



Department of Energy
Washington, DC 20585

July 13, 2016

VIA OVERNIGHT MAIL CARRIER

Mr. John D. Woolery
President and Project Manager
Portsmouth and Paducah DUF₆ Project
BWXT Conversion Services, LLC
1020 Monarch Street Suite 300
Lexington, Kentucky 40513

WEA-2016-03

Dear Mr. Woolery:

This letter refers to the Department of Energy's (DOE) investigation into the facts and circumstances associated with the March 25, 2015, potassium hydroxide (KOH) injury event at the Portsmouth DUF₆ Conversion Plant. The DOE Office of Enterprise Assessments' Office of Enforcement provided the results of the investigation to BWXT Conversion Services, LLC (BWCS) in an investigation report dated January 20, 2016. An enforcement conference was convened on March 3, 2016, with you and members of your staff to discuss the report's findings and BWCS' response. A summary of the enforcement conference and list of attendees is enclosed.

DOE considers the KOH injury event to be of high safety significance. Workers were completing the final steps of a filter change on a scrubber unit that contained an aqueous solution of KOH when system pressure was inadvertently restored before installation of the final filter housing plug. Consequently, workers were exposed to splash contact with the released KOH solution; the event resulted in serious injuries that could have been more severe under different circumstances. The event revealed deficiencies in: (1) management responsibilities, (2) hazard identification and assessment, (3) hazard prevention and abatement, (4) training and information, (5) recordkeeping and reporting, (6) lockout/tagout (LOTO), and (7) emergency response and occupational medicine.

Based on an evaluation of the evidence in this matter, including information presented at the enforcement conference, DOE concludes that BWCS violated requirements prescribed under 10 C.F.R. Part 851, *Worker Safety and Health Program*. Accordingly, DOE hereby issues the enclosed Preliminary Notice of Violation (PNOV), which cites four Severity Level I violations and three Severity Level II violations. The DOE Portsmouth/Paducah Project Office (PPPO) withheld from BWCS \$207,241 of earned fee in Fiscal Year 2015 for safety and health performance deficiencies that included those revealed by the KOH injury



event. Therefore, in accordance with 10 C.F.R. § 851.5(c), DOE proposes no civil penalties for the Part 851 violations cited in this PNOV.

BWCS conducted a causal factors analysis of the KOH exposure event and formulated 18 judgments of need with a resulting corrective action plan. However, BWCS' evaluation did not address several regulatory deficiencies that are elements of the violations in the attached PNOV, including the absence of: (1) full adherence to the hierarchy of controls in the X-1300 scrubber room, (2) personal locks during LOTO by operations personnel, and (3) proactive preparation and hazard communication with emergency services prior to the event. Consequently, DOE considers the BWCS analysis and resulting corrective action plan as only partially responsive to the Part 851 violations identified in this PNOV.

Pursuant to 10 C.F.R. § 851.42, *Preliminary Notice of Violation*, you are obligated to submit a written reply within 30 calendar days of receipt of the enclosed PNOV and to follow the instructions specified in the PNOV when preparing your response. If you fail to submit a reply within the 30 calendar days, then in accordance with 10 C.F.R. § 851.42(d), you relinquish any right to appeal any matter in the PNOV, and the PNOV will constitute a final order.

After reviewing your reply to the PNOV, including any proposed additional corrective actions entered into DOE's Noncompliance Tracking System, DOE will determine whether any further activity is necessary to ensure compliance with DOE worker safety and health requirements. DOE will continue to monitor the completion of corrective actions until this matter is fully resolved.

Sincerely,



Steven C. Simonson

Director

Office of Enforcement

Office of Enterprise Assessments

Enclosures: Preliminary Notice of Violation (WEA-2016-03)
Enforcement Conference Summary and List of Attendees

cc: Robert Edwards, PPPO
Josie Blackmon, BWCS

Preliminary Notice of Violation

BWXT Conversion Services, LLC
Portsmouth DUF₆ Conversion Plant

WEA-2016-03

A U.S. Department of Energy (DOE) investigation into the facts and circumstances associated with the March 25, 2015, potassium hydroxide (KOH) injury event at the Portsmouth Depleted Uranium Hexafluoride (DUF₆) Conversion Plant revealed multiple violations of DOE worker safety and health requirements by BWXT Conversion Services, LLC (BWCS). Workers were completing the final steps of a filter change on a scrubber unit that contained an aqueous solution of KOH. System pressure was inadvertently restored before installation of the final filter housing plug, consequently exposing the workers to splash contact with the released KOH solution. DOE provided BWCS with an investigation report dated January 20, 2016, and convened an enforcement conference on March 3, 2016, with BWCS representatives to discuss the report's findings and BWCS' response. A summary of the conference and list of attendees is enclosed.

Pursuant to Section 234C of the Atomic Energy Act of 1954, as amended, and DOE regulations set forth at 10 C.F.R. Part 851 (Part 851), *Worker Safety and Health Program*, DOE hereby issues this Preliminary Notice of Violation (PNOV) to BWCS. The violations cited in this PNOV include deficiencies in: (1) management responsibilities, (2) hazard identification and assessment, (3) hazard prevention and abatement, (4) training and information, (5) recordkeeping and reporting, (6) lockout/tagout (LOTO), and (7) emergency response and occupational medicine. DOE has grouped and categorized four Severity Level I violations and three Severity Level II violations.

Severity Levels are explained in Part 851, Appendix B, *General Statement of Enforcement Policy*. Subparagraph VI(b)(1) states that “[a] Severity Level I violation is a serious violation. A serious violation shall be deemed to exist in a place of employment if there is a potential that death or serious physical harm could result from a condition which exists, or from one or more practices, means, methods, operations, or processes which have been adopted or are in use, in such place of employment.”

Subparagraph VI(b)(2) states that “[a] Severity Level II violation is an other-than-serious violation. An other-than-serious violation occurs where the most serious injury or illness that would potentially result from a hazardous condition cannot reasonably be predicted to cause death or serious physical harm to employees but does have a direct relationship to their safety and health.”

The DOE Portsmouth/Paducah Project Office withheld \$207,241 of earned fee in Fiscal Year 2015 for safety and health performance deficiencies that included those revealed by the KOH injury event. Therefore, in accordance with the provisions of 10 C.F.R. § 851.5(b) and DOE Acquisition Regulation 48 C.F.R. § 970.5215-3, *Conditional Payment of Fee Clause*, DOE proposes no civil penalty for the violations cited in this PNOV.

As required by 10 C.F.R. § 851.42(b) and consistent with Part 851, Appendix B, the violations are listed below. If this PNOV becomes a final order, then BWCS may be required to post a copy of this PNOV in accordance with 10 C.F.R. § 851.42(e).

I. VIOLATIONS

A. Management Responsibilities

Title 10 C.F.R. § 851.10, *General requirements*, subsection (a), states that “[w]ith respect to a covered workplace for which a contractor is responsible, the contractor must: . . . (2) [e]nsure that work is performed in accordance with: (i) [a]ll applicable requirements of [10 C.F.R. Part 851]; and (ii) [w]ith the worker safety and health program for that workplace.”

Title 10 CFR § 851.20, *Management Responsibilities and Worker Rights and Responsibilities*, subsection (a), *Management Responsibilities*, states that “[c]ontractors are responsible for the safety and health of their workforce and must ensure that contractor management at a covered workplace: . . . (3) [a]ssign worker safety and health program responsibilities, evaluate personnel performance, and hold personnel accountable for worker safety and health performance.”

BWCS document DUF6-BWCS-PLN-074, Rev 4, *Worker Safety and Health Program* (effective date: November 14, 2014), section 8, *Roles and Responsibilities*, states that “[c]lear definitions of authorities, roles, and responsibilities related to the implementation of the WSHP are defined in the following subsections.” Subsection 8.1, *Organizational Structure*, states that “roles and responsibilities for implementation of the WSHP are summarized in Table 1, *Roles and Responsibilities for Implementation of WSHP*.” Table 1 states that senior managers are responsible for: “ensuring that activities conform to ES&H [environment, safety, and health] related policies, laws, regulations, and internal procedural requirement” Table 1 further states that functional and line managers are responsible for: “[a]ccepting responsibility and accountability for ES&H performance associated with the work performed under their direct supervision including. . . [e]nsuring that subordinates operate in strict compliance with the policies and applicable procedural requirements.”

Contrary to these requirements, BWCS failed to effectively evaluate personnel task assignments for, and subsequent performance during, filter change operations in the X-1300 building to ensure that program responsibilities were adequately assigned and work was performed in accordance with the applicable requirements of Part 851 and the BWCS WSHP.

Specific examples include the following:

1. BWCS did not ensure that work order WO1501182, *Filter For SK-620*, adequately defined roles and responsibilities, in that the document did not clearly indicate whether maintenance or operations employees were tasked with re-installing the filter housing vent plug after the filter change. Additionally, BWCS did not ensure that the work order was consistent with task assignments and duties typically performed at the site by maintenance and operations personnel, respectively.
2. BWCS did not effectively monitor work activities in the X-1300 building to ensure work was performed in accordance with safety and health requirements, including the use of personal protective equipment (PPE) and LOTO procedures, contained in the work control documents related to the filter change operation.

Collectively, these noncompliances constitute a Severity Level II violation.

B. Hazard Identification and Assessment

Title 10 C.F.R. § 851.21, *Hazard identification and assessment*, subsection (a), states that “[c]ontractors must establish procedures to identify existing and potential workplace hazards and assess the risk of associated workers injury and illness” and “[p]rocedures must include methods to: (1) [a]ssess worker exposure to chemical, physical, biological, or safety workplace hazards through appropriate workplace monitoring; (2) [d]ocument assessments for chemical, physical, biological, and safety workplace hazards using recognized exposure assessment and testing methodologies . . . ; (3) [r]ecord observations, testing and monitoring results; (4) [a]nalyze designs of new facilities and modifications to existing facilities and equipment for potential workplace hazards; (5) [e]valuate operations, procedures, and facilities to identify workplace hazards; (6) [p]erform routine job activity-level hazard analyses; and . . . (8) [c]onsider interactions between workplace hazards and other hazards such as radiological hazards.” Subsection (c) states that “[c]ontractors must perform the activities identified in [subsection] (a) of this section, initially to obtain baseline information and as often thereafter as necessary to ensure compliance with the requirements in this Subpart.”

Title 10 C.F.R. § 851.23, *Safety and health standards*, subsection (a) states that “[c]ontractors must comply with the following safety and health standards that are applicable to the hazards at their covered workplace: . . . (3) Title 29 [C.F.R.] Part 1910, *Occupational Safety and Health Standards* . . . [and] . . . (9) American Conference of Governmental Industrial Hygienists (ACGIH), “Threshold Limit Values (TLV[®]) for Chemical Substances and Physical Agents and Biological Exposure Indices,” (2005). . .” Subsection (b) states that “[n]othing in this part must be construed as relieving a contractor from complying with any additional specific safety and health requirements that it determines to be necessary to protect the safety and health of workers.”

Title 10 C.F.R. § 851.24, *Functional Areas*, subsection (a) states that “[c]ontractors must have a structured approach to their worker safety and health program which at a minimum

include provisions for the following applicable functional areas. . . fire protection [and] industrial hygiene . . .”. Subsection (b) states that “[i]n implementing the structured approach required by [subsection] (a) of this section, contractors must comply with the applicable standards and provisions in Appendix A of this part, entitled “Worker Safety and Health Functional Areas.”

Title 10 C.F.R. Part 851, Appendix A.6, *Industrial Hygiene*, states that “[c]ontractors must implement a comprehensive industrial hygiene program that includes at least the following elements: (a) [i]nitial or baseline surveys and periodic resurveys and/or exposure monitoring as appropriate of all work areas or operations to identify and evaluate potential worker health risks.”

Title 29 C.F.R. § 1910.132, *General requirements*, subsection (d) *Hazard assessment and equipment selection*, states that “(1) [t]he employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE).” Subsection (d) also states that, “(2) [t]he employer shall verify that the required workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date(s) of the hazard assessment; and, which identifies the document as a certification of hazard assessment.”

BWCS Document DUF6-BWCS-PLN-074, section 9, *Hazard Identification and Assessment*, states that “[t]he identification and assessment of hazards takes place prior to performing a work task. Potential hazards are identified and assessed for the defined work-scope to assure that appropriate measures are taken to prevent or mitigate potential exposure to the hazards. Consideration is given for interactions between workplace hazards and other hazards such as radiological hazards. Hazards will also be addressed when selecting or purchasing equipment, products and services.” The document further states: “[f]or conversion facility O&M [operations and maintenance] activities, each system or component is further defined to identify the required work steps and to assess those steps to ensure the identification of potential hazards...and ultimately the appropriate hazard controls for each. As appropriate, worker exposure monitoring is performed utilizing recognized testing methodologies and accredited/certified laboratories as required.”

BWCS Document DUF6-BWCS-PLN-074, section 15, *Supporting Information*, subsection 15.2, *Source References*, identifies BWCS-U-SHP-0505, *Exposure Assessments (Non-Radiological)*, as supporting information.

BWCS document BWCS-U-SHP-0505, Section 8.1, *Industrial Hygiene Program Manager (IHPM)*, states that the process for the IHPM includes: “[1] maintain an exposure assessment sampling strategy that provides a 95% confidence level...[4]compare sampling results against the American Conference of Governmental Industrial Hygienists (ACGIH), *Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices* booklet as well as with the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs).” Section 10, *References*, identifies “American Conference of Governmental Industrial Hygienists Threshold Limit Values for Chemical

Substances and Physical Agents and Biological Exposure Indices (latest edition)” as the applicable reference document.

The 2015 ACGIH® TLV booklet section titled *Introduction to Chemical Substances*, identifies a Threshold Limit Value – Ceiling (TLV-C) as “the concentration that should not be exceeded during any part of the working exposure. If instantaneous measurements are not available, sampling should be conducted for the minimum period of time sufficient to detect exposures at or above the ceiling value.” The ACGIH establishes a TLV-C of 2 milligrams per cubic meter (mg/m³) for KOH.

BWCS Document WO1501182, Attachment A, Section 2.0, *Precautions, Limitations, and Prerequisites*, subsection 2.1, *Precautions and Limitations*, paragraph 2.1.3, states: “the POS [process off gas system] scrubber contains KOH which may have been exposed to DUF₆ resulting in radioactive internal contamination...” Paragraph 2.1.4, states: “the POS scrubber also contains potassium fluoride (KF), which is hazardous and requires the same precautions as hydrofluoric acid...” The incorporated Activity Hazard Analysis (AHA) AHA-X-14-0468, Rev. 0, *Replace POS KOH Filter, X-n-POS-FL-600A/B and X-n-POS-FL-601A/B and X-n-POS-FL-620A/B*, identifies “chemical hazard from exposure to Potassium Hydroxide (KOH) and Potassium Fluoride (KF).”

Contrary to these requirements and as evidenced by the following facts, BWCS failed to adequately assess and/or document initial workplace conditions and potential worker exposures to airborne hazardous chemicals in order to ensure that personnel were protected from hazardous chemicals; and to ensure that work was performed in accordance with the applicable requirements of Part 851 and the BWCS WSHP. Specific examples include the following:

1. BWCS did not adequately conduct and/or document initial or baseline surveys, prior to performing the work task, using personal breathing zone (BZ) monitoring or other appropriate assessments for airborne exposures to KOH or KF, identified as chemical hazards, during the filter change operations. BWCS provided industrial hygiene air sampling data sheets, corroborated by personnel interviews, which revealed that airborne KOH monitoring was conducted during “typical work activities” and “daily routine rounds.” However, BWCS did not adequately collect or document BZ samples, or conduct other appropriate assessments, during periodic maintenance activities, such as scrubber filter changes, when the system piping integrity was breached and personnel were most directly exposed to KOH, KF, and related chemical hazards.
2. BWCS did not adequately conduct and/or document initial or baseline KOH sampling for the period of time consistent with methods for evaluating worker exposure for comparison with a ceiling limit value prior to performing the filter change work task. BWCS reported that its KOH sample durations ranged from 75 to 590 minutes. Additionally, the BWCS-provided *Sampling by Agent* database summary sheets inaccurately identified the KOH laboratory results as an “8-hour TWA” (i.e., time

weighted average). The KOH exposure limit of 2 mg/m³, to which the results should be applied, is actually a TLV-C.

Collectively, these noncompliances constitute a Severity Level II violation.

C. Hazard Prevention and Abatement

Title 10 C.F.R. § 851.22, *Hazard prevention and abatement*, subsection (a), states that “[c]ontractors must establish and implement a hazard prevention and abatement process to ensure that all identified and potential hazards are prevented or abated in a timely manner.” Subsection (a) further states: “(1) [f]or hazards identified either in the facility design or during the development of procedures, controls must be incorporated in the appropriate facility design or procedure.” Subsection (b) states that “[c]ontractors must select hazard controls based on the following hierarchy: (1) [e]limination or substitution of the hazards where feasible and appropriate; (2) [e]ngineering controls where feasible and appropriate; (3) [w]ork practices and administrative controls that limit worker exposures; and (4) [p]ersonal protective equipment.”

BWCS document DUF6-BWCS-PLN-074, section 10, *Hazard Prevention and Abatement*, states that “[o]nce the hazards have been identified and assessed, appropriate preventive or mitigative systems, structures, or components are credited and engineered, and administrative controls are identified and implemented to ensure there is no significant risk to the public, worker, and/or environment.” Section 10 further states that “[t]he selection of hazard controls is based on the following hierarchy:

1. Elimination or substitution
2. Engineering Controls
3. Work Practices and Administrative Controls (procedures, plans, directives, etc.)
4. PPE (safety harness, respirator, etc.)”

Contrary to these requirements, BWCS failed to adequately evaluate and/or implement the hierarchy of controls to protect personnel from workplace chemical hazards in accordance with the applicable requirements of Part 851 and the BWCS WSHP. Specific examples include the following:

1. BWCS did not adequately evaluate and/or implement feasible options to eliminate worker exposure to the hazard of pressurized KOH during filter change operations on the backup scrubber, in accordance with the hierarchy of controls, through options such as de-energizing the scrubber system pump to relieve the KOH pressure when the system integrity is breached during filter changes.
2. BWCS did not evaluate and implement feasible engineering controls in accordance with the hierarchy to reduce worker exposure to KOH splashes during scrubber operation.
 - a. BWCS replaced the threaded plugs, as originally installed on the primary scrubber filter casing vent/drain ports, with valves to minimize worker exposure to KOH leaks.

- This action was accomplished under condition reports and a work order in response to at least two near-miss incidents of potential personnel exposure to KOH from filter/system leaks in 2010 and 2011. However, BWCS did not also apply this engineering control to the backup scrubber filters, which offered the same hazard potential as that from the primary scrubbers. The failure to extend this retrofit to the backup scrubber contributed, at least in part, to worker skin exposure to KOH during the March 25, 2015 event.
- b. BWCS installed engineering controls, in the form of drain ports with valves, on the retrofitted primary scrubber filter casing valves to better control or contain the KOH flow in the event of a leak. However, BWCS only partly controlled the hazard in that KOH could splash and contact the workers if the released liquid impacted the filter casing top, scrubber structural supports, or shop floor. BWCS did not fully implement a further engineering control to eliminate splashes by, for example, attaching a tube or pipe to the drain port ends to convey released KOH to a covered receptacle.
 - c. BWCS did not provide documentation showing that it had fully assessed and/or implemented comprehensive engineering controls to minimize or eliminate worker exposure to KOH splashes from system leaks. BWCS was made aware of ongoing scrubber system leaks from the previous 2010 and 2011 events, personnel condition reports, and at least one workplace safety and health walkthrough report dated February 24, 2015.
3. BWCS did not adequately ensure that administrative controls in the form of work instructions for the filter change, fully reflected workplace conditions, personnel task assignments, and hold points for critical steps.
 4. BWCS did not adequately ensure clear delineation of boundaries around the backup scrubber beyond which PPE in addition to normal site requirements is required; or that workers consistently used the appropriate PPE when reaching beyond this boundary.

Collectively, these noncompliances constitute a Severity Level I violation.

D. Training and Information

Title 10 C.F.R. § 851.25, *Training and information*, subsection (a), states that “[c]ontractors must develop and implement a worker safety and health training and information program to ensure that all workers exposed or potentially exposed to hazards are provided with training and information on that hazard in order to perform their duties in a safe and healthful manner.” Subsection (c) states that “[c]ontractors must provide training and information to workers who have worker safety and health program responsibilities that is necessary for them to carry out those responsibilities.”

Title 29 C.F.R. § 1910.132, *General requirements*, subsection (f) *Training*, states that “(1) [t]he employer shall provide training to each employee who is required by this section to use

PPE. . . to know at least . . . [w]hen PPE is necessary . . . [and] [w]hat PPE is necessary.” Subsection (f) also states that “(2) [e]ach affected employee shall demonstrate an understanding of the training specified in paragraph (f)(1) of this section, and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE.” Subsection (f) further states that, “(3) [w]hen the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by paragraph (f)(2) of this section, the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where . . . (iii) [i]nadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill.”

Title 29 C.F.R. § 1910.1200, *Hazard communication*, subsection (h), *Employee information and training*, states that “(1) [e]mployers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area. . .”

BWCS document DUF6-BWCS-PLN-074, section 9, *Hazard Identification and Assessment*, subsection 9.1, *Known Chemical Hazards*, states that the “primary chemical hazards of concern include natural gas, uranium hexafluoride, uranyl fluoride, uranium oxide, hydrogen fluoride (HF), hydrogen gas, hydrated lime, liquid nitrogen, and potassium hydroxide.” Section 12, *Functional Areas*, subsection 12.6, *Industrial Hygiene*, of this document states that the “magnitude of the hazard and new hazards impacts the application of the graded approach by influencing the hazardous material training. . .”

BWCS Document DUF6-BWCS-PLN-074, Attachment B, *Implementing Document Matrix for Operation and Maintenance Activities*, lists BWCS-U-SHP-0601, *Hazard Communications*, and BWCS-X-SHP-0303, *Piketon [Portsmouth] Emergency Protective Actions*.

BWCS document BWCS-U-SHP-0601, *Hazard Communications* (effective date: March 9, 2012), section 5, *Process*, subsection 5.1, *General Requirements*, states that supervisors must “[21][e]nsure that employees are aware of the hazards, controls, and symptoms of exposure before assigning them tasks that involve potential exposure to hazardous chemicals. This awareness may be part of General Employee Training, review of work packages and associated [material safety data sheets (MSDSs)], [activity hazard analysis (AHA)]/crew briefings, or similar work control documents. [22] Review existing hazards and inform employees of any new chemical introduced into their work area(s). Personnel must be informed of the hazards, the controls, and symptoms of exposure.” This document also establishes BWCS-X-OPS-0405, *Chemical Control*, as an operational procedure for implementing some of the hazard communication program requirements.

BWCS document BWCS-X-SHP-0303, Revision 4, *Piketon [Portsmouth] Emergency Protective Actions* (effective date: October 21, 2014), section 5, *Procedure*, subsection 6, *Chemical/Hazardous Material Release Threat*, paragraph 2, *Incidental Release*, states that “[e]mployees are able to identify and safely mitigate the [incidental] release in accord with

job-specific instructions, procedures and required chemical training under the Hazard Communication standard.”

BWCS document BWCS-X-OPS-0405, *Chemical Control* (effective date: November 30, 2012), section 7.2, *Prerequisites*, step 6, states that “personnel working with and around hazardous materials shall be trained to the extent that they are familiar with and understand the nature of the chemical hazards with which they work.”

Contrary to these requirements, BWCS failed to ensure that personnel were effectively trained to understand the hazards, controls, symptoms of exposure, and spill response techniques associated with KOH and KF in accordance with the applicable requirements of Parts 851 and 1910, and the BWCS WSHP. Specific examples include the following:

1. BWCS did not effectively train employees initially, or provide refresher training as necessary, to ensure an appropriate understanding of the hazards, controls, and symptoms of exposure for chemicals associated with the scrubber process in the X-1300 building. The two workers exposed to KOH on March 25, 2015, attended related job training four or more years prior to the event. Neither employee initially and effectively recognized the potential adverse health effects of the KOH exposure.
2. BWCS did not adequately train employees initially, or provide refresher training as necessary, to ensure the appropriate use of PPE. Because of this failure, operators and maintenance mechanics did not use the PPE required for the activity during the three phases of filter replacement on the backup process off gas system (POS) on March 25, 2015. After the event, BWCS-RPT-15-002, section 6, documented employee understanding and recognition of correct PPE requirements as a significant latent organizational weakness.

Collectively, these noncompliances constitute a Severity Level I violation.

E. Recordkeeping and Reporting

Title 10 C.F.R. § 851.26, *Recordkeeping and reporting*, subsection (a), *Recordkeeping*, states that “[c]ontractors must: (1) [e]stablish and maintain complete and accurate records of all hazard inventory information, hazard assessments, exposure measurements, and exposure controls ...”

BWCS document BWCS-U-SHP-0505, section 8, *Process*, subsection 8.1, *Industrial Hygiene Program Manager (IHPM)*, states that the process for the IHPM includes: “[1] maintain an exposure assessment sampling strategy that provides a 95% confidence level...[4][c]ompare sampling results against the American Conference of Governmental Industrial Hygienists (ACGIH), *Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices* booklet as well as with the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs)... [and]

[5][n]otify personnel of their sampling results in writing within the period defined by OSHA and/or Department of Energy (DOE) requirements.”

BWCS Document BWCS-U-SHP-0505, section 8, *Process* subsection 8.3, *Health and Safety Technician* [HST], states that the process for the HST includes: “[4][s]egregate the workforce into similar exposure group(s) [SEG] . . . [p]erform monitoring using the following outline: [a] [o]btain breathing zone samples wherever possible . [b] [m]onitor the highest potentially exposed member(s) of each SEG.[c][a]ssess each unique task/workgroup that has significantly different exposure potentials.”

Contrary to these requirements, BWCS failed to effectively maintain records to track the completion of scrubber safety-related retrofits or adequately notify all impacted personnel of workplace chemical hazard sampling results in accordance with the applicable requirements of Part 851 and the BWCS WSHP. Specific examples include the following:

1. BWCS did not maintain complete records of hazard inventory information, assessments, exposure measurements, and exposure controls in that:
 - a. BWCS did not effectively maintain records to track the retrofit of existing process equipment to ensure that a valve to replace the threaded plugs on the primary scrubber filter housings (i.e., an exposure control and “lesson learned” identified by BWCS) was also installed on the backup scrubber. The failure to similarly retrofit the backup scrubber contributed to the March 25, 2015, KOH exposure.
 - b. BWCS did not effectively maintain records of the dispositioning of the process system leak repair and the establishment of a safety program element when the need was documented by an exposure assessments. Work Place Environmental Safety and Health Walkthrough, *X1300 Scrubber Room*, dated February 24, 2015, identified a large number of KOH leaks in the scrubber room and recommended that “an aggressive leak correction program be initiated.” The report also noted that BWCS has “no program in place to comply with ANSI [American National Standards Institute] Z358.1” requirements for annual checks of eyewash flow rates and integrity. Two levels of management subsequently reviewed and endorsed this report. However, BWCS provided no record of corrective actions for, or the final disposition of, these workplace assessment items.
2. BWCS did not provide personnel in an SEG with written notification of the exposure assessment breathing zone sampling results as represented by data obtained from the highest potentially exposed member.

Collectively, these noncompliances constitute a Severity Level II violation.

F. Lockout/Tagout

Title 29 C.F.R. § 1910.147, *The control of hazardous energy (lockout/tagout)*, subparagraph (c)(7)(iii), *Employee retraining*, states that “[r]etraining shall be provided for all authorized

and affected employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.”

Title 29 C.F.R. § 1910.147, *The control of hazardous energy (lockout/tagout)*, subparagraph (c)(5)(ii)(D), *Identifiable*, states that “[l]ockout devices and tagout devices shall indicate the identity of the employee applying the device(s).”

Title 29 C.F.R. § 1910.147, *The control of hazardous energy (lockout/tagout)*, subsection (e), *Release from lockout or tagout*, states that “[b]efore lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employee(s) to ensure the following: . . .(1) [t]he work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.”

Title 29 C.F.R. § 1910.147, *The control of hazardous energy (lockout/tagout)*, subparagraph (f)(3)(ii)(D), states that “[e]ach authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and remove those devices when he or she stops working on the machine or equipment being serviced or maintained.”

Title 29 C.F.R. § 1910.147, *The control of hazardous energy (lockout/tagout)*, paragraph (f)(4), *Shift or personnel changes*, states that “[s]pecific procedures shall be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, to minimize exposure to hazards from the unexpected energization or start-up of the . . . equipment or the release of stored energy.”

Document DUF6-BWCS-PLN-074, Attachment B, *Implementing Document Matrix for Operation and Maintenance Activities*, lists BWCS-U-GFP-0108, *Control of Work*, and BWCS-X-GFP-0216, *Lockout/Tagout (LOTO)*.

BWCS document BWCS-U-GFP-0108, Revision 9, *Control of Work* (effective date: August 1, 2014), section 5, *Procedure*, subsection 5.8, *Executing Work*, at paragraph 5.8.1 states that the supervisor or line manager will “[2]review the work package and ensure all needed permits are complete and contain appropriate approval signatures.” In addition, paragraph 5.8.1 states that “[15][b].2 requires that “[t]hese instructions are required to be at the job-site. . .”

BWCS document BWCS-X-GFP-0216, Revision 2, *Lockout/Tagout (LOTO)* (effective date: August 8, 2014), Section 5, *Process*, subsection 4, *Permit-Required LOTO*, paragraph 5.4.10, *Releasing the Permit*, states that as part of releasing the permit: “[a]ssigned authorized employee [will] ensure . . . [h]ousekeeping has been performed . . . [e]quipment is operationally intact . . . [a]ll work is complete, per work-package instructions [or] equipment is mechanically complete . . . [and] [c]ircuits and equipment are in a condition to re-energize safely.” Paragraph 5.4.10 additionally states that “[s]upervisor [a]fter [a]uthorized

[e]mployees have removed their personal locks, [will] physically inspect work area to ensure that LOTO permit can be released safely. . . ” Paragraph 5.4.10 further states that “[if] all personal locks have been removed from permit or satellite lockbox, [then] remove department lock from permit lockbox.”

Contrary to these requirements, BWCS failed to adequately implement LOTO to ensure that personnel were protected from exposure to hazardous chemicals contained in the backup scrubber POS during a planned system breach in accordance with the applicable requirements of Parts 851 and 1910, and the BWCS WSHP. Specific examples include the following:

- BWCS did not ensure that during work activities associated with a filter change on the backup scrubber on March 25, 2015, supervisors were aware of revised procedures for conducting the work, operators were briefed on the revised procedures, work was conducted with the operators protected by the application of personal locks, and the system was properly restored prior to the release of LOTO.
 - Prior to the initial LOTO of the filter on the backup POS by one team of operators, and the release of the LOTO by a second team of operators, neither BWCS supervisor reviewed the task on demand (TOD) procedure, X-POS-TOD-03, Revision 1, in the work control documents; informed operators of the revised procedure during pre-job briefings; or provided the work package for use at the work location.
 - Following the application of an operations department generic tag lock for each valve, the first team of operators breached the backup POS system. During this activity, both operators were potentially exposed to residual pressure in the isolated section of the system, as well as to KOH and KF. Neither operator performed the work under the application of personal locks. In addition, the second team of operators conducted work activities on the filter section of the backup POS prior to the release of the LOTO, and also without the application of personal locks.
 - Prior to the release of the LOTO, the operator(s) and supervisor(s) either did not conduct, or inadequately performed, the required inspections to ensure that the backup POS was operationally intact and in a condition to re-pressurize safely. After removal of LOTO, the system was re-pressurized, resulting in the release of the KOH and KF aqueous mixture and exposure of two operators to these chemicals.

Collectively, these noncompliances constitute a Severity Level I violation.

G. Emergency Response and Occupational Medicine

Title 10 C.F.R. Part 851, Appendix A.2, *Fire Protection*, states that “[c]ontractors must implement a comprehensive fire safety and emergency response program to protect workers commensurate with the nature of the work that is performed. This includes appropriate

facility and site-wide fire protection, fire alarm notification and egress features, and access to a fully staffed, trained, and equipped emergency response organization that is capable of responding in a timely and effective manner to site emergencies.”

Title 10 C.F.R. Part 851, Appendix A.8, *Occupational Medicine*, subsection (d), states that “[c]ontractors must provide the occupational medicine providers access to hazard information by promoting its communication, coordination, and sharing among operating and environment, safety, and health protection organizations.” Subsection (d) further states that “(1) [c]ontractors must provide the occupational medicine providers with access to information on the following: (i) [c]urrent information about actual or potential work-related site hazards (chemical, radiological, physical, biological, or ergonomic); [and] (iii) [a]ctual or potential work-site exposures of each employee.” Subsection (f) states that “[a] record, containing any medical, health history, exposure history, and demographic data collected for the occupational medicine purposes, must be developed and maintained for each employee for whom medical services are provided.”

Title 10 C.F.R. Part 851, Appendix A.8, *Occupational Medicine*, paragraph (k)(5), states that “[t]he occupational medicine services provider must develop and periodically review medical emergency response procedures included in site emergency and disaster preparedness plans...”

Title 29 C.F.R. § 1910.151, *Medical services and first aid*, states that “(b) [i]n the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained to render first aid. Adequate first aid supplies shall be readily available.”

BWCS-U-GFP-0112, *Drill Program*, Revision 0 (effective date: December 7, 2012), section 4, *Responsibilities*, states that “Conversion Operations Manager (or designee) [or] Operations Support Manager (or designee): initiates a facility, project, or activity drill to provide condition response training that cannot be covered adequately in the classroom or simulator.”

Document BWCS-X-SHP-0303, section, 5, *Procedure*, subsection 5.2, *Reporting an Emergency*, states: “[1] [i]mmediately report any emergency using any of the following methods:

- Dial 911 on an office phone.
- Dial 740-897-2444 on a cell phone.
- BWCS plant radio on the emergency frequency (channel 1).
- Contact on duty FM [facility manager] at 740-835-6559.
- Pull a fire call box.
- Send a messenger.”

The subsection further states: “[7] [d]o not move or transport an injured person unless the victim is in an immediately life-threatening situation.” Subsection 5.13, *Participation in*

Drills and Exercises, of the section outlines the responsibilities of the Portsmouth Operations Director, employees, and subcontractors for participating in the plant site drill and exercise program.

Contrary to these requirements, BWCS failed to adequately provide information to the occupational medicine provider on employee-specific exposures to hazardous chemicals, to ensure the availability of appropriate first aid supplies and instructions, or fully prepare for responding to a process chemical release in the X-1300 building in accordance with the applicable requirements of Part 851 and the BWCS WSHP. Specific examples include the following:

1. Following the exposure of two operators to an aqueous mixture of KOH and KF on March 25, 2015, site first responders and medical personnel were not informed of the potential exposure to KF. Although initial treatment for dermal and eye exposure of either KOH or KF consists of flushing with copious amounts of water, subsequent medical treatments for, and the chronic effects from, each chemical are different.
2. BWCS did not ensure that the occupational medicine provider performed an effective, accurate, and timely review of the first aid instructions for exposure to KOH, which were contained in the work area response kits, prior to the March 25, 2015 event. The first aid instructions called for the topical application of vinegar to neutralize KOH on the skin. After the event, the occupational medicine provider did not concur with using vinegar (or dilute acetic acid) as a neutralizing agent for skin contact, and determined that flushing with copious amounts of water was the preferred first aid response.
3. BWCS did not ensure that the facility emergency packet for the X-1300 conversion facility contained adequate information on KOH and KF (DUF6-BWCS-PLN-116, *X-1300 Conversion Building Facility Emergency Packet*, Revision 1, effective date: September 20, 2013). BWCS developed this document to provide essential facility information to emergency responders. BWCS recognized the presence of KOH and KF in the backup scrubber work order and related hazard analysis. However, BWCS did not include this information in DUF6-BWCS-PLN-116.
4. BWCS did not adequately ensure that the telephones restricted to onsite calls would successfully redirect 911 calls to the onsite emergency response organization for reporting emergencies under one of the options identified in document BWCS-X-SHP-0303.
5. BWCS did not conduct effective emergency drills or exercises to train and prepare all personnel in the X-1300 scrubber room to adequately respond to KOH and KF releases. Consequently, the actions taken in response to the KOH and KF release and exposure event on March 25, 2015, demonstrated a number of weaknesses, including:
 - a. BWCS did not implement prompt decontamination for skin exposure. BWCS delayed showering until the impacted employees contacted the facility manager and

- walked to another part of the building, instead of promptly using the emergency shower adjacent to the work area where the exposure occurred.
- b. BWCS emergency reporting procedures included multiple options, some of which involved steps that may have delayed notification to the emergency response organization. This contributed to notification delays to site emergency services during the March 25, 2015, exposure event. Employees made multiple contacts within BWCS during the 34 minutes between the initial KOH exposure and the call to site emergency services, including a call to update the Operations Manager that the incident was worse than initially thought.
 - c. BWCS did not adequately define objective criteria for employees to determine whether hazardous chemical releases are “incidental” or “significant”. Incidental chemical release response actions are handled by BWCS employees. Significant chemical release response actions are escalated to the site-wide emergency services. BWCS-X-SHP-0303 provided employees with only subjective criteria to employees for characterizing the seriousness of chemical spills. Consequently, BWCS personnel initially responded to the KOH release as if it were incidental, thereby delaying an appropriate response to what was actually a significant release.

Collectively, these noncompliances constitute a Severity Level I violation.

II. REPLY

Pursuant to 10 C.F.R. § 851.42(b)(4), BWCS is hereby obligated to submit a written reply within 30 calendar days of receipt of this PNOV. The reply should be clearly marked as a “Reply to the Preliminary Notice of Violation.”

If BWCS chooses not to contest the violations set forth in this PNOV, then the reply should clearly state that BWCS waives the right to contest any aspect of this PNOV. In such case, this PNOV will constitute a final order upon the filing of the reply.

If BWCS disagrees with any aspect of this PNOV, then as applicable and in accordance with 10 C.F.R. § 851.42(c)(1), the reply must: (1) state any facts, explanations, and arguments that support a denial of an alleged violation; and (2) discuss the relevant authorities that support the position asserted, including rulings, regulations, interpretations, and previous decisions issued by DOE. In addition, 10 C.F.R. § 851.42(c)(2) requires that the reply include copies of all relevant documents.

If BWCS fails to submit a written reply within 30 calendar days of receipt of this PNOV, then pursuant to 10 C.F.R. § 851.42(d), BWCS relinquishes any right to appeal any matter in this PNOV and this PNOV will constitute a final order.

Please send the appropriate reply by overnight carrier to the following address:

Director, Office of Enforcement
Attention: Office of the Docketing Clerk, EA-10
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

A copy of the reply should also be sent to the Manager of the Portsmouth/Paducah Project Office.

III. CORRECTIVE ACTIONS

Corrective actions that have been or will be taken to avoid further violations should be delineated with target and completion dates in DOE's Noncompliance Tracking System.



Steven C. Simonson
Director
Office of Enforcement
Office of Enterprise Assessments

Washington, D.C.
This 13th day of July 2016