Mid-America Conversion Services, LLC
Depleted Uranium Hexafluoride Conversion Facility
Portsmouth Site

Report from the Department of Energy
Voluntary Protection Program
Onsite Review
April 29-May 7, 2019

U.S. Department of Energy
Office of Environment, Health, Safety and Security
Office of Health and Safety
Office of Worker Safety and Health Assistance
Washington, DC 20585

Foreword

The Department of Energy (DOE) recognizes 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 the implementation of 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 the 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 aimed at recognizing 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 allows DOE to recognize achievements while learning more about a contractor's safety program before determining approval requirements for recognition in the Merit or Star program.

By approving an applicant for participation in DOE-VPP, DOE recognizes that the contractor complies with the appropriate DOE, OSHA, local, State and Federal safety regulations and laws but is also working to exceed those minimum requirements. 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.

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS

AHA	Activity Hazard Analysis
AU	Office of Environment, Health, Safety and Security
AU-12	Office of Worker Safety and Health Assistance
BLS	Bureau of Labor Statistics
CFR	Code of Federal Regulations
CSY	Cylinder Storage Yard
DART	Days Away, Restricted or Transferred
DOE	Department of Energy
DSA	Documented Safety Analysis
DUF_6	Depleted Uranium Hexafluoride
EM	Office of Environmental Management
EMP	Emergency Management Program
EPHA	Emergency Planning Hazard Assessment
ERO	Emergency Response Organization
ES&H	Environment, Safety, and Health
FBP	Fluor B&W Portsmouth
GET	General Employee Training
HF	Hydrofluoric Acid
ISMS	Integrated Safety Management System
KOH	Potassium Hydroxide
MCS	Mid-America Conversion Services, LLC
MCS PORTS	MCS DUF_6 Conversion Facility Operations at the Portsmouth Site
NAICS	North American Industry Classification System
OSHA	Occupational Safety and Health Administration
PEMP	Performance Evaluation Management Plan
PORTS	Portsmouth Site
PPE	Personal Protective Equipment
PPPO	Portsmouth/Paducah Project Office
SME	Subject Matter Expert
Team	Office of Environment, Health, Safety and Security DOE-VPP Team
TRC	Total Recordable Case
TSR	Technical Safety Requirement
UF_6	Uranium Hexafluoride
UO_x	Uranium Oxide
USW	United Steel Workers
VPP	Voluntary Protection Program

EXECUTIVE SUMMARY

The Department of Energy's (DOE) Voluntary Protection Program (VPP) Assessment Team (Team) from the Office of Environment, Health, Safety and Security (AU) recommends Mid-America Conversion Services, LLC (MCS) at the Portsmouth Site depleted uranium hexafluoride (DUF_6) conversion facility (MCS PORTS) be admitted to DOE-VPP at the Star level.

This report summarizes the results from the evaluation of MCS PORTS conducted April 29-May 7, 2019, and provides the Associate Under Secretary for Environment, Health, Safety and Security with the necessary information to make the final decision regarding the admission of MCS PORTS at the Star level of participation in the DOE-VPP.

MCS PORTS manages the DUF_6 conversion facility and employs approximately 200 workers at the Portsmouth Site for DOE. DOE awarded the contract in November 2016. MCS PORTS submitted its application requesting participation in DOE-VPP to AU, in 2017.

The DUF_6 conversion process involves potential exposure to radiological and chemical hazards, as well as the full range of industrial hazards inherent in a chemical processing plant. MCS PORTS loads the uranium oxide product into the empty DUF_6 cylinders, and stores these cylinders in dedicated cylinder storage yards pending permanent disposal. Hydrofluoric acid, generated as a byproduct of the conversion process is sold to a third party.

Although MCS PORTS experienced five reportable injuries over the past 3 years, its injury and illness rates are 60 percent less than comparison industry rates. In addition, MCS PORTS has maintained good standing in regards to compliance with DOE, Occupational Safety and Health Administration, local, State, and Federal safety and health regulations/requirements. These two minimum requirements allow MCS PORTS to be eligible for DOE-VPP consideration.

MCS PORTS' managers are knowledgeable and experienced with the DUF_6 conversion processes and equipment and are comfortable talking with workers about any issues. The managers share workers' ownership of the facility and desire to reduce the potential hazards at the site, protecting both the workers and the surrounding communities. MCS' approach of giving the local managers authority to operate the conversion process at optimal rates rather than maximum rates has improved managers and workers' belief in safe production.

MCS PORTS has several methods to promote employee involvement. The VPP and the Safety First Committees provide workers the opportunity to raise issues and recommend safety improvements. Although the Safety First Committee has a record of addressing several hundred employee safety concerns, some workers remain reluctant to submit concerns through this program. The committees are working to market the successes of the Safety First process to earn the trust of the entire workforce. MCS PORTS also demonstrated an active wellness program.

The MCS PORTS work planning process ensures proper identification and analysis of hazards in the workplace. A written safety and health program includes the use of hazard identification checklists, activity hazard analyses, and workplace inspections. MCS PORTS should expedite its efforts to revise and convert "blue sheeted" procedures to ensure they reflect current MCS business practices, drive continuous safety and health program improvements, and prevent confusion due to references to outdated position titles. MCS PORTS should also create a process

to track all the inspections it conducts to ensure routine inspections of workplaces for safety and health concerns occur at least monthly and cover the whole worksite at least quarterly.

MCS PORTS uses the hierarchy of controls to protect workers, prevent injuries, and mitigate workplace hazards. Improvements to the overall safety culture continue and as a result, workers are encouraged by managers and do not hesitate to call a Time-Out. Standard and specialized personal protective equipment is readily available to the workers. An Occupational Medical Program provides comprehensive services. The new process improvement program captures, evaluates, and tracks lower level conditions and will contribute to continuous safety program improvement.

The MCS PORTS safety and health training program ensures workers understand workplace hazards and can protect themselves and their coworkers. Because of the 2015 potassium hydroxide exposure event, the training organization reevaluated and improved the qualification requirements and training for operators and maintenance. The improvements increased the workers' knowledge of the facility systems so they would better understand their activities' effect on the facility. In 2019, MCS PORTS initiated a similar revision to the qualification programs for engineers; work control; and environment, safety, and health.

In the 2½ years since taking over operation of the conversion facility, MCS PORTS has successfully empowered the workforce to raise issues and concerns, and made addressing those concerns a management goal. The singular mission of the site, the small footprint, and relatively small workforce has created a sense of teamwork among workers and managers. Most of the workforce believes MCS PORTS is committed to achieving the mission safely and wants workers to raise safety issues and make recommendations to improve safety. The workforce believes MCS PORTS is committed to safety as a mission-enabling function. MCS PORTS has worked with DOE to identify resources and make significant plant improvements to reduce risk to workers and the environment. This report identifies opportunities for improvement to further enhance MCS PORTS safety and contribute to mission performance.

TABLE 1
OPPORTUNITIES FOR IMPROVEMENT

Opportunity for Improvement	Page
MCS PORTS should identify meaningful leading indicators of safety for its own internal use.	**5**
MCS PORTS should develop an assessment process to collect and analyze the broad range of assessments and use the results to establish annual goals for its DOE-VPP efforts.	**5**
MCS should work with PPPO to remove specific TRC and DART rate goals from the PEMP, ensure there are no potential disincentives for reporting injuries or illnesses, identify specific actions to reduce accident and injury rates, and include those actions in the PEMP.	**6**
The MCS PORTS VPP Committee should strengthen worker awareness of safety improvements made due to worker-identified issues in order to garner workers' trust and participation.	**8**
MCS should expedite its efforts to revise and convert "blue sheeted" procedures to ensure they adequately reflect current MCS business practices, drive continuous safety and health program improvement, and prevent confusion due to references to outdated position titles.	**11**
MCS should create a process 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.	**12**
MCS PORTS should develop an outage materials list based on previous outage experiences and personnel input to procure and stock additional materials prior to outages to ensure workers have adequate supplies during planned outages.	**16**

I. INTRODUCTION

This report provides the Associate Under Secretary for Environment, Health, Safety and Security (AU) the results of an assessment of Mid-America Conversion Services, LLC (MCS) operations at the Portsmouth Site (PORTS) depleted uranium hexafluoride (DUF_6) conversion plant in Piketon, Ohio (MCS PORTS). The assessment supports the Team recommendation to admit MCS PORTS into the Department of Energy's (DOE) Voluntary Protection Program (VPP) at the Star level.

The DOE-VPP encourages excellence in occupational safety and health protection by recognizing DOE contractors and subcontractors that demonstrate safety programs that surpass compliance with DOE, Occupational Safety and Health Administration (OSHA), local, State and Federal safety standards. The Star program is the core of DOE-VPP aimed at recognizing outstanding protectors of employee safety and health.

MCS PORTS submitted its application to the Office of Worker Safety and Health Assistance (AU-12) in 2017 requesting participation in DOE-VPP. AU-12 did not identify any significant noncompliances or safety issues prior to the assessment. After reviewing the application, AU-12 scheduled the onsite assessment from April 29 to May 7, 2019.

The Portsmouth Site is a multi-employer site, located on a 3,714-acre DOE reservation near Piketon, Ohio. Currently five contractors perform work at the site for DOE. DOE contracted with MCS in November 2016 to disposition the DUF_6 stored at both the Portsmouth, Ohio, and Paducah, Kentucky sites. Atkins Global Nuclear Security leads MCS with Westinghouse Government Services and Fluor Federal Services as partners. MCS PORTS employs 214 people; the United Steel Workers (USW) Union Local 1-689 represents 113 of those workers. The USW contract for the site expired nearly 4 years ago. USW workers have been working under the contract provisions and negotiating a new contract since then. The DOE-VPP application received in 2017 only covers MCS PORTS operations.

Under the current contract, MCS PORTS operates and maintains the DUF_6 conversion facilities and associated equipment to convert the DUF_6 to uranium oxide (UO_x), a stable chemical form acceptable for beneficial use or disposal. DUF_6 is a byproduct of the uranium enrichment process used to make uranium suitable for use as nuclear reactor fuel or for national security purposes.

The conversion process begins with heating uranium hexafluoride (UF_6) in an autoclave, converting it to its gas form. The UF_6 gas mixes with steam and hydrogen gas in a fluidized bed reactor to form a mixture of UO_x and hydrofluoric acid (HF). The UO_x collects in a hopper then loaded into modified empty UF_6 cylinders for storage at the site Cylinder Storage Yard (CSY) and ultimate disposal.

HF and excess steam condense into 45-55 percent aqueous HF. A treatment system mixes off-gas from the condenser with potassium hydroxide (KOH) to form potassium fluoride. The KOH recovery system uses hydrated lime to make calcium fluoride (solid) and regenerate the KOH. MCS PORTS transports and disposes of the resulting end-products and wastes, sells the aqueous HF product, and maintains and operates the cylinder storage yards (CSY). Support systems include:

- Natural gas fueled, hydrogen generation units;
- KOH storage;

- Nitrogen generation and liquid storage plant; and
- KOH recovery system utilizing a hydrated lime process.

The process involves potential exposure to radiological and chemical hazards, as well as the full range of industrial hazards inherent in a chemical processing plant including confined spaces and powered industrial truck usage. Typical operations supporting the process include moving DUF_6 cylinders using specialized, mobile heavy equipment and crane operations. MCS PORTS stores the UO_x product in the empty DUF_6 cylinders and stores the cylinders in the CSY pending permanent disposal. MCS PORTS sells the HF byproduct to a third party who ships it via rail and tanker trucks.

The hazards from HF and KOH present the greatest chemical hazard to workers. HF causes severe burns to skin, mucous membranes, and the respiratory system, and binds calcium. Skin exposures to HF require immediate treatment and can lead to severe injuries. Concentrated KOH is a strong caustic, which can cause severe chemical skin burns.

On March 15, 2015, under the previous operating contractor, a vent cap from the KOH recovery system came off when the system was pressurized exposing two workers to KOH. One employee had a few drops of KOH on his head that he removed in a safety shower and then treated with vinegar to neutralize the KOH. An air ambulance took the second worker to a Columbus, Ohio, trauma center because he potentially had KOH in his eye requiring rapid medical treatment. The event exposed issues related to work control, hazard evaluation, and conduct of operations resulting in the shutdown of the Portsmouth DUF_6 plant until December 2017.

II. INJURY INCIDENCE/LOST WORKDAYS CASE RATE

Injury Incidence/Lost Workdays Case Rate (MCS PORTS)					
Calendar Year	Hours Worked	Total Recordable Cases (TRC)	TRC Incidence Rate per 200,000 hours	DART* Cases	DART* Case Rate per 200,000 hours
2016	411,902	0	0.0	0	0.0
2017	397,530	2	1.0	0	0.0
2018	394,860	3	1.5	1	0.5
3-Year Totals	1,204,292	5	0.83	1	0.16
Bureau of Labor Statistics (BLS-2017) average for NAICS** 325180- Other Basic Inorganic Chemical Manufacturing			2.30		1.30
Injury Incidence/Lost Workdays Case Rate Subcontractors (MCS PORTS Subcontractors)					
Calendar Year	Hours Worked	Total Recordable Cases (TRC)	TRC Incidence Rate per 200,000 hours	DART* Cases	DART* Case Rate per 200,000 hours
2016	53,322	0	0.00	0	0.00
2017	25,795	0	0.00	0	0.00
2018	24,963	0	0.00	0	0.00
3-Year Totals	104, 080	0	0.00	0	0.00
Bureau of Labor Statistics (BLS-2017) average for NAICS** 325180- Other Basic Inorganic Chemical Manufacturing			2.30		1.30

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

TRC Incidence Rates, including subcontractors: 0.76
DART Case Rates, including subcontractors: 0.15

Discussion
MCS employs approximately 200 workers. For the years 2016 to 2018, MCS experienced zero, two, and three recordable cases respectively, resulting in a 3-year TRC rate of 0.83 and a DART rate of 0.16. Injury and illness statistics for workplaces with smaller numbers of employees are sensitive to even one event. Despite this rise, MCS' injury and illness rates are 60 percent less than the comparison industry and meet the expectations for VPP participation.

III. MANAGEMENT LEADERSHIP

Management leadership is a key element of developing and sustaining an effective safety culture. The contractor must demonstrate a 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.

MCS PORTS managers demonstrate their commitment to occupational safety and health and to meeting the requirements of DOE-VPP. Management systems defined in a comprehensive set of policies and procedures include an approved worker safety and health plan, integrate health and safety into the work, ensure workers and supervisors have the necessary authority and responsibility to safely conduct or stop work. The small size of the site, the relatively small site population, the singular mission, and confinement of processing systems to a few buildings make it easy for managers to visit worksites frequently and interact with the workforce. Most MCS PORTS managers interact with workers throughout the workday and reinforce high standards for safety leading to effective operations.

Many senior managers in MCS' parent companies have VPP experience at DOE, OSHA, and the Department of Defense's VPP sites. The parent companies did not force MCS PORTS to pursue DOE-VPP, but have encouraged it to seek DOE-VPP Star status. They recognize the value safety brings to reliable production, and want to leverage reliable, safe operation to achieve excellent contract performance.

Workers and middle managers who transferred to MCS PORTS from the previous operating contractors were complimentary of the improvement a few senior leaders at the site made in the culture of the plant. Middle managers expressed frustration about the previous contractor preventing them from making decisions that would improve plant safety. Although the last plant manager under the previous contractor had begun making some improvements in the few months prior to contract transition, the pace of improvement accelerated under MCS, which convinced the workforce to support pursuit of VPP soon after transition.

MCS PORTS' managers bring experience from several other facilities, including DOE, commercial nuclear, and chemical facilities. Most of the current management team at MCS PORTS have been with the DUF_6 conversion process for many years and feel a sense of ownership for the facility. Their background and ownership help them understand, manage, and integrate the hazardous processes involved with DUF_6 conversion.

When MCS PORTS began running the plant, they decided to address all the outstanding safety concerns at the MCS PORTS facility, including plant configuration and design issues. Its commitment to resolving and fixing employee-raised issues has improved workers' trust and motivated workers to make additional suggestions and raise safety issues.

When DOE awarded the MCS contract, the MCS PORTS' deputy manager requested the training supervisor/manager to develop the "2-minute rule" safety video, which included MCS PORTS' personnel photos and a musical soundtrack. The 2-minute rule reinforced workers' thinking

about the work they were preparing for, and to think about any other issues they needed to consider before proceeding. The safety message in the video is: "Take 2 minutes to make sure the plan is correct."

MCS PORTS tracks performance indicators related to its contract performance. While those indicators are essential to helping MCS earn its contract fee, it does not have a set of performance indicators for its internal management of work. In particular, MCS PORTS does not use a set of statistical indicators would help it identify developing trends and better manage its safety performance. Current safety and health statistics focus on days since last injury, 12-month rolling TRC/DART rates, etc. MCS PORTS should identify meaningful leading indicators of safety for its own internal use. Examples might include percentage of scheduled Management Field Observations completed, number of safety observations reported, or time since the last safety pause.

Opportunity for Improvement: MCS PORTS should identify meaningful leading indicators of safety for its own internal use.

MCS PORTS performs a broad range of self-assessments related to safety, heath, and safety culture. It identifies these assessments at the beginning of the year and schedules them throughout the year. MCS PORTS also schedules daily management field observations, enters assessments and field observation results into a database, identifies required actions as findings or opportunities for improvement, and tracks those actions to completion. Although MCS PORTS performs a broad range of assessments, it does not yet perform an annual review of those assessments using the VPP tenets. MCS PORTS should develop an assessment process that will collect and analyze the broad range of assessments and use the results to establish annual goals for its VPP efforts.

Opportunity for Improvement: MCS PORTS should develop an assessment process to collect and analyze the broad range of assessments and use the results to establish annual goals for its VPP efforts.

MCS faces some challenges with its current contract. The Portsmouth/Paducah Project Office (PPPO), within DOE's Office of Environmental Management (EM), and EM have established a set of performance-based incentives including many major upgrades to plant systems that will improve safety and reliability. PPPO and EM have not yet revised the contract to include resources to install these upgrades although MCS and EM are negotiating revisions. Without adequate funds, MCS PORTS may have to choose, at some future point, to reduce costs elsewhere to support desired plant improvements, a practice that may threaten the cultural improvements made over the past 3 years. MCS is working with PPPO and EM to request adjustments on its contract to prevent potential issues.

PPPO includes a specific TRC and DART rate target in MCS PORTS' performance evaluation management plan (PEMP). Specifically, MCS must be below the EM-specified DART and TRC goals to achieve more than a satisfactory rating. Exceeding those numbers could lead to award fee reductions. PPPO and MCS should work together to remove specific TRC and DART rate goals from the PEMP and ensure there are no potential disincentives for reporting injuries or illnesses. Instead, MCS should work with PPPO to identify specific actions that will lead to

reduced accident/injury rates and include those actions in the PEMP. Although MCS PORTS is currently above the EM goal, it is below the BLS average for the comparison industry.

Opportunity for Improvement: MCS should work with PPPO to remove specific TRC and DART rate goals from the PEMP, ensure there are no potential disincentives for reporting injuries or illnesses, identify specific actions to reduce accident and injury rates, and include those actions in the PEMP.

Conclusion

MCS PORTS managers are knowledgeable and experienced with the DUF_6 conversion processes and equipment and are comfortable talking with workers about any issues. MCS PORTS has an approved worker safety and health plan, and written management systems that implement the plan. The managers share workers' ownership of the facility and desire to reduce the potential hazards at the site, as well as protecting the surrounding communities. MCS' approach of giving the local managers authority to operate the conversion process at optimal rates rather than maximum rates has improved managers and workers' belief in safe production. MCS PORTS managers exhibit the Management Leadership expected of a DOE-VPP participant.

IV. EMPLOYEE INVOLVEMENT

Employees at all levels must be involved in structuring and operating the safety and health program. Employee involvement is a major pillar of a strong safety culture 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 their involvement adds value, is crucial, and is welcome. Managers must be proactive in recognizing and rewarding workers for their contributions. Employees and managers must communicate and collaborate in open forums to discuss continuing improvements, recognize and resolve issues, and learn from their experiences.

MCS PORTS' primary safety committees are the VPP Committee and the Safety First Committee. In 2017, MCS PORTS established the VPP Committee. This committee includes a core team, steering committee, and points of contact. Various craftspeople and managers make up the working parts of the committee. The VPP Committee's primary responsibility is stewarding MCS PORTS' VPP activities by developing challenging safety and health goals based on an annual program evaluation; identifying and implementing improvement activities to promote a strong safety culture; maintaining procedures, policies, and other program documents to meet DOE-VPP expectations; and coordinating MCS PORTS' staff participation in the regional and national Voluntary Protection Programs Participants' Association, Inc., conferences. The committee's functions also include communicating and sharing information from other DOE and OSHA VPP participants.

The Safety First Committee provides a forum for employees, subcontractors, visitors, and managers to submit suggestions, discuss near-misses, and talk through ES&H concerns or issues at the DUF_6 facility. Workers can submit safety concerns or operational improvements to the Safety First Committee using the Safety First form. Workers can also raise concerns to safety representatives, supervisors, or managers. The committee usually meets on the third Thursday of each month, unless the ES&H Coordinator schedules it otherwise. The committee reviews Safety First items, recommends corrective actions, enters, and tracks completion using a database. Since its inception, the committee has addressed several hundred employee safety concerns. Safety First Committee meeting minutes include the agenda, names of attendees with job title, and corrective action status with the responsible owners. The Safety First Committee also convenes in response to accidents. MCS generates a condition report for any Safety First concern submitted to ensure proper review and followup.

The company president appoints the ES&H department manager and the USW safety representative as co-chairs of the Safety First Committee. The committee includes bargaining unit employees, exempt, and nonexempt salaried employees. MCS PORTS makes it clear to supervisors that they should allow personnel to attend the meeting if they desire. The Safety First Committee participates in plant safety inspections and assessments when requested. The Safety First Committee plays an integral role in making managers aware of safety concerns, assisting with timely resolution, and implementing title 10, Code of Federal Regulations, part 851 (10 CFR 851), *Workers Safety and Health Program*, and 10 CFR 835, *Occupational Radiation Protection*.

The Team attended a Safety First Committee meeting during this review. The meeting had excellent attendance including workers and managers who addressed several employee concerns. The discussion among the craft workers and managers demonstrated thorough responses to

issues. During the meeting, the ES&H manager recognized all the workers for excellent and safe performance during the current outage, including thanking workers for several work pauses called by workers to verify and clarify concerns to ensure they performed work safely.

One discussion during the meeting focused on new alarms from safety showers in the plant. MCS PORTS installed the alarms to alert control room personnel when a worker activates an emergency safety shower. Workers had suggested having the showers' alarm in the control room would accelerate emergency response to a chemical exposure. MCS PORTS installed the alarms during the outage, and workers did not know if MCS had trained control room operators to respond to the alarm. The change management process had identified the need to update the alarm response procedure for the control room operators and MCS was developing the alarm response procedure, but had not yet informed the general workforce. The discussion demonstrated how the Safety First Committee meeting had become a useful forum to let the workforce express their safety concerns and allow managers to explain plans and actions to address those concerns.

Workers who had been at the Portsmouth site for many years were more likely to distrust MCS PORTS managers, but the Team determined the distrust grew out of actions by previous contractors (and the ongoing union contract negotiation). Workers hired in the past 4 years (since the KOH exposure incident) were positive about the company and its efforts to work safely. Several workers in this category admitted they originally felt MCS PORTS worked too cautiously until they realized MCS PORTS' expectations for safety were authentic. The newly hired workers appreciated this approach and suggested improvements based on their work experience at other chemical processing facilities.

Some workers remain hesitant to submit Safety First forms to address safety or operational deficiencies. While the workers' reluctance to trust their managers based on their personal experience with previous contractor is understandable, their reluctance could inhibit MCS PORTS' ability to make improvements. The VPP Committee is addressing this concern by planning to market VPP to the workers who still have trust issues. Since MCS PORTS has a relatively small workforce, the MCS PORTS' Safety First and VPP Committees should consider having representatives converse with workers at every opportunity to endorse and reinforce the benefits for workers to raise their concerns and promote worker trust in the process (e.g., elevator speeches). The Committee representatives could emphasize how employee-identified concerns over the past 2 years led to safety improvements and operational efficiency through the Safety First program (see Hazard Prevention and Control section). The VPP Committee should strengthen worker awareness of safety improvements made due to worker-identified issues to garner workers' trust and participation.

Opportunity for Improvement: The VPP Committee should strengthen worker awareness of safety improvements made due to worker-identified issues to garner workers' trust and participation.

The VPP Committee implemented a housekeeping initiative that includes weekly walk-downs by committee members to address housekeeping issues throughout the facility. The housekeeping initiative has been in place for the past year and MCS PORTS' employees reported vast improvements in housekeeping conditions across the facility. The Team observed excellent housekeeping throughout the facility, probably due to this initiative.

MCS' Lexington corporate office develops and distributes a quarterly newsletter covering the Paducah and Portsmouth sites. The Company newsletter, titled "Between the Lines," informs workers about events and occurrences at both sites. The newsletter addresses many topics, including production status, new hires, retirements, successful process improvement initiatives, and outreach activities.

MCS PORTS uses quarterly Learning Lunches to communicate information to the workforce. The Learning Lunches focus on various topics typically developed by the ES&H group or the Wellness Program Coordinator. MCS PORTS conducts the sessions during the workers' lunch hour and provides a box lunch as an incentive for attending.

MCS PORTS holds an annual "Safety and Health Bash" every summer. The 2018 Safety Bash included 15 vendors and 5 live safety demonstrations. The Safety Bash typically runs for 3 hours and includes a company provided lunch. MCS PORTS provides the same information, materials, and a box lunch to shift workers who cannot attend a Learning Lunch on their shift.

MCS PORTS has an active Wellness Program. The MCS PORTS Wellness Coordinator coordinates several initiatives for the well-being of all MCS PORTS employees. Employees can choose to participate in any of the 32 different wellness incentives MCS PORTS provides. All MCS PORTS employees who participate receive a Wellness Incentive Booklet describing each incentive. Each incentive includes tasks the employee completes to earn points. Employees can use the points to earn various prizes. In April, MCS PORTS was promoting the Water Challenge. Participating employees received a free water bottle. Another challenge in 2019 was a weight-loss challenge where participants earned points by losing five pounds or more during the period of a month. Other opportunities for points include tobacco cessation, FitBit® walking monitoring, receiving a flu shot, completing a physical exam, getting a hearing test, or participating in a community event (i.e., 5k walk/run). Employees earning 25 points can select prizes valued at $25; 26 to 50 points is worth a $50 prize. Fifty-one points and over earns a $75 prize and additional entries into a safety raffle held at the annual Safety Bash.

The wellness incentives also include reimbursement for gym membership. The gym membership program provides for a 75 percent reimbursement of membership fees up to $65 per month if the employee visits the gym at least 8 times a month. The gym wellness program also supports family members' expenses up to the $65 limit. MCS PORTS tracks employees' participation using an honor system.

Conclusion

MCS PORTS has several methods to promote Employee Involvement. The VPP and the Safety First Committees provide workers the opportunity to raise issues and recommend safety improvements. Although the Safety First Committee has addressed several hundred employee safety concerns, some workers remain reluctant to submit concerns through the Safety First program. The committees are working to market the successes of the Safety First process and earn the disaffected workers' trust. MCS PORTS also has an active wellness program. MCS PORTS demonstrates the necessary Employee Involvement for 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 systematic approach to controlling hazards. The results of the analysis must be used in subsequent work planning efforts. Strong safety programs also integrate feedback from workers regarding additional hazards encountered and include a system to ensure 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.

DUF6-X-DSA-001, *Revision 14*, and DUF6-X-DSA-003, *Revision 7,* the Documented Safety Analyses (DSA) for the DUF_6 Conversion Facility and the DUF_6 CSYs document and analyze the hazards associated with the DUF_6 Conversion project. The DUF_6 Conversion Facility and the CSYs are Hazard Category 3 and 2 nuclear facilities respectively, per DOE-STD-1027-92, *Hazard Classification of DOE Nuclear Facilities*.

The DSA evaluated all conversion facility operations and included comprehensive hazard identification evaluations of the Conversion Facility activities using standard hazard analysis methods. The process materials, specifically DUF_6 and its intermediate reaction products, HF acid, and UO_x are the primary hazardous materials. Comprehensive hazard evaluations led to potential accident scenarios resulting from failure to control the identified hazards. The DSA process used "What-if/checklists" and Hazard and Operability evaluations to develop scenarios, estimate the risk from these scenarios, identify potential controls, and identify the need for more detailed accident analysis. The potential controls identified provide defense-in-depth protection for these events. The event types identified and evaluated for these operations include the potential for a criticality event, direct radiation exposure, leaks due to equipment failure or human errors, backflow into interfacing systems, overpressure events, loss or failure of utilities, kinetic impacts, fires, natural phenomena events, external manmade hazards, and explosions. The analyses identified potential chemical consequences that exceed the low-consequence threshold for the onsite worker and the offsite public from dispersion of DUF_6 from a damaged liquid DUF_6 cylinder, thus safety-significant engineered features and administrative controls are specified for the Conversion Facility operation as part of the ISMS to prevent or mitigate these accidents.

Even though the DUF_6 Conversion Facility design is a standards-based, defense-in-depth design approved by DOE, the 2015 KOH exposure event revealed design deficiencies. MCS PORTS conducted additional design reviews and made system modifications during a recent outage and is planning additional modifications as funding permits.

Storage and maintenance of UF_6 cylinders and depleted UO_x in cylinders and drums comprise the scope of operations performed in the CSY. Basic maintenance activities include inspection, valve repair, and cylinder moves.

The principal hazard associated with DUF_6 conversion is UF_6 and its reaction products. UF_6 is both a radiological and chemical hazard. All chemical and radiological consequences are due to release of UF_6. UF_6 reacts with water in the air releasing HF, which is highly corrosive and is

quickly absorbed through skin or inhalation. The uranium forms a soluble UO_2F_2 oxide that can be inhaled as a fine powder and absorbed into the blood stream, where the uranium may be chemically toxic to the kidneys. The DSA identifies, and the facility employs the necessary controls to provide an acceptable level of safety, compliant with 10 CFR 830, subpart B.

DUF6-U-SHP-0211, *Hazard Analysis,* documents the process MCS PORTS uses to identify, analyze, and control workplace hazards. The process establishes roles and responsibilities for those personnel performing hazard analysis and outlines the steps used to complete the analysis. The first step is defining the scope of work using Form DUF6-U-SHP-0211-F03, *Hazard Controls Identification Checklist*, during a scoping walk-down. The checklist identifies hazards and the proposed controls specific to the work. The checklist helps determine the level of hazards presented by the work. For hazards requiring additional controls, the checklist allows for "tailored controls." In addition, the hazard analysis procedure directs a formal job or activity walk-down and an AHA for any hazards not adequately addressed by the checklist. Subject matter experts, supervisors, workers, and work planners participate in the completion of the AHA form. The procedure specifically directs the use of hierarchy of controls in decisions about hazard controls. Both work package planners and written procedure developers use this process.

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 controls. Qualified personnel from appropriate disciplines had reviewed and commented on the AHAs, and the applicable work manager and the ES&H Manager had formally reviewed and approved the AHAs. Work packages incorporated 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.

MCS PORTS conducts periodic workplace inspections and assessments of its operations using procedure BWCS-U-SHP-0103, *Safety Walkthroughs.* MCS PORTS uses this procedure for all health and safety inspections, including those conducted by the ES&H Director, the Site ES&H Manager, the Environmental Programs Manager, the Radiological Control Manager, the Industrial Hygiene Program Manager, ES&H Supervisor, and other performers of walkthroughs. MCS PORTS tracks inspection results using DUF6-U-QAP-0005, *Issues Management* (See Hazard Prevention and Control), to ensure timely follow-up and hazard abatement. The previous contractor created and implemented BWCS-U-SHP-0103. MCS "blue sheeted" the procedure in December 2016. During the process, reviewers suggested several improvements and revisions, including the integration of safety conscience work environment and safety culture policy and concepts, and the need to change position titles to reflect MCS' position titles. MCS PORTS has not yet made the improvements identified during the blue sheet review effort. MCS PORTS should expedite its efforts to revise and convert "blue sheeted" procedures to ensure they adequately reflect current MCS business practices, drive continuous safety and health program improvement, and prevent confusion due to references to outdated position titles.

Opportunity for Improvement: MCS should expedite its efforts to revise and convert "blue sheeted" procedures to ensure they adequately reflect current MCS business practices, drive continuous safety and health program improvement, and prevent confusion due to references to outdated position titles.

The *Inspections* procedure does not prescribe the frequency required for the many workplace inspections. In addition, the Team could not identify a systematic, comprehensive program that tracked workplace inspections to ensure monthly workplace inspections cover the whole worksite at least quarterly in accordance with DOE-VPP expectations. MCS should create a process 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: MCS should create a process 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.

MCS produces an integrated (Portsmouth, Paducah, and Lexington) monthly report as part of its Contractor Assurance System (CAS). The report identifies 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 ES&H goals tracked are rates for TRC, DART, and Near-Misses.

MCS' accident investigation program, documented in DUF6-U-SHP-0301, *Accident/Incident Reporting,* details the process for the investigation of off-normal events, including injuries and illnesses. The MCS PORTS ES&H Manager, with support from an onsite registered nurse, makes injury and illness recordability decisions. An onsite Registered Nurse performs case management and provides support to the ES&H Manager. A third contractor assurance worker does the Computerized Accident/Injury Reporting System data entry and is responsible for Occurrence Reporting and Processing System reporting in accordance with MCS PORTS' procedure DUF6-U-CPL-0016, *Occurrence Notification and Reporting*. The documented procedure ensures the plant manager is aware of any case management issues. Because the State of Ohio's Workers' Compensation laws, injured or ill workers may be eligible to receive 100 percent of their normal compensation, potentially incentivizing workers to delay their return-to-work. For cases involving days away from work, MCS PORTS managers should be careful not to adopt a case management strategy that could foster worker perceptions that the company is trying to pressure premature return-to-work.

Conclusion

MCS PORTS' work planning process ensures proper identification and analysis of hazards in the workplace. A written safety and health program includes procedures, such as a hazard identification checklist, AHAs, and workplace inspections, and provides a means to identify and analyze hazards resulting in a workplace free from recognized hazards. MCS PORTS should expedite its efforts to revise and convert "blue sheeted" procedures to ensure they reflect current MCS business practices, drive continuous safety and health program improvement, and prevent confusion due to references to outdated position titles. MCS PORTS should also create a process to track all the inspections it conducts to ensure routine inspections of workplaces for safety and health concerns occur at least monthly and cover the whole worksite at least quarterly. MCS satisfies the necessary elements for Worksite Analysis for 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 comply 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 lower the severity of mishaps.

MCS PORTS successfully uses the hierarchy of controls to mitigate workplace hazards. MCS provided examples of controls and the Team identified others during workplace walk-downs. One example, the result of an employee suggestion, involved high foot traffic walking path improvements throughout the facility. The original facility design did not include specific employee walking paths. Instead, the construction contractor used crushed rock in non-vehicular areas. The crushed rock could move, creating uneven walking surfaces and tripping hazards. MCS PORTS procured and installed Fiberglass nonslip mats for walking paths resulting from a joint effort among affected workers, managers, engineers, and outside vendors to create safe, designated walkways. Additional engineered controls include redesigning the HF-cylinder lifting fixture to use two lifting points instead of a single lift point, reducing the risk of cylinders rotating when lifted. When workers identified the need for increased lighting, MCS PORTS installed low-voltage, light-emitting diode lighting in several areas of the facility to improve visibility and safety. MCS PORTS also modified emergency showers to sound alarms, both locally and in the control room to provide quick notification of an emergency.

During the recent outage, MCS PORTS made other plant modifications to improve engineered controls. Modifications included: (1) replacing polyvinyl chloride process piping with more robust stainless steel; (2) replacing hydrogen fluoride recovery separators with chemical-resistant materials; and (3) modifying the KOH filter plug to a vent valve that directs vented material away from workers. MCS PORTS is also evaluating installing rear view cameras for the DUF_6 cylinder handling equipment to improve operators' awareness of objects or personnel around the equipment.

DUF6-U-QAP-0022, *Time-Out/Stop Work*, documents MCS PORTS' stop-work process. The procedure applies to all personnel performing work on the DUF_6 project and details the process and responsibilities for a work suspension, either timeouts or stop work. The procedure defines the three levels of timeouts and the process for a stop work. Level-1 timeouts are broad, temporary interruptions of work, affecting the entire project (Portsmouth, Paducah, and Lexington). Levels 2 and 3 timeouts progressively decrease in scope and impact, with Level-3 being used by small crews and their supervision at the work package level. The procedure defines stop work as: "A formal method to stop a specific task or activity that poses imminent danger (death or serious physical harm) to humans or the environment, or that could severely degrade quality or safety. A Stop Work may also be issued if a Time-Out cannot be effectively resolved." Workers stated they would not hesitate to call a timeout, and managers and supervisors regularly encourage the use of Level 3 timeouts. Workers also stated that the progressive discipline process does not discourage them from requesting a timeout or stop work.

Under the previous contractor, workers created a cart to move all the testing equipment necessary to test and calibrate pressure transmitters. The cart, built without engineering input or review, presented potential hazards to workers (ergonomic hazards, unlabeled valves, improperly stored equipment). The engineering group evaluated the pressure transmitter calibration cart and redesigned it. The redesigned cart now has a sound technical basis that incorporates operating instructions, clear labels, and ergonomic design features making it safer to use. MCS has maintained a special tool program to ensure design and fabrication rigor for any shop-designed tools.

MCS PORTS has contracted with Adena Occupational Health to provide occupational medicine services. Services include medical evaluations, assistance with MCS PORTS' in-house wellness program, and treating injuries and illnesses. A registered nurse is on staff during the day shift and assists with injury and illness case management. The local emergency room provides care for backshift injuries or illnesses. Adena Occupational Health has advance arrangements for emergency air transport by helicopter. Doctors and nurses from the occupational medicine providers have surveyed most areas of contractor-controlled spaces and are familiar with the hazards from chemicals or work practices. Fluor B&W Portsmouth (FBP) is the management and operating contractor for the Portsmouth Gaseous Diffusion Plant and provides fire department coverage and emergency response. In addition, MCS PORTS employs and has corporate reach-back access to certified professionals (safety professionals, industrial hygienists, and health physics professionals) to support its mission.

To satisfy the requirements of DOE Order 151.1C, *Comprehensive Emergency Management System*, MCS PORTS developed the MCS PORTS Emergency Management Program (EMP) and a more detailed DUF6-PLN-045, *Portsmouth Emergency Plan*. The plan provides a comprehensive description of emergency planning, preparedness, and response to operational emergencies at the Portsmouth DUF_6 Conversion facility. The emergency plan implements the requirements of the site-wide EMP, and details the MCS PORTS' emergency management program. The EMP implements a coordinated program of periodic emergency response drills and exercises, including facility and site-wide events. Trained and qualified evaluators monitor major exercises. Event and drill hot washes after the drill identify opportunities for improvement. FBP and MCS PORTS coordinate their responses and equipment during the site emergency management training, drills, and exercise programs. MCS PORTS is responsible for emergency preparedness at the facility level and integrating its Emergency Response Organization (ERO) members into the PORTS site emergency management training, drill, and exercise programs.

To ensure adequate emergency planning, MCS PORTS uses an Emergency Planning Hazard Assessment (EPHA) process. The EPHA identifies, evaluates, and selects the range of initiating events for emergencies for workers, the public, and environment, forming the basis for each site emergency management plan. This process ensures the emergency planning for each scenario addresses and prepares for the probable facility events. The EPHA process reviews, analyzes, and evaluates emergency scenarios for the following categories:

- Fire;
- Explosion;
- Loss of Confinement;
- Direct chemical exposure;
- Criticality;
- External man-made causes;

- Natural phenomena; and
- Malevolent acts.

The analysis identifies credible scenarios leading to potential releases of radioactive and nonradioactive hazardous materials stored or used at the DUF_6 Conversion Facility that could affect the facility, collocated workers, the public, and the environment. Other occurrences necessitating response under the EMP include industrial accidents, equipment failures, operational errors, natural phenomena, security events, and offsite events, such as major highway or rail accidents.

General employee training (GET) and visitor orientation briefings include emergency preparedness and response guidance. Interviews with emergency management personnel confirmed MCS PORTS conducts annual evacuation drills and performs regular exercises and drills. Workers consistently demonstrated an understanding of their response actions in the case of emergencies.

FBP is responsible for site-wide emergency response and provides 24-hour notification points for emergency reporting through the Fire Services Organization. The Site Plant Shift Superintendent, serving in the role as the Incident Commander, activates the appropriate ERO element, classifies the event, initiates appropriate notifications, and directs the resolution of the emergency. Site emergency management plans and implementing procedures detail descriptions and procedures regarding the ERO activation. During an emergency, MCS PORTS supports the Incident Commander and overall site response with event classification, worker protection, mitigation, and other technical support, including support to the Emergency Operations Center, Joint Information Center, and Field ERO.

MCS PORTS' issues management/tracking program, documented in DUF6-U-QAP-0005, *Issues Management,* establishes the requirements and responsibilities to implement the requirements of DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*. DUF6-U-QAP-0005 identifies and evaluates events or issues, and delineates the process to document preventive and remedial actions, as well as capture lessons-learned opportunities. This procedure implements the DUF_6 Project corrective action element of the DUF6-PLN-003, *Project Quality Assurance Plan (PQAP)*, and DUF6-PLN-145, *DUF_6 Site Contractor Assurance System*.

The intent of the issues management process is to ensure MCS captures, analyzes, and responds to identified programmatic and performance deficiencies in a timely and effective manner. The goals of the issues management process include:

- Keep the corrective action process simple;
- Involve all personnel as stakeholders in the program with defined roles and responsibilities in identifying and reporting issues;
- Provide easy access for reporting issues across the sites; and
- Maintain strong management support and emphasis with ownership of the program that encourages all personnel to participate without fear of retaliation.

In addition to a documented issues management program that tracks and trends safety and health deficiencies and findings, MCS PORTS is testing a process improvement program to capture, evaluate and track "optional" recommendations, opportunities for improvement, and worker suggestions. Although the process improvement reporting and tracking database is running,

MCS PORTS has not yet developed the implementing procedure or training associated with the new process.

MCS PORTS maintains normal warehouse inventory using the Aptean® Ross i-Renaissance Enterprise Resource Planning software (iREN™). The software uses established minimum-maximum (min-max) levels to initiate procurements. Prior to the current outage, the logistics group recognized the min-max levels for many warehouse items were inadequate for projected demand during the outage. These items included materials necessary to ensure safety, such as polyethylene wrap (for contamination control), anti-contamination clothing, decontamination supplies, and waste disposal supplies. The logistics manager in charge of the warehouse made additional procurements based on informal communications with staff. As a means of improving future outage planning, MCS PORTS should develop an outage materials list based on previous outage experiences and personnel input to procure and stock additional materials prior to outagesto ensure workers have adequate supplies during planned outages.

Opportunity for Improvement: MCS PORTS should develop an outage materials list based on previous outage experiences and personnel input to procure and stock additional materials prior to outages to ensure workers have adequate supplies during planned outages.

Conclusion

MCS PORTS uses the hierarchy of controls to protect workers, prevent injuries, and mitigate workplace hazards. Improvements to the overall safety culture at the DUF_6 facility continue and, as a result, workers do not hesitate to call a timeout, and managers and supervisors regularly encourage the use of Level 3 timeouts. Standard and specialized PPE is readily available for the workers. An Occupational Medical Program provides comprehensive services. A new issues management program that captures, evaluates, and tracks lower level conditions will contribute to continuous safety program improvement. MCS PORTS' pursuit of additional improvements and its written programs meet the Hazard Prevention and Control expectations for 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 responsibilities are understood, personnel recognize hazards they may encounter, and employees are capable of acting in accordance with managers' expectations and approved procedures.

MCS PORTS-DUF6-TRN 001, *DUF_6, Qualification and Training,* defines the MCS PORTS training program. All employees must ensure their training prepares them to perform assigned activities, and managers must ensure they provide workers with training according to the scope, complexity, and nature of their duties. MCS PORTS-DUF6-TRN 001 provides a comprehensive and detailed training process, follows a logical sequence, and implements a systematic approach to training. It defines how MCS PORTS identifies and develops GET, job-specific qualification requirements, and requalification. It also addresses training delivery methods, testing, qualification, and evaluation processes.

Training for all personnel begins with GET, cybersecurity, and chemical hazard awareness training. MCS PORTS requires all personnel spending more than 10 working days at the site to complete GET. GET includes an overview of hazards at the site, general alarms and responses, signs and hazard postings, and other topics necessary to prevent workers from putting themselves at risk while accessing the facility unescorted. GET is primarily computer-based training, supplemented by instructors who can answer questions and provide clarification. Workers must pass a test with a correct score of at least 80 percent. All Team members completed the GET, cybersecurity, and chemical hazard awareness modules. The MCS PORTS training organization had experienced individuals available to answer Team member questions and provide additional information to clarify any questions. The training modules' design helped students understand the material and had appropriate challenge questions ensuring students understood the subject.

In addition to a variety of general safety and health subjects presented in GET, each employee receives expanded instruction through other training topics. For example, employees receive facility-specific orientation training. Employees also participate in periodic drills and are trained to safely operate the process systems in accordance with the DSA, implement Technical Safety Requirements (TSR), and respond to alarms.

MCS PORTS provides facility and job-specific training based on the location of an employee's job assignment and the tasks performed using a systematic approach to training. Teams of SMEs and training personnel collaborate to identify the appropriate knowledge, skills, and abilities necessary to perform job-specific tasks, and then develop formal and informal training to ensure personnel meet those requirements. This approach incorporates a set of tools for analyzing the job tasks to be performed and develops course material, and in-field or on-the-job training. Written and oral examinations and performance demonstrations under the direct oversight of a qualified person evaluate employee knowledge and performance. If an employee transfers to a different facility or function, MCS PORTS analyzes the new assignment for training and qualification needs. The employee completes the additional training before the employee assumes new work duties.

Operations and Production Support Qualification or Requalification Cards document the training completion. Each employee has a qualification profile listing the employee's training requirements. The Qualification or Requalification Cards track each individual's training and

qualification. MCS PORTS maintains accurate training records for DUF_6 employees, site visitors, contractors, and subcontractors in accordance with DUF6-U-TRN-0001. MCS PORTS tracks each employee's training history using the Web Smart Training Database. The database provides notice to workers and supervisors of expiring training and qualification requirements in a 30-60-90-day look-ahead report. In 2018, MCS PORTS revamped the Web Smart electronic management training system to be more user friendly and made the 30-60-90-day look clearer.

The majority of DUF_6 training programs require the successful completion of written, performance demonstration, end of course/module exams, challenge exams, and oral exams. MCS PORTS also provides programs of continuing education and recertification also to update qualifications and maintain proficiency at regular intervals.

The DUF_6 training staff has the responsibility to ensure safety and health training remains accurate and up to date. They perform periodic systematic evaluations of training and qualifications programs (not to exceed 3 years) using DOE-STD-1070-94, *Guidelines for Evaluation of Nuclear Facility Training Programs and Programmatic Training Evaluation Process*, in accordance with DOE-HDBK-1078-94.

MCS PORTS developed new qualification and training requirements for operators and maintenance workers due to actions required in response to the KOH exposure and subsequent facility shutdown in 2015. New qualifications require additional training to operators and maintenance workers regarding TSR requirements, DSA, and safety significant equipment.

In 2018, MCS PORTS training coordinated with Operations, Maintenance, Cylinder Yard, Production Support, and Quality to develop new training qualification programs for each of these departments. This effort improved the groups' training for the project work they perform, and address issues noted in various audits and evaluations. This was a team effort involving the work groups, managers, and the union leaders. Workers interviewed by the Team stated the updated training was significantly better than the previous training. Specifically, they stated the improved training informed them of the potential impacts of their activities on the facilities' safety systems. In 2019, MCS PORTS began a similar revision to the qualification programs for Engineering, Work Control, and ES&H to improve the quality of the training in those particular areas. Those improvements are still in process.

MCS PORTS' supervisors who provide direct oversight/supervision to hourly employees receive the same ES&H training as the hourly workers and, in some cases, a higher level or degree of training for a particular subject. Also, the supervisors are required to attend a daily pre-job, crew briefing; read lessons learned when applicable; attend monthly safety meetings; All Hands Meetings; and review all work-related procedures and changes.

MCS PORTS managers attend supervisory and leadership courses provided by SMEs or via computer-based training. In the fall of 2016, the PORTS management team completed a series of Nuclear Safety Culture, Team Building, and Leadership courses. The intent of the Nuclear Safety Culture training was to reinforce the traits of a healthy Nuclear Safety Culture and ensure safe and continued operations. Classes included a mixture of senior managers and hourly employees to emphasize the importance of the training and encourage an open dialog between team members. Classroom activities included a discussion on the benefits of a healthy Nuclear Safety Culture. The MCS PORTS management team also completed Leadership Development and People, Teams, and Conflicts courses. These courses emphasized engaging and motivating

people; building high performance teams; dealing with conflict, leadership styles, and understanding; and dealing with "four generations" in the workforces.

Conclusion

MCS PORTS safety and health training program ensures workers understand workplace hazards and can protect themselves and their coworkers. Because of the 2015 KOH event, the training organization reevaluated and improved the qualification requirements and training for operators and maintenance. The improvements increased the workers' knowledge of the facility systems so they would better understand their activities' effect on the facility. In 2019, MCS PORTS initiated a similar revision to the qualification programs for Engineers, Work Control, and ES&H. MCS PORTS meets the Safety and Health Training expectations for participation in DOE-VPP.

VIII. CONCLUSIONS

In the 2½ years since taking over operation of the DUF_6 conversion facility at Portsmouth, MCS has successfully empowered the workforce to raise issues and concerns, and made addressing those concerns a management goal. The singular mission of the site, the small footprint, and relatively small workforce have created a sense of teamwork among workers and managers. Most of the workers generally believe MCS is committed to achieving the mission safely, and wants workers to raise safety issues and make recommendations to improve safety. They believe MCS is committed to safety as a mission-enabling function. MCS has worked with its DOE customer to identify resources and make significant plant improvements to reduce risk to workers and the environment. This report identifies some opportunities for improvement which will further enhance MCS' safety and contribute to its mission performance. MCS meets the expectations for participation in DOE-VPP, and the Team recommends MCS be admitted to DOE-VPP at the Star level.

Appendix A: Onsite VPP Assessment Team Roster

Management

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

Todd N. Lapointe
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