented by NWSol include the training group's development and use of a screening form to determine if required reading was appropriate to train workers on technical procedure changes or updates. If the changes are administrative only, the screening form will determine if the required reading is unnecessary. The screening form limits the use of required reading so that workers will recognize the importance of the reading and not become complacent.

NWSol emphasizes a mentoring program for operators and maintenance personnel. NWSol also establishes high expectations for CONOPS. NWSol has created two staffing positions for CONOPS mentors that coach and help new operators in conjunction with the training organization's on-the-job training program. Workers appreciate the additional attention to CONOPS instruction, which has improved their understanding of the significance of CONOPS and compliance with the documented safety analysis.

The training organization introduced the Difficulty, Importance and Frequency (DIF) approach to evaluate training effectiveness for certain high importance work tasks. The DIF approach evaluates the workers' opinion of training effectiveness related to individual work tasks for a particular job. The training group obtains the workers' ratings of training effectiveness from a specifically developed survey and uses the results from that survey to add training on specific tasks. This approach allows the training group to determine if workers believe additional training is needed to ensure safe performance of high-risk operations.

The NWSol Training Manager recognized that employees were unable to view their personal training records under the previous system. In an effort to promote transparency, the training manager established a "viewing" screen that allowed all employees to view their personal training records.

NWSol training group provides a 30- and 7-day alert system to alert workers and supervisors for upcoming training requirements. The training group intentionally changed to this schedule because most workers ignored the 60- and 90-day notifications. Workers and supervisors are alerted to upcoming training recommendations via e-mail alerts 30 days in advance, and again 7 days in advance.

The NWSol Training group initiated a continuous training program (CTP) approach. The CTP provides continuous training on several topics throughout the year to reinforce learning related to those topics. For example, topics on the current year's schedule include continuous learning lessons related to specific administrative controls for technical safety requirements, and ISMS elements. The CTP training is scheduled for all identified employees but is not required if the worker cannot attend for accepted reasons. The CTP provides additional training to employees related to facility technical safety requirements on a routine basis to promote understanding of those requirements throughout the year.

The training group provides HPI Dynamic Learning Training for NWSol employees periodically throughout the year to further emphasize CONOPS principles. The Dynamic Learning Training emphasizes trainee involvement and participation throughout the class. The Team attended an HPI training class that was highly effective and engaging for the students. The training provided an excellent learning opportunity for participants and emphasized student involvement.

NWSol continues to use mockups for new process work tasks within the MTB. Workers gave several examples where they were personally involved in mockup training exercises to develop work processes and procedures (see Hazard Prevention and Control).

NWSol provides training for building wardens that focuses on the building wardens' emergency management responsibility. Over the past few years, building warden responsibilities have expanded beyond the basic emergency management role to include periodic building safety inspections (see Hazard Prevention and Control). The training for building wardens does not include these expanded responsibilities. The training group should evaluate the Building Warden training course to ensure it reflects the current roles of building wardens to ensure effective safety inspections are performed as outlined in the NWSol Inspection procedure.

Opportunity for Improvement: The training group should evaluate the Building Warden training course to ensure it reflects the current roles of building wardens to ensure effective safety inspections are performed as outlined in the NWSol Inspection procedure.

Conclusion

NWSol continues to maintain a solid safety and health training program. NWSol has even improved several elements of the training program, including an emphasis on CONOPS mentoring improvements, continuous training program implementation, expanded use of mockup training, and the development of a required reading evaluation form. The changes implemented have resulted in a more robust safety and health training program. NWSol continues to meet the expectations for continued participation in DOE-VPP in Safety and Health Training.

VIII. CONCLUSIONS

Since taking over operation of TWPC in 2015, NWSol has successfully maintained the processes, procedures, and practices that enable safe mission completion. NWSol is carefully managing the complex hybrid structure of the contract and shielding workers from schedule pressures that might induce unsafe work practices or shortcuts. Workers demonstrated their commitment and skills related to CONOPS and their willingness to step back, pause, or stop work when questions arose. No workers expressed any fear of retaliation, and most workers were dedicated to the site mission. TWPC has a mature work planning system that addresses potential hazards, and provides workers with the knowledge and tools they need to be safe. The opportunities for improvement identified in this report will help NWSol achieve further excellence over the remaining term of its contract. The Team recommends that NWSol continue to participate in DOE-VPP as a Star participant.

Appendix A: Onsite VPP Assessment Team Roster

Management

Matthew B. Moury
Associate Under Secretary for
Environment, Health, Safety and Security

Joseph Olencz
Acting Deputy Associate Under Secretary for
Environment, Health and Safety

Patricia R. Worthington, PhD
Director
Office of Health and Safety
Office of Environment, Health, Safety and Security

Bradley K. Davy
Director
Office of Worker Safety and Health Assistance
Office of Health and Safety

Review Team

Name	Affiliation/Phone	Project/Review Element
Bradley K. Davy	DOE/AU (301) 903-2473	Team Lead, Management Leadership
Michael S. Gilroy	DOE/AU	Employee Involvement, Safety and Health Training
Richard C. Caummisar	DOE/AU	Worksite Analysis, Hazard Prevention and Control
Anthony J. Chaney	National Nuclear Security Administration/Office of Secure Transportation	Worksite Analysis, Hazard Prevention and Control