

**Office of Enterprise Assessments Review of the  
West Valley Demonstration Project Site  
Fire Protection Program**



**March 2016**

**Office of Nuclear Safety and Environmental Assessments  
Office of Environment, Safety and Health Assessments  
Office of Enterprise Assessments  
U.S. Department of Energy**

## Table of Contents

Acronyms .....	ii
Executive Summary .....	iii
1.0 Purpose .....	1
2.0 Scope .....	1
3.0 Background .....	1
4.0 Methodology .....	2
5.0 Results .....	3
5.1 Fire Protection Program .....	3
5.2 Fire Hazards Analyses and Documented Safety Analyses Integration .....	8
5.3 Fire Prevention and Protection (Engineered Systems) .....	9
5.4 Surveillance and Testing .....	13
5.5 Configuration Management .....	15
5.6 Contractor Self-Assessment Program .....	16
5.7 DOE Oversight .....	17
6.0 Findings .....	19
7.0 Opportunities for Improvement .....	20
8.0 Items for Follow-up .....	20
Appendix A: Supplemental Information .....	A-1
Appendix B: Key Documents Reviewed, Interviews, and Observations .....	B-1
Appendix C: Deficiencies .....	C-1

## Acronyms

AHJ	Authority Having Jurisdiction
BNA	Baseline Needs Assessment
CFR	Code of Federal Regulations
CHBWV	CH2M Hill BWXT West Valley, LLC
CRAD	Criteria, Review, and Approach Document
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DOE-WVDP	DOE West Valley Demonstration Project
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
EM	Office of Environmental Management
FHA	Fire Hazards Analysis
FPE	Fire Protection Engineer
FPP	Fire Protection Program
FR	Facility Representative
gpm	Gallons per Minute
IBC	International Building Code
ITM	Inspection, Testing, and Maintenance
LSA	Lag Storage Area
MPFL	Maximum Possible Fire Loss
MPPB	Main Plant Process Building
NFPA	National Fire Protection Association
OFI	Opportunity for Improvement
OITS	Open Items Tracking System
psi	Pounds per Square Inch
PSO	Plant Systems Operations
RHWF	Remote Handled Waste Facility
SHIP	Safety and Health Implementing Procedure
SME	Subject Matter Expert
SOP	Standard Operating Procedure
STD	Standard
TFHA	Transitional Fire Hazards Analysis
TRU	Transuranic
USQ	Unreviewed Safety Question
WIPP	Waste Isolation Pilot Plant
WPA	Waste Processing Area
WVDP	West Valley Demonstration Project

**Office of Enterprise Assessments Review of the  
West Valley Demonstration Project Site  
Fire Protection Program**

**EXECUTIVE SUMMARY**

The U.S. Department of Energy (DOE) independent Office of Enterprise Assessments (EA) conducted a review of the fire protection program at the West Valley Demonstration Project (WVDP), as managed by CH2M Hill BWXT West Valley (CHBWW). The Office of Environment, Safety and Health Assessments within EA conducted this review on August 17-20 and September 14-16, 2015. This review was part of a targeted assessment of fire protection at nuclear facilities across the DOE complex to ensure that fire protection programs at DOE facilities comply with DOE Order 420.1C, *Facility Safety*, and corresponding National Fire Protection Association codes. EA reviewed and assessed the effectiveness of CHBWW's fire protection program, with specific attention to program implementation at the Main Process Plant Building and the Lag Storage Area facilities.

EA's review included an evaluation of key program elements, including the adequacy and integration of the fire hazards analysis with the safety basis controls; fire pre-plans; the exemption and equivalency process; combustible controls; the inspection, testing, and maintenance of fire protection systems (designated as defense in depth, not safety significant systems) and supporting infrastructure; and configuration management. The review also evaluated the WVDP contractor self-assessment and DOE oversight processes that are intended to verify the adequacy of the site fire protection program.

EA found that in most cases, the CHBWW fire protection program adequately meets DOE objectives for minimizing the potential for a fire or related event that could cause an unacceptable onsite or offsite release of hazardous or radiological material, property loss, or damage of critical process controls. The CHBWW fire protection engineers and staff are knowledgeable and actively engaged in evaluating and maintaining facility fire systems and supporting the fire protection program.

EA identified some weaknesses with the WVDP fire protection program that present vulnerabilities to DOE. These weaknesses are primarily associated with lack of training and qualification of fire system engineers and fire safety specialists; delayed notification process for offsite emergency response calls; inadequate implementation of the exemption and equivalency process; and missing analyses of the fire pump test data and fire water supply adequacy. In addition, like many sites across the DOE complex, WVDP has component degradation issues, particularly for the fire water storage tank, that challenge the reliability and adequacy of the fire water supply.

The DOE West Valley Demonstration Project (DOE-WVDP) field office oversight for fire protection, management of fire protection issues, and resolution of fire protection deficiencies was generally adequate. Annual assessments of the contractor's fire protection program were being performed, but there was insufficient involvement by a qualified fire protection engineer, a contributing factor in the field office's failure to identify some program deficiencies. Other weaknesses within DOE-WVDP include inadequate assurance that the contractor submits major fire protection program changes for the Authority Having Jurisdiction's review and approval, and inaccurately or poorly documented risks associated with storing radioactive waste in a non-sprinklered Lag Storage Area facility.

**Office of Enterprise Assessments Review of the  
West Valley Demonstration Project Site  
Fire Protection Program**

**1.0 PURPOSE**

The U.S. Department of Energy (DOE) independent Office of Enterprise Assessments (EA) conducted a review of the fire protection program (FPP) at the West Valley Demonstration Project (WVDP), as managed by CH2M Hill BWXT West Valley (CHBWV). EA conducted this review within the broader context of an ongoing program of targeted assessments of FPPs across the DOE complex at hazard category 1, 2, and 3 nuclear facilities. The purpose of the EA targeted review was to evaluate the implementation of program requirements and the adequacy of controls designed to reduce the risk resulting from a fire or explosion at nuclear facilities. Selected core fire protection elements were evaluated to provide information to the site and responsible DOE line management organizations for benchmarking the program's effectiveness. EA conducted the onsite portion of the review on August 17-20 and September 14-16, 2015.

**2.0 SCOPE**

EA assessed the effectiveness and implementation of selected elements of the WVDP site FPP, with specific attention to program implementation at the Main Plant Process Building (MPPB) and Lag Storage Area (LSA) facilities. EA evaluated key elements of the CHBWV FPP, consistent with the review scope defined in the *Plan for the Office of Enterprise Assessments Targeted Review of Fire Protection Program Implementation at the West Valley Demonstration Project*, dated September 14, 2015. This review also included a focused assessment of fire protection oversight performed by DOE-WVDP, the responsible DOE field element. Because the fire protection baseline needs assessment (BNA) had received two recent reviews and was undergoing significant revision, EA excluded the BNA from the scope of this review.

**3.0 BACKGROUND**

The WVDP site originated in 1963 with the construction of the MPPB from 1963 to 1966 for Nuclear Fuel Services, Inc., which was licensed by the Atomic Energy Commission to reprocess spent nuclear reactor fuel. The MPPB, a multi-story building, is classified as a hazard category 3 nuclear facility and is located in the center of the site. The MPPB operated from 1966 to early 1972, when the plant was shut down for facility expansion, but it never restarted and was placed in standby. After vitrification of the site's high level waste, WVDP began decontamination and decommissioning (D&D) activities in early 2000 in preparation for final demolition of the MPPB. After D&D of the steam-supplied heating system in the MPPB, the automatic fire sprinkler system was placed out of service to avoid potential freeze-up. To compensate, a dry-pipe riser standpipe was added in the west stairwell to allow the fire department to charge the line for manual activation of the sprinkler system.

To support D&D operations, a series of lag storage facilities were constructed to sort, package, and stage various radiological and hazardous wastes until they could be shipped off site for disposal. The original lag storage facilities were considered temporary, and some have been dismantled. Currently, the LSA Complex is an interconnected single story building comprised of LSA-3, LSA-4, and the Shipping Depot, with a combined floor area of approximately 58,900 square feet. LSA-3 was constructed in 1997, and

LSA-4 and the Shipping Depot were constructed two years later. Both LSA facilities are rigid steel-framed buildings with metal panel exterior walls, insulated with fiberglass. In 2005, a fire-resistant tent structure known as the Waste Processing Area (WPA) was erected inside the west end of LSA-4. The WPA is used for sorting and packaging contact-handled transuranic (TRU) waste, low level radioactive waste, mixed low level radioactive waste, and various non-radiological wastes. A stainless steel Container Sorting and Packaging Facility, also located inside the west end of LSA-4, processes wastes that are prohibited inside the WPA, such as flammable liquids; this facility has an automatic fixed FM-200 fire suppression system. The entire LSA Complex is a single fire area, classified as a low-hazard category 3 nuclear facility in WVDP-227, *WVDP Facility Identification and Categorization Matrix*. Sprinkler protection is provided only in the Shipping Depot. LSA-3 and LSA-4 have no sprinklers or other automatic fire suppression systems, but in 2014 a linear beam detection system was installed in both LSA-3 and LSA-4 with audible and visible alarms and automatic alarm signal transmission to the main gate guard house.

WVDP is located approximately five miles southeast of West Valley, New York, covers approximately 200 acres, and is managed by CHBWW with some 300 employees. As the prime contractor for the site, CHBWW has primary FPP functions at WVDP. EA selected the MPPB and LSA Complex for this targeted review to assess implementation of the WVDP FPP, as defined in WVDP-177, *WVDP Fire Protection Manual*. Currently, there are no critical process controls or active safety systems in either the MPPB or LSA Complex, and the fire protection systems are classified as defense-in-depth.

EA identified fire protection as an area for targeted reviews in a memorandum to DOE senior line management, entitled *Independent Oversight of Nuclear Safety – Targeted Review Areas Starting in FY 2013*, dated November 6, 2012.

#### **4.0 METHODOLOGY**

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*. EA implements the independent oversight program through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. Organizations and programs within DOE use varying terms to document specific assessment results. In this report, EA uses the terms “deficiencies, findings, and opportunities for improvement (OFIs)” as defined in DOE Order 227.1A. In accordance with DOE Order 227.1A, DOE line management and/or contractor organizations must develop and implement corrective action plans for the deficiencies identified as findings. Other important deficiencies not meeting the criteria for a finding are also highlighted in the report and should be addressed consistent with site-specific corrective action management procedures. Findings and deficiencies are identified in the discussion of Results in Section 5 of this report. Findings are summarized in Section 6, while deficiencies are listed in Appendix C. Line organizations are also encouraged to review the full text of this report to determine if any action is appropriate for other lower level concerns (e.g., minor compliance or performance issues) not specifically identified in this report as deficiencies. Finally, in accordance with DOE Order 227.1A, OFIs related to the results of this assessment are presented in Section 7 of this report. They are recommendations for line management consideration; they do not, by themselves, require formal resolution by management through a corrective action process.

As identified in the review plan, this review considered requirements related to fire protection listed in 10 CFR 830, *Nuclear Safety Management*; 10 CFR 851, *Worker Safety and Health Program*; DOE Order 420.1C, *Facility Safety*; DOE-STD-1066-2012, *Fire Protection*; and various National Fire Protection Association (NFPA) codes and standards. Key aspects of these requirements are included in the criteria and lines of inquiry of the CRAD(s) used by the review team.

EA used selected sections of CRAD 45-34, *Fire Protection*, Revision 1, with particular emphasis on the following elements:

- Section I, Programmatic Elements
  - Program Documentation
  - Program Implementation - Fire and Related Safety Hazards and Self-Assessments
  - Program Implementation - Fire Prevention and Protection
- Section II, FHA/DSA Integration
- Section III, Engineered System Design Features
- Section IV, TSR Surveillance and Testing
- Section V, Configuration Management

EA also used selected elements of CRAD 45-21, *Feedback and Continuous Improvement Inspection Criteria and Approach – DOE Field Element*, Revision 1, to collect and analyze data on DOE-WVDP oversight of the FPP.

The review included program documentation; authority having jurisdiction (AHJ) determinations and exemption and equivalency processes; life safety assessments; pre-incident plans; ignition source and combustible controls; fire system impairment process; inspection, testing, and maintenance (ITM) of suppression and alarm systems, and supporting infrastructure. EA also evaluated the integration of the fire hazards analysis (FHA) and the documented safety analysis (DSA); the flowdown of the safety basis requirements into the FPP; and the CHBWV self-assessment program. Supplemental information on the review, including the members of the EA review team, the Quality Review Board, and EA management responsible for this review is provided in Appendix A. A list of the key documents reviewed, personnel interviewed, and observations made during this review, relevant to the findings and conclusions of this report, is provided in Appendix B. As stated earlier, deficiencies that do not rise to the level of a finding are listed in Appendix C.

EA has not conducted a previous review of the FPP at WVDP. Therefore, there were no previous items for EA follow-up during this review.

## **5.0 RESULTS**

### **5.1 Fire Protection Program**

#### ***Criteria***

*A documented FPP that includes elements and requirements for design, operations, emergency response, fire analysis and assessments, wildland fire, and specific fire protection criteria must be developed, implemented, and maintained by the contractor. The FPP shall include requirements for life safety and means of egress for building occupants. (DOE Order 420.1C, DOE-STD-1066-2012)*

*Pre-incident strategies, plans and standard operating procedures must be established to enhance the effectiveness of manual fire suppression activities. (DOE Order 420.1C)*

*A process must be established for developing and requesting approval from the DOE AHJ for equivalencies and exemptions to fire protection requirements. (DOE Order 420.1C)*

*Comprehensive, written fire protection criteria and procedures must be established and include use and storage of combustible, flammable, radioactive and hazardous materials. (DOE Order 420.1C)*

*A documented comprehensive self-assessment of the fire protection program is performed by the DOE site office and the facility contractor at least every three years, or at a frequency with appropriate justification approved by the DOE head of field element. (DOE Order 420.1C)*

## **Program Documentation**

CHBWV has a documented FPP for the WVDP site as described in WVDP-177, *WVDP Fire Protection Manual*. The FPP is designed to provide a level of fire protection consistent with industrial risks as required by DOE Order 420.1C, *Facility Safety*, and 10 CFR 851, *Worker Safety and Health Program*, Appendix A. The FPP is based on nationally recognized codes and standards, including the International Building Code (IBC) and NFPA codes and standards. WVDP-177 includes a clear and concise policy statement of CHBWV's management commitment to the FPP and specifies the implementation of the orders, codes, and standards related to fire protection for which CHBWV is contractually obligated. CHBWV administers the FPP with adequate authority, with key roles held by the safety manager, systems engineer, fire safety specialist, plant systems operations manager, emergency management coordinator, security manager, and industrial safety technicians. The DOE-WVDP Director serves as fire protection AHJ and has not delegated any AHJ responsibilities to CHBWV. Resolution of conflicts between DOE Order 420.1C, NFPA codes and standards, and the applicable building code require involvement of the designated AHJ.

The FPP, as implemented in the MPPB and LSA Complex, is intended to provide a level of fire protection sufficient to fulfill the requirements for the best-protected class of industrial risks (i.e., "Highly Protected Risk" or "Improved Risk"). Accordingly, the CHBWV FPP includes both active and passive fire protection features, as well as administrative controls designed to limit the material at risk and combustible loading in the facilities. Additionally, CHBWV has documented self-assessments of the FPP; an established wildland fire management plan that minimizes the vulnerability of site personnel and property to wildland fire damage; and a hot work procedure that establishes a permit system to control and safely perform hot work activities consistent with the requirements of NFPA 51B, *Standard for Fire Prevention in Use of Cutting and Other Hot Work* (2014 Edition).

CHBWV has adequate fire protection staff and subcontractor support, including fire protection engineers (FPEs) and technicians, needed to implement the requirements of DOE Order 420.1C. Roles and responsibilities for administration of the FPP are clearly established in WVDP-177, with key program functions being performed by FPEs, fire systems engineers, and fire safety specialists, as well as line management. Interviews with fire protection personnel indicate that they take ownership of the FPP and their areas of responsibility. All fire protection personnel interviewed expressed a willingness and desire to improve the program where necessary.

Although CHBWV generally has a comprehensive documented FPP for the WVDP site, EA identified a weakness in the FPP documentation. According to DOE Order 420.1C (Attachment 2, Chapter II, Section 3.d (2) (a)) and DOE-STD-1066-2012 (5.2.1.3), training and qualifications are to be established for FPEs and fire protection technicians commensurate with their duties. As specified in DOE-STD-1066-2012 (5.2.1.3), the training and qualifications shall include DOE-specific fire protection elements and application of DOE orders that are commensurate with engineering responsibilities. However, CHBWV has not established the required training and qualifications for fire protection personnel. (See **Finding F-CHBWV-2015-01.**)



A specific deficiency in the documentation of FPP requirements involves allowing combustible materials in permanent construction. WVDP-177 identifies applicable design and construction criteria for new facilities and major modifications to existing facilities, including the use of nationally recognized codes and standards. However, Section 3.6.2 of WVDP-177 allows the permanent installation of some combustible materials, contrary to the prohibition in Section 5.5.1 of NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials* (**Deficiency**). EA did not observe any instance of limited combustible materials in use for facility construction.

WVDP-177 also addresses establishment of the code of record for facilities and major modifications thereto, stating that provisions of subsequent editions of codes or standards are mandatory only to the extent that they are explicitly stated to be applicable to existing facilities. However, WVDP-177 does not distinguish between technical provisions and operational provisions of codes and standards, and does not address the applicability of operational provisions of the most recent codes and standards (promulgated after the code of record), which, according to DOE-STD-1066-2012 (2.2.8), should be evaluated and implemented to the extent practicable. Additionally, WVDP has no process or mechanism in place to review new revisions of NFPA codes and standards to identify and implement new operational requirements. Therefore, the FPP and associated implementing procedures may not reflect the latest operational requirements. For example, WVDP-408, *Fire Protection Systems Performance Manual*, does not implement the hydrostatic test of fire department connections on fire sprinkler systems, which was introduced in the 2014 edition of NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems* (13.7.4). (See **OFI-CHBWV-2015-01**.)

Overall, except for the lack of training and qualification requirements for fire protection personnel, the FPP description documents adequately define the program and incorporate the requirements in DOE Order 420.1C, Attachment 2, Chapter II, *Fire Protection*, and DOE-STD-1066-2012.

### **Exemption and Equivalency Process**

DOE Order 420.1C requires contractors to establish a process for developing and requesting AHJ approval of fire protection equivalencies and exemptions to fire protection requirements. DOE Order 420.1C also requires that records of technical justification be maintained and reevaluated for appropriateness as activities and operations change. WVDP-177, Section 8.1 defines fire protection exemptions and equivalencies and identifies DOE-WVDP as the approval authority. However, no process has been established for developing and requesting AHJ and Building Code Official approvals of exemptions and equivalencies from fire protection requirements. Additionally, no process has been established for determining when and how to obtain required AHJ approvals to ensure that applicable requirements are met. The EA team requested documentation for current approved exemptions and equivalencies to verify maintenance and availability of records. The documents provided, specifically for the MPPB and LSA Complex, were not identified as approved exemptions or equivalencies. Historical records of exemptions and equivalencies were not readily available.

As established in DOE Order 420.1C, the DOE head of field element is responsible for fulfilling the roles and responsibilities for the AHJ for matters involving fire protection, as defined by the NFPA, and Building Code Official, as defined in DOE-STD-1066-2012, for matters concerning the building code. Interviews with DOE and CHBWV fire protection personnel and document reviews indicate that not all documents and activities that require AHJ or Building Code Official review and approval are being submitted to and reviewed, approved, and/or accepted by the DOE AHJ. For example, the linear beam smoke detection and duct detection systems designed and installed in LSA-3 and -4 and the fire suppression system upgrade in the Administrative Building computer room were not reviewed, approved, and accepted by DOE as the AHJ/Building Code Official, contrary to NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, 2008 edition, Section 5.1 and IBC Section 107.2.2.

Overall, CHBWV's processes for managing exemptions and equivalencies and obtaining AHJ approvals for fire protection installations do not fully meet DOE Order 420.1C. See **Finding F-CHBWV-2015-02**.

### **Pre-Fire Plans/Pre-Incident Plans**

CHBWV is responsible for developing pre-fire plans. Pre-fire plans for each WVDP facility are documented in WVDP-178, *WVDP Pre-Fire Plan*. The plan describes fire hazards and fire protection systems that are specific to each facility, and provides guidance for the onsite incident commander and the West Valley Volunteer Hose Company, which provides emergency medical and manual firefighting forces for WVDP site emergencies. The WVDP pre-fire planning process is a team effort that includes Site Operations, Nuclear Safety, Emergency Management, Fire Safety, and the West Valley Volunteer Hose Company. All pre-fire plans that involve water suppression in or adjacent to moderator-controlled areas are required to be reviewed/approved by a criticality safety engineer as specified in WVDP-177, Section 7.1.1. Pre-fire plans are maintained at the Plant Systems Operations office, which serves as the incident commander for all emergencies. Pre-fire plans are updated periodically to ensure that facility information remains current. Overall, the pre-fire plans are generally adequate and, for the most part, meet DOE requirements and standards. However, EA identified one deficiency. The WVDP site has several potential dead zones where radio communications may be affected, but those zones are not outlined in the pre-fire plan, contrary to Section 5.10.2 of NFPA 1620, *Standard for Pre-Incident Planning*, which requires aspects of communications that can impact emergency response activities to be recorded in the pre-incident plan (**Deficiency**).

### **Combustible Control Program**

WVDP has a documented site combustible control program, Safety and Health Implementing Procedure (SHIP) 228, *Combustible Control Program for Radiological Facilities*, to manage fire hazards associated with combustible and flammable materials that are handled, stored, or processed in radiological facilities. The procedure is generally adequate, and program requirements are sufficiently implemented, with few exceptions. Very few exposed combustibles were observed, and housekeeping was excellent in the LSA-3 and LSA-4 facilities. However, during a walkthrough of the LSA Complex, EA observed a pile of combustible wooden timbers stacked outside the southwest end of the building, well within 30 feet of the building. SHIP 228, Section 5.2.1 requires combustible materials stored outside to be at least 30 feet from a radiological facility. The site took no immediate actions to correct this deficiency and comply with SHIP 228 requirements (**Deficiency**). Additionally, numerous flammable/combustible liquids storage cabinets in both LSA-3 and LSA-4 had been modified with hasp and lock assemblies, where fasteners penetrated the door assembly. These modifications can violate a cabinet's integrity and impair its insulating ability, compromising the performance of the cabinet during an actual fire.

### **Hot Work Program**

The WVDP FPP includes a documented hot work program. WVDP-177, Section 5.0, and SHIP 200, *Hot Work Activities*, set requirements for hot work activities and establish a permit system to control and safely perform hot work activities consistent with the requirements of NFPA 51B. Interviews with the permit authorizing individual, review of recent hot work permits, and review of inspection results for designated hot work areas indicated that the hot work program is effectively implemented.

### **Facility and Building Assessments**

Facility fire assessments are required to verify programmatic and functional compliance with applicable fire protection regulations and DOE orders associated with an individual facility to satisfy the requirements in DOE Order 420.1C for facility/building assessments.

Overall, the facility/building assessments are being performed under the supervision of an FPE and are conducted by personnel with an appropriate level of knowledge of fire safety codes and standards. However, although FHAs have been performed for the MPPB and the LSA Complex (both hazard category 3 nuclear facilities), facility/building assessments had not been conducted for these facilities. Facility/building assessments involve evaluation of different criteria than the FHA, and are required to be conducted annually for facilities considered a high hazard by DOE Order 420.1C (Attachment 2, Chapter II, Section 3.f.(2)), to ensure the identification and correction of deficiencies and the effective communication of lessons learned (**Deficiency**).

### **Fire Protection System Impairments**

EA reviewed procedures and conducted interviews with the fire systems engineer and fire safety specialist to verify compliance with applicable requirements regarding impairment of fire protection systems and equipment. EA also reviewed the impairment log, which lists current, open fire protection system impairments.

Standard Operating Procedure (SOP) 33-16, *Operation of Fire Alarm Panels, Draining and Filling of Sprinkler Systems and Impairment Control*, provides the minimum requirements for controlling fire protection system impairments and ensuring that affected systems are returned to service in an acceptable and timely manner. SOP 33-16 describes adequate interim compensatory measures during fire protection system impairments to ensure employee life safety and site fire protection. The procedure implements associated requirements of DOE Order 420.1C and WVDP-177, but it is not fully compliant with the requirements of NFPA 25 for water-based fire systems. For example, SOP 33-16 does not require appropriate notifications to the fire department and AHJ of planned and emergency impairments in accordance with NFPA 25, Sections 15.5 and 15.6. Also, EA's interviews and examination of the tags used on site indicated that a tag system and appropriate location for hanging of tags had not been established and consistently used in accordance with NFPA 25, Section 15.3.

### **Wildland Fire Management**

The WVDP wildland fire management plan is established and documented in WVDP-177, Section 9.0. The plan implements the requirements NFPA 1143, *Standard for Wildland Fire Management*, and NFPA 1144, *Standard for Reducing Structure Ignition Hazards from Wildland Fire*, and provides general wildland fire management objectives, information, and tasks to those organizations directly involved in the preparedness for, prevention of, response to, and recovery from wildland fires on the WVDP.

The primary objective of the wildland fire management plan is to minimize the vulnerability of site personnel and property to wildland fire damage. The WVDP fire management plan incorporates specific tasks to be implemented in order to achieve this objective. These tasks include implementation of a fire prevention program that minimizes the occurrence and impact of fire; implementation of fire preparedness activities to ensure timely and effective response to fire; implementation of a fuels management program to ensure that vegetation fuels, if involved in a wildland fire, do not endanger site personnel, high value property, or radiological facilities; integration of wildland fire management activities with first responder emergency organizations; and recovery actions for returning to pre-emergency conditions commensurate with the extent of fire damage.

Although the wildland fire management plan generally implements an appropriate level of protection of the WVDP site from wildland fires, the plan does not reference and incorporate for consistency the Federal wildland fire management policy as specified by DOE Order 420.1C, Attachment 2, Chapter II, Section 3.g.

## Conclusion

For the most part, the FPP is a well-documented, comprehensive program. It includes the necessary programmatic elements, and most of the program is implemented adequately at WVDP. However, a number of deficiencies in the program could represent vulnerabilities. First, CHBWV does not have an approved training and qualification program for fire protection personnel. Second, some changes in fire detection or suppression systems were not submitted to or reviewed, approved, and/or accepted by the AHJ or Building Code Official, and there is no formal process for identifying and submitting these requests. Finally, although facility/building assessments have been performed for a significant number of site facilities, they are not performed annually for high hazard nuclear facilities, particularly the MPPB and the LSA Complex.

## 5.2 Fire Hazards Analyses and Documented Safety Analyses Integration

### Criteria

*FHAs have been prepared for each nuclear facility, with the conclusions integrated into the DSA as appropriate. (DOE Order 420.1C, DOE-STD-1066-2012)*

*The safety authorization basis is consistent with the FHA; demonstrates the adequacy of controls provided to eliminate, limit, or mitigate identified hazards; and defines the processes for maintaining the controls. (DOE Order 420.1C, DOE-STD-1066-2012, DOE-HDBK-1163, NFPA 801)*

*Fire and related safety hazards on site (or within the facility) have been identified and evaluated in conjunction with a current and comprehensive FHA. The FHA and self-assessments address all essential elements for a complete analysis as delineated in DOE Order 420.1C. The information contained in the FHA and assessment is accurate, as required by applicable fire safety criteria. (DOE Order 420.1C)*

WVDP-177, Section 6.2 requires FHAs and transitional FHAs to be developed according to DOE Order 420.1C and DOE-STD-1066-2012. EA reviewed the FHAs for the MPPB facility and the LSA Complex. The FHAs are generally adequate, and the results are integrated into the safety bases. However, EA identified the following deficiencies in the MPPB and LSA Complex FHAs:

- WVNS-FHA-011, *Fire Hazards Analysis Main Plant Process Building/Vitrification Facility*:
  - Sections 2.3.1 and 2.3.2 do not provide an analysis of the epoxy based coating (Amerlok 400) and Carboline based product to ensure that these products meet the interior finish criteria (i.e., for flame spread/smoke generation) to assess risks of fire spread and smoke development throughout the facility during a fire, as specified in DOE-STD-1066-2012, Section 7.1 (**Deficiency**).
  - DOE-STD-1066-2012 specifies that a transitional FHA shall be developed for hazard category 1, 2, or 3 nuclear facilities undergoing transition, and defines a transitional facility as “[one of] those facilities that have been placed in a safe-shutdown condition and may or may not be maintained, or are undergoing decontamination and decommissioning (D&D) work and ultimately demolition.” Contrary to DOE Order 420.1C, Section 3.f and DOE-STD-1066-2012, Sections 5.4.1 and 7.1.3.1, CHBWV has not performed a transitional FHA for the MPPB, which is undergoing transition that includes D&D work involving asbestos removal and abatement, decontamination and size reduction of contaminated equipment, and removal of low level and TRU waste (**Deficiency**).

- WVNS-FHA-015, *Fire Hazards Analysis for the LSA-3/LSA-4 Complex*:
  - The FHA for the LSA Complex had recently been reviewed by the contractor's FPE, and was currently under revision. Key elements, such as the linear beam detection system, are not described in the outdated FHA.
  - The FHA for the LSA Complex does not discuss the locations of the nearest fire hydrants for manual firefighting efforts (**Deficiency**).
  - Fire scenarios in the DSA and FHA for the LSA Complex are not consistent. CHBWV self-identified this condition in the December 2014 self-assessment of the FPP, and prepared issues report IR-2370 to track the resolution of this problem (**Deficiency**).

## Conclusion

For the most part, EA found the integration of the FHAs and DSA to be adequate. FHAs for both the MPPB and LSA Complex identified the fire hazards within the facility. The safety authorization basis is generally consistent with the FHAs and demonstrates the adequacy of controls provided to eliminate, limit, or mitigate fire hazards. However, analyses of interior finishes were not complete, a transitional FHA was not performed for MPPB, discussion of fire hydrants was missing, and fire scenarios were not fully consistent with the DSA.

### 5.3 Fire Prevention and Protection (Engineered Systems)

#### *Criteria*

*A complete spectrum of fire prevention controls and procedures have been developed and implemented to eliminate, limit, or mitigate identified hazards, as required by applicable fire safety criteria. (DOE Order 420.1C, Site & Facility Procedures)*

*Technical, functional, and performance requirements for the systems are specified in (or referenced in) the facility authorization basis documents consistent with the facility FHA. These authorization basis documents identify and describe the system safety functions, and these criteria are translated into design calculations and procedures. (DOE Order 420.1C, site and facility procedures)*

*All fixed fire protection features (appropriate construction types, fire barriers, fire alarm and signaling systems, manual and automatic fire suppression systems, etc.), that are required by DOE directives and standards, NFPA codes and standards, and FHAs have been installed and are tested and maintained to ensure that they can perform the designated safety functions under analyzed and plausible accident conditions. (DOE Order 420.1C, DOE-STD-1066-2012, NFPA 13, NFPA 22, NFPA 801)*

*A reliable and adequate water supply and distribution system must be provided for fire suppression, as documented through appropriate analysis. (DOE Order 420.1C)*

*A means for collecting and containing a credible quantity of fire suppression water for a minimum of 30 minutes is provided to avoid the spread or release of radioactive material during a fire. (DOE-STD-1066-2012, NFPA 801)*

EA reviewed engineered fire protection systems at the MPPB and LSA Complex (specifically in the LSA Shipping Depot) to confirm, in part, that they are appropriate for the facility fire hazards described in the FHA and the safety basis accident scenarios and that they are designed and installed in compliance with

required DOE orders, DOE standards, and consensus industry codes and standards. EA also reviewed the adequacy of the water supply to the fire suppression systems in both facilities. In addition, EA reviewed the contaminated waste collection program to ensure that a means is provided to prevent or mitigate the spread or release of radioactive material from fire water runoff.

### **Fire Suppression Systems**

EA reviewed the wet pipe sprinkler system installed in the LSA Shipping Depot (built in 1999), which is designated as a parking area for diesel and propane fueled forklifts when not in use. The system analysis was to confirm, in part, that it is appropriate for the facility fire hazards as described in the FHA and the safety design basis accident scenarios; that it is designed and installed in compliance with required DOE orders, DOE standards, and consensus industry codes and standards; and that an appropriate ITM program for fire safety systems is in place and is being implemented.

DOE Order 420.1C Section 3.c(3)(e), DOE Order 420.1B Section 3.c(1), and WVDP-177 Section 3.2.2 require a reliable and adequate water supply for fire suppression systems. WVNS-DSA-001, *Documented Safety Analysis for Waste Processing and Support Activities*, specifies in Section 11.4.4.1 that fire detection and suppression systems must have the appropriate capacity and capability to minimize the adverse effects of fires. Additionally, NFPA 13 (1999 Edition), *Standard for the Installation of Sprinkler Systems*, Chapter 9 requires a water supply capable of providing the required flow and pressures for sprinkler systems. Furthermore, WVDP-408, Section 6.2 specifies that one of the minimum conditions for operation of water-based fire protection systems is that the system supply water pressure does not fall below 90 pounds per square inch (psi). WVNS-FHA-015, *Fire Hazards Analysis for the LSA-3/LSA-4 Complex*, Section 4.1.1, indicates that the maximum sprinkler system demand for the LSA Complex Shipping Depot is 1,020 gallons per minute (gpm) at 101.9 psi, plus a hose stream allowance of 250 gpm. The WVDP fire water distribution system, independent of the site potable water system, is supplied by two fire pumps: one electric-driven pump rated at 1,000 gpm at 100 psi, as specified on the manufacturer's pump curve and pump data plate; and one diesel-driven pump, for which WVDP could not produce a manufacturer's pump curve and the pump data plate was not legible. Additionally, WVDP could not produce pump performance curves from previous annual pump capacity tests to confirm the adequacy of the pump's performance characteristics and had not developed a fire water supply curve demonstrating that a reliable and adequate water supply is available to support the maximum sprinkler system flow and pressure demands for the LSA Complex Shipping Depot. Contrary to DOE Order 420.1C and NFPA 13, CHBWV has not documented an analysis demonstrating that a reliable and adequate water supply and distribution system is provided for fire suppression. (See **Finding F-CHBWV-2015-03**.)

### **Life Safety Systems**

EA toured the MPPB and LSA Complex to verify compliance with NFPA 101, *Life Safety Code*. Due to the nature of the D&D work in the MPPB, temporary contamination control and asbestos control barriers are frequently constructed in various rooms and aisles. CHBWV is aware that these temporary structures may restrict access to normal building exits, and provides instructions on egress pathways as needed in work packages. CHBWV discusses these changes and identifies the best egress pathways for workers during the plan-of-the-day meeting. EA observed that required life safety features are provided, including an adequate number of emergency exits and egress paths to accommodate occupants and adequate travel distances. Designated emergency exits were appropriately marked. Recent upgrades to emergency lighting in LSA-3 and LSA-4 were implemented in response to self-identified Open Items Tracking System (OITS) issue 1420979-I/CIA. Overall, life safety systems are in compliance with DOE and NFPA, with one exception: records of completion and results of the annual preventive maintenance of

emergency lights and exit signs (Job Card #W1501940-01) have not been kept for inspection by the AHJ, contrary to the requirements of NFPA 101, Section 7.9.3.

### **Fire Detection and Alarm Systems and Emergency Notification**

WVDP-177, Section 2.2 addresses program requirements for reporting fires of all sizes, even if extinguished. These requirements include making an announcement using the plant-wide paging system and notifying the shift supervisor of Plant Systems Operations (PSO) and Security. Upon notification, security officers at the main gate are to initiate emergency response by phone dialing 911.

Security officers also continuously man the proprietary supervising station (Keltron) that monitors automatic fire alarm signals, as well as plant process alarm and security alarm signals. Based on interviews and review of Conduct of Security Task procedures, upon receipt of a fire alarm or trouble signal at the supervising station, the security officer notifies the PSO shift supervisor, who in turn verifies facility conditions and directs the preferred response. If directed to do so by the PSO shift supervisor, the security officer initiates emergency response by dialing 911 by phone. This alarm signal pre-verification violates the NFPA requirement for immediately retransmitting the alarm signal to a communications center and does not meet the conditions for which pre-verification is allowable under NFPA 72, Section 26.

NFPA 72, *National Fire Alarm and Signaling Code*, Section 26.4.6.3 requires that indication of a fire shall be promptly retransmitted to the communications center or other locations accepted by the AHJ, specifying the building or group of buildings from which the alarm has been received. The means of retransmission shall be accepted by the AHJ and shall be in accordance with NFPA 72, Sections 26.3.6.6 or 26.5.4.4, or Chapter 27. Where alarm signal verification is required by the responsible fire department, the supervising station shall immediately notify the communications center that a fire alarm signal has been received and verification is in process. Also, the conditions of NFPA 72, Section 26.2.3 must be met for verification of alarm signals.

During an interview with EA, the security officer demonstrated knowledge of operation of the proprietary supervising system and understood his responsibilities as described in the Conduct of Security Tasks procedures. EA also reviewed course completion records to determine the adequacy and method of personnel qualifications to operate the supervising system. NFPA 72 (10.5.4.1) requires operators of the supervising system to have demonstrated competence by one or more of the following: (1) certified by the manufacturer of the receiving system or equipment; (2) trained or certified by an organization approved by the AHJ; or (3) licensed or certified by a state or local authority. The security operators have demonstrated some level of competence in operating the system as documented in completion of Course SE315P, "Monitor the Keltron Alarm System." However, the method of demonstration is not in accordance with NFPA requirements, and has not been approved by the AHJ. (See **Finding F-CHBWV-2015-04.**)

### **Fire Water Storage Tank**

The WVDP fire water storage tank (32D-1) has a capacity of 475,800 gallons, of which 300,000 gallons are reserved for fire protection systems and firefighting needs, providing adequate capacity for supplying a 90-minute fire water demand (114,000 gallons) to the sprinkler system protecting the LSA Shipping Depot. Water supplies for the tank are provided from two onsite wells. The required five-year internal inspection of the tank was performed on December 5, 2012, by Pittsburg Tank & Tower Maintenance Co., Inc. The report identified several significant structural integrity deficiencies. For example:

- The liquid level indicator is in poor condition and should be replaced with a water-level gauge of suitable design.
- The existing roof vent should be replaced with an appropriate sized vacuum/pressure, frost-proof vent and screen. The existing vent has a cross-sectional area of 29 square inches. According to NFPA 22 (2008), *Standard for Water Tanks for Private Fire Protection*, Section 4.14.2, the vent pipe should have a minimum cross-sectional area of 75 square inches to prevent buckling of the tank.
- Repairs should be made to the tank floor to prevent further buckling. The internal inspection of the tank identified areas on the underneath side of the tank floor where buckling is occurring.
- The interior liner has significant signs of pitting and abrasions. The interior surface of the tank should be sandblasted and an epoxy liner applied to all interior surfaces.

Contrary to DOE Order 420.1B, Attachment 2, Chapter II, Section 3.d (1) (f), CHBWV has not entered any of the fire water storage tank structural deficiencies into OITS or taken actions to correct them. (See **Finding F-CHBWV-2015-05.**)

### **Contaminated Waste Collection Program**

WVDP-178 includes a description of CHBWV's contaminated waste collection program which provides means for collecting and containing a credible quantity of fire suppression water to avoid the spread or release of radioactive material during a fire.

WVNS-FHA-015, Section 4.1.2 discusses provisions to contain or limit fire water runoff in the LSA Complex. Fire water from operation of the Shipping Depot sprinkler system (1,020 gpm) and manual firefighting efforts (250 gpm) for 30 minutes will generate approximately 38,100 gallons of potentially contaminated waste water runoff. The LSA-3/LSA-4 storage facilities have a continuous dike installed around the entire footprint of the building and do not have floor drains. Each storage facility has a water containment capacity of approximate 85,000 gallons, well above the anticipated 30 minute volume of contaminated fire water.

WVNS-FHA-011, Section 13 discusses the application of liquid runoff controls to contain fire water runoff and references the pre-fire plan, WVDP-178.

### **Conclusion**

While some positive aspects were identified, the engineered system design features element of the FPP is less than adequate. Although fire prevention controls and procedures have been developed and implemented to eliminate, limit, or mitigate most identified hazards, CHBWV has not appropriately analyzed the fire water system and has taken no action to correct structural deficiencies in the fire water storage tank. Both of these issues represent a significant vulnerability. Also, the process of physically verifying a fire condition before immediately communicating a fire alarm to an emergency response center, and the fact that alarm operators do not demonstrate competence in accordance with NFPA 72 requirements, could result in a potentially dangerous delay in summoning help.



## 5.4 Surveillance and Testing

### Criteria

*Surveillance and testing is performed to demonstrate that the fire protection system, including supporting infrastructure, is capable of accomplishing its safety functions and continues to meet applicable system requirements and performance criteria. (DOE Order 420.1C, DOE-STD-1066-2012)*

*Surveillance and test procedures are established for implementing the ITM program. Test results are reviewed by qualified FPEs and other qualified persons and compared to previous data to identify adverse trends in system performance or reliability. A preventive maintenance program is established to perform regular preventive or corrective maintenance repairs to ensure operability of the system or equipment. (DOE Order 420.1C, DOE-STD-1066-2012, NFPA codes and standards)*

*Records are maintained consistent with the requirements of DOE Administrative Records Schedule 18, Security, Emergency Planning and Safety Records. (DOE Order 420.1C, DOE Administrative Records Schedule 18, NFPA codes and standards)*

### Controls, Procedures, and Requirements

Fire protection systems installed in WVDP hazard category 3 nuclear facilities are classified as defense-in-depth and therefore have no associated technical safety requirements. WVNS-DSA-001 recognizes the FPP in Section 11.4.2, which indicates that the FPP goes beyond the minimum requirements established by NFPA. CHBWV has established minimum operating conditions and ITM frequencies for the WVDP fire suppression and detection systems, which are documented in WVDP-408. EA found that this document sets minimum operating conditions and establishes ITM frequencies in line with NFPA codes and standards. However, while observing ITM activities and reviewing completed ITM test data, EA identified the following deficiencies:

- Work packages W1502950, *Annual Testing of the Electric Fire Pump*, and W1502951-01, *Flow Capacity Test of the Standby Diesel Fire Pump*, which were performed on July 17, 2015, did not provide adequate instructions for analyzing fire pump test data as required by NFPA 25, Section 8.3.3, as described below: (See **Finding F-CHBWV-2015-06.**)
  - Calculations for correction to the rated speed were not performed to determine actual performance of the diesel engine driven pumps, contrary to (NFPA 25, Section 8.3.7.2.1.
  - No pump curve was developed for either pump to determine whether the pumps perform at no less than 95 percent of the pressure at rated flow and rated speed of the initial unadjusted field acceptance test curve or original certified pump curve, contrary to NFPA 25, Section 8.3.7.4.
  - The performance of the pumps was not evaluated using the unadjusted flow rates and pressures to ensure that the pumps can supply the system demand, as required by NFPA 25, Section 8.3.7.7.
  - NFPA 25, Sections 3.3.34 and 8.3.3.1 requires annual testing of fire pumps to be conducted by qualified personnel, defined as competent and capable persons who have met the requirements and training for a given field. Pump capacity tests were performed by Davis Ulmer (subcontractor to CHBWV) and witnessed by the fire systems engineer. Based on interviews, EA discovered that test personnel were not aware that: (1) calculations are

required for correction to the rated speed of the fire pump; (2) acceptance of a fire pump relies on having the manufacturer's original field acceptance test curve, manufacturer's certified pump curve, or a legible pump nameplate; (3) pump capacity test data must be plotted on a curve for comparison to the original field acceptance/manufacturer's original test curve; and (4) each pump's performance is to be evaluated using the unadjusted flow rates and pressures to ensure that the pump can supply the system demand.

- No inspections or tests were scheduled in the MPPB or LSA Complex facilities during the EA review. However, EA was invited to observe annual testing of a wet pipe sprinkler system (#33FP) in the Remote Handled Waste Facility (RHWF). The inspections and testing were performed by a sprinkler contractor licensed within the state of New York. The sprinkler riser was located outside the main building in an attached mechanical/communications room. Before the testing began, a large metal box was found in front of the riser, blocking access to the alarm valve and trim piping. The box was too large to move by hand, and WVDP did not have personnel available to relocate the box on short notice. EA witnessed the sprinkler technicians climbing on and over the box to operate valves and record gauge readings. WVDP-177, Section 5.3.1.C states: "Fire protection systems and equipment shall not be blocked or obstructed without an approved impairment." According to CHBWV, no approved impairment had been issued for the location of this box. In addition, NFPA 25, Section 4.1.3 requires the property owner to provide ready accessibility to components of water-based fire protection systems that require ITM.
- There was no hydraulic nameplate for the sprinkler system at the riser, and the ITM data sheet does not address verifying that the hydraulic nameplate is in place and is legible. WVDP-408, Attachment A, "Table of Inspection and Test Components" and NFPA 25, Section 5.2.6 and Table 5.1.1.2 require the hydraulic design information nameplate to be inspected quarterly to verify that it is provided, attached securely to the sprinkler riser, and legible.
- The sprinkler contractor used Work Package PM W1504039-01, *RHWF Fire Alarm System*, to perform the ITM on the facility fire alarm system and wet pipe sprinkler system 33FP. The sprinkler test results were recorded on Form WV-0163, *WVDP Sprinkler Systems Semi-Annual Inspection and Test Report*, which requires recording a final static pressure, after closing the main drain valve. This pressure was not recorded on the data form. Additionally, the form requires a trip time to be recorded in seconds, but this time was not recorded on the data form.

## **Records Management and Retention**

Fire protection related records are managed in accordance with WVDP-262, *WVDP Records Management Plan*, which provides instructions for the creation, inventory/identification, transfer, receipt, processing, maintenance/storage, correction, preservation, and retrieval of records generated or used at the WVDP. WVDP-529, *WVDP Records Disposition Plan*, provides additional requirements regarding records that are no longer needed to conduct regular, current business. Interviews with records management personnel and review of a sample of records indicated that with one exception, records related to fire protection are retained appropriately. Retention periods for fire protection system inspection and test records meet the requirements of DOE Administrative Records Schedule 18. As discussed in Section 5.3, records of completion and results of the annual preventive maintenance of emergency lights and exit signs have not been retained.

## Conclusion

Overall, CHBWV surveillance and testing was generally adequate. CHBWV has appropriately established minimum operating conditions and ITM frequencies for the WVDP fire suppression and detection systems. Also, for the most part, fire protection records are adequately collected and retained. However, although ITM for the fire pumps was performed at the correct frequency, the necessary calculations and analysis of ITM data were not adequately performed, which casts doubt on the ability of the fire pumps to perform as required. In addition, key data was missing, and in some cases CHBWV did not meet program requirements and had not requested an exemption from the AHJ.

## 5.5 Configuration Management

### *Criteria*

*A configuration management process is established and adequately integrates the elements of fire protection system requirements and performance criteria, system assessments, change control, work control, and documentation control. Changes to the fire protection system requirements, documents, and installed components are formally designed, reviewed, approved, implemented, tested, and documented. (DOE Order 420.1C, DOE-STD-1066-2012)*

*An unreviewed safety question (USQ) process has been established in accordance with 10 CFR 830 and is appropriately implemented for making controlled changes on fire safety systems, including those documents that govern work to be performed. (10 CFR 830, DOE Order 420.1C, DOE-STD-1066-2012)*

EA reviewed the configuration management program specifically related to the FPP and found evidence that CHBWV has an established program for integrating system requirements and performance criteria, system assessments, change control, work control, and documentation control as required by DOE Order 420.1C. For example:

- Work packages for performing ITM on fire protection sprinkler and alarm systems were complete, including the flowdown of DOE directives and NFPA codes and standards.
- FHAs have been completed for the MPPB and Lag Storage Complex, both hazard category 3 nuclear facilities.
- Change control was demonstrated in the recent upgrade of the site fire alarm system.
- Drawing 900-D-5284, *System 33 WVDP Fire Protection Main Lines*, has been updated to identify fire hydrants that were placed out of service in 2008.

However, the configuration management program has not adequately integrated all elements of the fire protection system requirements and performance criteria (**Deficiency**). For example:

- Manufacturers pump curves and a legible pump data plate could not be provided for the diesel-driven fire pump. (See previous discussion of fire suppression systems in section 5.3.)
- No hydraulic nameplate was provided on sprinkler riser #33FP. (See previous discussion in section 5.4.)

- Significant fire water tank deficiencies have not been entered into OITS for resolution. (See previous discussion in section 5.3 and **Finding F-CHBWW-2015-05**.)

### **Unreviewed Safety Questions**

EA also performed a limited review of the USQ process as it specifically relates to the FPP. WV-914, *Unreviewed Safety Question Process (USQP)*, implements the requirements of 10 CFR 830.203 and applies to proposed activities and discovered conditions that could affect the WVDP DSA. WV-914 has been approved by DOE as required. EA reviewed a sample of USQ determinations related to fire protection (USQD-15-133 and USQD-14-116) to verify that facility design changes were appropriately evaluated using the USQ process. The approved process was followed appropriately. No recent USQ determinations have resulted in a potential inadequacy in the DSA.

### **Conclusion**

The CHBWW configuration management process was adequate, with a few noted weaknesses. Based on the records that EA reviewed, changes are being formally designed, reviewed using the USQ process, approved, implemented, tested, and documented. Although the configuration management program adequately captures design documentation, change control, and work control as related to fire protection, some elements of the FPP, including incorporation of manufacturer's pump curves, equipment nameplates, and maintenance recommendations were not sufficient.

### **5.6 Contractor Self-Assessment Program**

CHBWW performs FPP self-assessments as required by DOE Order 420.1C, Chapter II, Section 3.b (2). WVDP-177, Section 6.0 requires a documented comprehensive fire protection programmatic self-assessment to be performed every three years by or under the supervision of an FPE. The CHBWW integrated assessment program is broken into three separate programmatic elements, a third of which are assessed annually. EA reviewed the fourth quarter 2012, 2013, and 2014 self-assessments and confirmed that fire protection program self-assessments are conducted under the supervision of a qualified FPE, and include strengths and weaknesses of the program as prescribed in DOE-STD-1066-2012. EA also verified that the status of weaknesses from previous self-assessments are documented in the most current self-assessment report, tracked in the OITS system, and include corrective action plans. Examples of the issues identified in contractor self-assessments include:

- Improvements to the ITM program are required. Specifically, documentation of follow-up actions to correct and "close-out" identified deficiencies and rigor for maintaining ITM records per Con Ops is inadequate (OITS #s 1320018 and 1320019).
- Site specific controls for storage of hazardous chemicals has not been integrated into implementing procedures (OITS # 1320021).
- WVDP-408, Fire Protection Systems Performance Manual does not clearly specify when system ITM requirements, which are not met, need a posted impairment (OITS # 1320020).
- Recommendations offered in WVNS-FHA-015 for smoke detection in the LSAs and WPA, and automatic fire suppression in WPA have not been put in place (OITS #1320024).
- The BNA requires update to reflect that the Fire Brigade no longer provides continuous coverage (OITS # 1320025).
- Site specific chemical management policy/procedure WV-912 is inadequate (OITS # 1320021).

## Conclusion

EA concludes that CHBWV is performing fire protection program self-assessments as required by DOE 420.1C.

### 5.7 DOE Oversight

#### *Criteria*

*DOE field element line management has established and implemented effective oversight processes to evaluate the contractor's FPP and verify implementation (including compliance with requirements). (DOE Order 226.1B)*

*The DOE field element line oversight program includes written plans and schedules for planned assessments, focus areas for operational oversight, and reviews of the contractor's self-assessment of processes and systems. (DOE Order 226.1B, 4b (2))*

*Oversight processes are tailored according to the effectiveness of the contractor assurance systems, the hazards at the site/activity, and the degree of risk, giving additional emphasis to potentially high consequence activities. (DOE Order 226.1.B, 4b (5))*

*DOE field element staff are adequately trained and qualified to perform assigned oversight activities. (DOE Order 226.1B)*

EA reviewed DOE-WVDP oversight related to the CHBWV FPP. In general, DOE-WVDP has adequately defined its oversight process in a suite of comprehensive plans and procedures. The Policy, Procedure and Plan QP-111-01, Rev. 9, *DOE-WVDP Mission and Function Statement*, defines the mission of the Federal cleanup of the WVDP site in accordance with the West Valley Demonstration Project Act (Public Law 96-368), describes the DOE-WVDP organization, and identifies the functions and responsibilities of DOE-WVDP management and staff. DOE-WVDP-010, Rev 3, *DOE-WVDP Assurance Oversight Program Description*, describes the DOE field element oversight processes for the WVDP site. The purpose of this program is to ensure that DOE line management is sufficiently knowledgeable of site and contractor activities to make informed decisions about hazards, risks, and resources; provide direction to the site contractors; and evaluate contractor performance.

DOE-WVDP conducts oversight of CHBWV and other subcontractors at the WVDP through both daily interactions and more formal, scheduled surveillances and assessments. Fire protection oversight includes unannounced walkthroughs by the Facility Representatives (FRs), planned walkthroughs during scheduled surveillances performed by the DOE subject matter expert (SME) for fire protection, and formal assessments involving document reviews, interviews, and other assessment techniques. Oversight of the FPP at WVDP is performed by the fire protection SME with the help of the two FRs. The fire protection SME is not a certified FPE, but is a certified industrial hygienist with years of experience as a volunteer firefighter in the nearby community and the associated training and education in fire protection. The fire protection SME is responsible for leading surveillances and assessments in areas of fire protection and arranging for FPE support, as needed. The FRs perform the most frequent fire protection oversight and interface with the contractor on a daily basis. They routinely conduct facility walkthroughs to check combustible loading, means of egress, fire extinguisher dates, and other items.

As a small site, DOE-WVDP does not have a qualified FPE on staff but obtains Federal FPE support from EM as needed for specific reviews and planned assessments. Since the February 2014 fire at the Waste

Isolation Pilot Plant (WIPP), FPE support has been somewhat more difficult for WVDP to obtain, including in a delay of over 6 months for requested support. (See **OFI-DOE-2015-01**.)

EA reviewed recent DOE-WVDP surveillances in the area of fire protection and found them to be only moderately effective. In 2013, surveillance S13-010E, *Nuclear Facility Safety-Fire Protection*, identified two findings, one involving changes made without the necessary advance reviews, and the other involving lack of a qualified FPE review of proposed changes and other documents. The following year, surveillance S14-006E, *Nuclear Facility Safety-Fire Protection*, resulted in a single finding on the failure to perform annual inspections of fire doors, contrary to NFPA 80, *Fire Doors and Other Opening Protectives*, Section 5.21. In June 2015, surveillance S15-0061S/E, *Nuclear Facility Safety-Fire Protection*, was performed and resulted in no findings. All fire protection issues identified during DOE-WVDP oversight surveillances and assessments are transmitted to the contractor, where they are entered as issues reports in OITS. All issues reports require formal documentation to close and are walked down by the DOE assessment leader before closure.

In June 2015, a senior DOE FPE from EM Headquarters provided long-overdue support in fire protection to augment the DOE-WVDP fire protection SME. The EM FPE visited the WVDP site to review the draft WVDP Site Office FPP Description, review the site BNA, and observe the WVDP annual emergency exercise. The EM FPE's comments on the BNA were being incorporated during EA's review of the FPP. EA will address these items during a future follow-up review.

The DOE-WVDP Director is the designated fire protection AHJ for the WVDP site. Although a small number of fire protection equivalencies and exemptions are on file, none had been submitted since the CHBWV contract was enacted in August 2011. (See the related finding **F-CHBWV-2015-02**.) Of particular concern is that the lack of fire suppression sprinklers in the LSA 3/LSA 4 portion of the LSA Complex, which is not specifically covered in an exemption or equivalency, results in considerable risk to DOE. Although both DOE-WVDP and CHBWV are well aware of the issue and the previous decisions leading up to it, no exemption or equivalency is on file. Instead, there is reference to a 1989 letter documenting an agreement between the site contractor at that time (West Valley Nuclear Services) and the DOE-WVDP, and approved by the Ohio Field Office, to increase the maximum possible fire loss (MPFL) value from \$1 million to \$10 million. This letter, in conjunction with DOE Order 420.1B and DOE-STD-1066-99, was used in the mid to late 1990s to justify the decision to omit fire sprinklers in the design of the LSA-3 and LSA-4 waste sorting and storage facilities. In 2012, the FHA for the LSA Complex recommended retrofitting the LSA-3 and LSA-4 facilities with sprinklers, but this recommendation was caveated to say only if the operational life of the facility exceeded the three-year anticipated duration. That duration was exceeded in 2015. As a compensatory measure, a linear beam fire detection system was recently installed in LSA-4 that provides audible and visual alarms and automatically signals the alarm station in the gate house if smoke is detected. Although an improvement, this design decision has not been formally documented with an exemption approved by the AHJ (DOE-WVDP Director). In addition, the estimated MPFL for the LSA Complex and some of the assumptions underlying this decision are likely no longer valid, considering the changes in regulations over the past 20 years and the accumulated DOE complex-wide experience with fires. (See **OFI-DOE-2015-02**.)

In 2014, EA found the DOE-WVDP process for planning, scheduling, and conducting oversight of the contractor to be comprehensive. At that time, EA also reviewed the qualifications of the two DOE-WVDP FRs and examined the DOE-WVDP issues management processes, including documentation, tracking, and closeout of findings from DOE-WVDP assessments and surveillances. Since there were no issues in these programs at that time, EA did not further review these areas during this assessment.

## Conclusion

Overall, DOE-WVDP oversight of fire protection, management of fire protection issues, and resolution of fire protection deficiencies are generally adequate. The DOE-WVDP staff is sufficiently knowledgeable of the contractor FPP to make informed decisions about hazards and risks, efficiently evaluate contractor performance, and provide direction to the contractor as required by DOE Order 226.1, *Implementation of Department of Energy Oversight Policy*. DOE-WVDP has been performing periodic assessments of the CHBWV FPP but, like field offices at other small DOE sites, has insufficient expertise in fire protection to thoroughly address the requirements. Although DOE-WVDP requested FPE assistance from EM Headquarters, EM's resources have been directed largely toward WIPP recovery; EM's response to WVDP was not timely and supportive, delaying review of the contractor's BNA for months. Furthermore, although DOE-WVDP routinely conducts assessments of fire protection, the recent assessments did not include sufficient support from an FPE. More regular involvement from a qualified FPE may result in identifying some important shortcomings in the contractor's program and would enhance the field office's capabilities.

## 6.0 FINDINGS

Findings are deficiencies that warrant a high level of attention from management. If left uncorrected, findings could adversely affect the DOE mission, the environment, the safety or health of workers and the public, or national security. DOE line management and/or contractor organizations must develop and implement corrective action plans for EA appraisal findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 227.1A to manage these corrective action plans and track them to completion.

### CH2M Hill BWXT West Valley, LLC

**F-CHBWV-2015-01:** Training and qualifications have not been established for fire protection personnel, including FPEs and fire safety specialists, commensurate with their duties. (DOE Order 420.1C, Attachment 2, Chapter II, Section 3.d (2) (a) and DOE-STD-1066-2012, Section 5.2.1.3)

**F-CHBWV-2015-02:** CHBWV has not established or implemented a process for developing and requesting DOE AHJ approvals when required, such as for exemptions/equivalencies to fire protection requirements, designs of fire protection systems, acceptance testing results, etc. Documents and activities that require AHJ or Building Code Official review and approval are not being submitted to, and reviewed, approved, and or accepted by, the DOE Head of Field Element or designated AHJ. In addition, records of exemptions and equivalencies are not maintained readily available for periodic review. (DOE Order 420.1C, Attachment 2, Chapter II, Section 3.d)

**F-CHBWV-2015-03:** WVDP has not documented an analysis demonstrating that a reliable and adequate water supply and distribution system is provided for fire suppression. (DOE Order 420.1C, Attachment 2, Chapter II, Section 3.c (3) (e); WVDP-177, Section 3.2.2; WVNS-DSA-001, Section 11.4.4.1; and NFPA 13, Chapter 9)

**F-CHBWV-2015-04:** Alarm signals received by the proprietary supervising station are not immediately transmitted to a communications center, and alarm signal pre-verification does not meet the conditions of NFPA 72. Additionally, security officers in the supervising station have not demonstrated competence by being (1) certified by the manufacturer of the receiving system or equipment; (2) trained or certified by an organization approved by the AHJ; or (3) licensed or certified by a state or local authority. (NFPA 72, Sections 26.2.3 and 10.5.4.1)

**F-CHBWV-2015-05:** The deficiencies in fire water storage tank 32D-1 identified in 2012 during the five-year internal inspection have not been corrected or entered into OITS. All fire suppression systems rely on this tank to function. (DOE Order 420.1C, Attachment 2, Chapter II, Section 3.d (1) (f); NFPA 22, Sections 4.14.2 and 14.1.8)

**F-CHBWV-2015-06:** Work packages do not provide adequate instructions for analyzing fire pump test data to ensure that the pumps meet system design requirements. (NFPA 25)

## **7.0 OPPORTUNITIES FOR IMPROVEMENT**

EA identified some opportunities for improvement (OFIs) to assist cognizant managers in improving programs and operations. While OFIs may identify potential solutions to findings and deficiencies identified in appraisal reports, they may also address other conditions observed during the appraisal process. EA offers these OFIs only as recommendations for line management consideration; they do not require formal resolution by management through a corrective action process and are not intended to be prescriptive or mandatory. Rather, they are suggestions that may assist site management in implementing best practices or provide potential solutions to issues identified during the assessment.

### **CH2M Hill BWXT West Valley, LLC**

**OFI-CHBWV-2015-01:** CHBWV should consider revising WVDP-177 to distinguish between technical provisions and operational provisions of NFPA and building codes, as it relates to code of record. New editions of codes and standards typically incorporate operational provisions such as industry improvements and lessons-learned, that constitute best practices. The applicability of operational provisions in the most recent codes and standards (promulgated after the code of record) should be evaluated consistent with the guidance established in DOE-STD-1066-2012 (2.2.8). EA suggests establishing a process or mechanism to review new revisions of NFPA codes and standards to identify and evaluate operational requirements for implementation.

### **DOE-WVDP**

**OFI-DOE-2015-01:** DOE-WVDP should consider arranging for more frequent FPE involvement at WVDP, either through a more regular schedule with an EM headquarters FPE, or by obtaining FPE support from other DOE sites.

**OFI-DOE-2015-02:** DOE-WVDP should consider reviewing the responsibilities of the AHJ and ensuring that decisions involving fire protection matters are appropriately reviewed by an FPE. DOE-WVDP should remind the contractor of their responsibility to submit equivalencies and exemptions from NFPA codes or building codes for AHJ review and approval, when needed. Finally, DOE-WVDP should consider re-analyzing the risks assumed by storing radioactive waste in a non-sprinklered facility, considering the lessons from WIPP and other fires.

## **8.0 ITEMS FOR FOLLOW-UP**

EA will review the revised BNA after it has been approved by the DOE field element.



## **Appendix A Supplemental Information**

### **Dates of Review**

Onsite planning and initial data gathering: August 17-20, 2015

Onsite data gathering, interviews, and observations: September 14-16, 2015

### **Office of Enterprise Assessments Management**

Glenn S. Podonsky, Director, Office of Enterprise Assessments

William A. Eckroade, Deputy Director, Office of Enterprise Assessments

Thomas R. Staker, Director, Office of Environment, Safety and Health Assessments

William E. Miller, Deputy Director, Office of Environment, Safety and Health Assessments, and Acting Director, Office of Nuclear Safety and Environmental Assessments

Patricia Williams, Director, Office of Worker Safety and Health Assessments

Gerald M. McAteer, Director, Office of Emergency Management Assessments

### **Quality Review Board**

William A. Eckroade

Karen L. Boardman

John S. Boulden III

Thomas R. Staker

William E. Miller

Patricia Williams

Gerald M. McAteer

Michael A. Kilpatrick

### **Office of Enterprise Assessments Site Lead for West Valley Demonstration Project Site**

Rosemary B. Reeves

### **Office of Enterprise Assessments Team Composition**

Rosemary B. Reeves – Lead

Barry L. Snook

Taryn S. Couchman-Cates

## **Appendix B**

### **Key Documents Reviewed, Interviews, and Observations**

#### **Documents Reviewed**

##### **Programmatic Information:**

- WVDP-177, Rev 17, WVDP Fire Protection Manual, 12/19/2013
- WVDP-178, Rev 12, WVDP Pre-Fire Plan, 4/3/2014
- WVDP-408, Rev 10, Fire Protection Systems Performance Manual, 7/18/2013
- WVDP-519, Rev 1, WVDP Fire Protection Baseline Needs Assessment, 4/2/2014
- WVDP-227, Rev 26, WVDP Facility Identification and Categorization Matrix
- WVDP-262, WVDP Records Management Plan, Rev. 19, 06/19/13
- WVDP-529, WVDP Records Disposition Plan, Rev. 2, 08/14/12
- DOE-WVDP-010, Rev 3, DOE-WVDP Assurance Oversight Program Description
- DOE-WVDP-003, Rev 7, DOE-WVDP Facility Representative Program Description
- DOE-WVDP FY 2014 Program Oversight Schedule
- QP-111-01, Rev 10, Mission and Function Statement, 4/16/15
- QP-364-01, Rev 0, DOE-WVDP Implementation of the Technical Qualifications Program
- QP-414-02, Rev 10, Management and Independent Assessments and Corrective Action Disposition
- QP-414-03, Rev 3, DOE-WVDP Stop Work Orders
- PD-364-01, Rev 0, DOE-WVDP Technical Qualification Program Description
- WV-914, Rev. 32, Unreviewed Safety Question Process (USQP), 10/31/2012
- Letter, B. C. Bower to D. W. Coyne, subject: CH2M HILL B&W West Valley, LLC (CHBWV) Contract No. DE-EM0001529 – WV-914, “Unreviewed Safety Question Process,” Revision 32, dated 06/18/2012

##### **Fire Hazards Analyses:**

- WVNS-FHA-010, Rev 2, Fire Hazard Analysis Chemical Process Cell - Waste Storage Area, 10/8/2013
- WVNS-FHA-011, Rev 7, Fire Hazards Analysis Main Plant Process Building/Vitrification Facility, 6/30/2015
- WVNS-FHA-014, Rev 10, Fire Hazards Analysis Remote Handled Waste Facility, 11/9/2012
- WVNS-FHA-015, Rev 4, Fire Hazards Analysis for the LSA-3/LSA-4 Complex, 6/6/2012

##### **Fire Assessments:**

- FFA-16, Rev 4, Main Plant Office Building Facility Fire Assessment, 7/17/2013
- FFA-19, Rev 7, Low Level Waste Treatment (LLW2) Facility Fire Assessment, 10/21/2014
- WV:2012:0114, Fire Protection Program Assessment, 12/31/2012
- WV:2013:0094, Fire Protection Program Assessment, 12/31/2013
- WV:2014:0105, Fire Protection Program Assessment, 12/31.2014

##### **Safety Basis:**

- WVNS-DSA-001, Rev 18; Documented Safety Analysis for Waste Processing and Support Activities
- WVDP-146, West Valley Demonstration Project Technical Safety Requirements (TSR), Rev. 11, 06/30/15
- USQD-14-116, LSA-3 & 4 Fire Detection and Alarm System Installation, 08/18/2014
- USQD-15-133, WVNS-FHA-011, Fire Hazards Analysis for Main Plant Process Building/Vitrification Facility, 06/09/2015

**Design Information:**

- WVNS-SD-313-13A, Rev 2, Remote Handled Waste Facility SDD R13A System Design Description For Fire Detection System, 8/2/2007
- WVNS-SD-313-13B, Rev 1, Remote Handled Waste Facility SDD R13B System Design Description For Fire Suppression System, 8/11/2004
- WVNS-SDC-148, Rev 0, Summary Design Criteria, Site Supervisory Alarm System, 33A - Fire Detection, 9/23/2014
- WVNS-CAL-387, Rev 1, TRU Waste Physical and Fire Protection, 6/30/2015
- 900-D-5284, *System 33 WVDP Fire Protection Main Lines*

**Procedures:**

- SHIP-200, Rev. 4, Hot Work Activities, 12/29/14
- SHIP-228, Rev. 4, Combustible Control Program for Radiological Facilities, 06/15/15
- SHIP-231, Rev 2, Fire Safety Inspections, 6/11/2014
- SOP 033-02, Rev 12, Operation of The Fire Water Distribution System, 10/30/2014
- SOP 033-08, Rev 2, Testing of Fire Hose, 3/5/2009
- SOP 033-16, Rev 10, Operation of Fire Alarm Panels, Draining and Filling of Sprinkler Systems and Impairment Control, 5/4/2015
- Conduct of Security Tasks, Main Gate Operator Task 07, "Monitor Keltron Fire Alarm System," 07/15/2015
- Conduct of Security Tasks, Main Gate Operator Task 17, "Respond to Site Emergencies," 09/15/2015
- EMIP-102, Emergency Field Response, Rev. 28, 06/08/15
- EMD-10, Management Workplace Visit Program, Rev. 0, 12/21/11

**Work Packages:**

- WV-0163, WVDP Sprinkler Systems Semi-Annual Inspection and Test Report
- PM W1504039-01, RHWF Fire Alarm System
- W1502950, Annual Testing of the Electric Fire Pump
- W1502951-01, Flow Capacity Test of the Standby Diesel Fire Pump

**Other:**

- WVNSCO TRMS Report, Course Completion by Employee for Course SE315P, printed 09/16/2015
- Conveyance of Contract Deliverables, Conveyance Number 103-DLVR-08222011, Worker Safety and Health Program, 08/22/2011
- General Employee Training, Rev. 32, Section 3, Fire Safety
- MM233B, Rev. 3, Fire Watch Training
- Hot Work Permit, IWP# 105978, VIT LIF, 06/05/2015
- Hot Work Permit, WIP# 1503619, LLW2, 08/10/2015
- Safety Equipment Release Form, Impairment Number 15-21, 06/10/2015
- Safety Equipment Release Form, Impairment Number 15-26, 08/10/2015
- Safety Equipment Release Form, Impairment Number 15-34, 09/09/2015
- Safety Equipment Release Form, Impairment Number 15-33, 09/03/2015
- Safety Equipment Release Form, Impairment Number 15-31, 08/31/2015
- Safety Equipment Release Form, Impairment Number 15-29, 08/17/2015
- Safety Equipment Release Form, Impairment Number 15-28, 09/09/2015
- Fire System Impairment Log
- Job Card, PM W1501940-01, Check & Repair Emergency Lights & Exit Signs (annual), Closed 05/05/2015

- Job Card, PM W1500779-01, Check & Repair Emergency Lights and Exit Signs (annual), Closed 02/02/2015
- Job Card, PM W1503538-01, Check Emergency Lights & Exit Signs [LAG] (monthly). Closed 07/27/2015
- Job Card, PM W1502794-01, Check Emergency Lights & Exit Signs [LAG] (monthly), Closed 06/08/2015
- Job Card, PM W1503537-01, Check & Repair Emergency Lights & Exit Signs [Main Plant] (monthly), Closed 07/30/2015
- Job Card, PM W1502793-01, Check & Repair Emergency Light & Exit Signs [Main Plant] (monthly), Closed 06/29/2015
- Open Items Tracking System (OITS) Query of Open FP Items August 17, 2015
- Open Items Tracking System (OITS) Query of All FP Items 1/1/14 to 8/18/15
- Open Items Tracking System (OITS) numbers 1320018, 1320019, 1320020, 1320021, 1320024, and 1320025
- Facility Fire Safety Inspection Checklist, Inspection No. 14-034, Main Plant, 7/30/14
- Facility Fire Safety Inspection Checklist, Inspection No. 15-011, LLW2, 6/03/15 and 6/17/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-014, RHWF, 6/25/15
- Wildland Fire Assessment Checklist, RHWF and CPC/WSA, 6/25/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-013, Lag Storage, 6/03/15 and 6/17/15
- Wildland Fire Assessment Checklist, Lag Storage Area and Surrounding Hardstands, 6/03/14
- Facility Fire Safety Inspection Checklist, Inspection No. 15-012, VTF, 6/17/15
- Wildland Fire Assessment Checklist, VTF & LLW2, 6/03/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-015, Warehouse, 06/25/15
- Wildland Fire Assessment Checklist, Warehouse (WHSE), Waste Water Treatment Facility (WWTF) MNT-GLOs, 6/25/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-017, Drum Cell/Control Room, CMA and NDA, 06/25/15
- Wildland Fire Assessment Checklist, Drum Cell and NDA, 6/24/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-018, STS/PVS, 6/29/15
- Wildland Fire Assessment Checklist, STS, PVS, Vent Shelter and Waste Tank Farm (WTF), 6/29/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-019, Load-In/EDR Chg. Rm & EDR VA, 7/22/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-020, MPPB-CFA-EDR VA-OGA-COA & Labs, 8/05/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-021, LLW2, 8/11/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-022, VTF, 8/11/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-023, STS-WTF, 8/13/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-024, UR/URE, 8/13/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-010, Vit & Load In, 6/11/15
- Wildland Fire Assessment Checklist, Vitrification, Load-In and Vit Hill, 6/25/15
- Facility Fire Safety Inspection Checklist, Inspection No. 15-009, Main Plant & Office, 6/16/15
- Wildland Fire Assessment Checklist, Main Plan and Utility Room (UR/URE), 6/25/15
- Document Control List of Current Facility Fire Assessments, printed 8/20/15
- Letter (99036), G. L. Becker to B. C. Bower, Subject: "Response to U.S. Department of Energy (DOE) West Valley Demonstration Project (DOE-WVDP) Surveillance 507-039E," dated 3/27/2008
- Letter C. R. Rieman to A. Konetzni, Subject: "Response to U.S. Department of Energy West Valley Demonstration Project Surveillance S07-039E, Assessment of the West Valley Environmental Services LLC's (WVES) Fire Protection Program" dated 4/18/2008

- Letter C. R. Rieman to D. W. Coyne, Subject: “U.S. Department of Energy West Valley Demonstration Project (DOE-WVDP) Surveillance S13-010E, Nuclear Facility Safety – Fire Protection” dated 5/21/2013
- Letter C. R. Rieman to D. W. Coyne, Subject: U.S. Department of Energy West Valley Demonstration Project (DOE-WVDP) Surveillance S14-0006E, Nuclear Facility Safety – Fire Protection” dated 4/7/2014
- Letter C. R. Rieman to D. W. Coyne, Subject: U.S. Department of Energy West Valley Demonstration Project (DOE-WVDP) Surveillance S15-006I/E, Nuclear Facility Safety – Fire Protection” dated 6/9/2015
- Letter D. W. Coyne to B. C. Bower, Subject: Contract No. DE-EM0001529, Revised Deferred Maintenance Audit Report, dated 6/16/14
- Open Items Tracking System (OITS) Query of status of WIPP EOC Issue Reports, printed 08/20/15
- Letter C. J. Eckert to D. W. Coyne, Subject: U.S. Department of Energy Accident Investigation Report “Underground Salt Haul Truck Fire at the Waste Isolation Pilot Plant February 5, 2014,” dated March 2014, dated 3/31/14
- Letter C. J. Eckert to D. W. Coyne, Subject: Review of U. S. Department of Energy Accident Investigation Report “Underground Salt Haul Truck Fire at the Waste Isolation Pilot Plant February 5, 2014,” dated March 2014, dated 6/18/14
- Letter D. W. Coyne to B. C. Bower, Subject: Contract No. DE-EM0001529, “U.S. Department of Energy Accident Investigation Report Underground Salt Haul Truck Fire at the Waste Isolation Pilot Plant February 5, 2014,” dated March 2014, dated 5/01/14
- Letter D. W. Coyne to B. C. Bower, Subject: Contract No. DE-EM0001 529, “U.S. Department of Energy Accident Investigation Report Underground Salt Haul Truck Fire at the Waste Isolation Pilot Plant February 5, 2014,” dated March 2014- Supplementary Information, dated 6/11/14
- Letter D. W. Coyne to B. C. Bower, Subject: “Review of U.S. Department of Energy Accident Investigation Report Underground Salt Haul Truck Fire at the Waste Isolation Pilot Plant February 5, 2014,” dated March 2014, dated 10/20/14
- Trip Report for the West Valley Demonstration Project (WVDP) June 15-19, 2015 (by J. Landmesser, FPE, EM-41), dated 9/9/2015

## Interviews

### Contractor:

- CHBWW Safety Basis Engineer
- CHBWW Nuclear Safety Specialist
- CHBWW Project Engineer
- CHBWW Fire Protection/FPP Point of Contact
- CHBWW Fire Systems Engineer
- CHBWW Fire Safety Specialist
- CHBWW Fire Protection Engineer (contractor from RJR Engineering, PC)
- CHBWW Utilities Superintendent
- CHBWW Maintenance Manager
- CHBWW Support Supervisor/Backup Cognizant System Engineer
- CHBWW Instrumentation and Control Technician
- CHBWW D&D Supervisor
- CHBWW D&D Operators
- CHBWW Waste Operations Supervisor
- CHBWW Safety Manager
- CHBWW Engineering Manager

- CHBWV Hot Work Permit Authorizing Individual
- CHBWV Plant Shift Operations Supervisor
- CHBWV Safeguards & Security Manager
- CHBWV Central Alarm Station Representative
- Security Officers (from Allied Barton)
- Davis Ulmer Sprinkler Co. Certified Sprinkler Test Engineer/Technician

**DOE:**

- DOE-WVDP Director
- DOE-WVDP Team Leader, Safety and Site Programs Team
- DOE-WVDP SME, Fire Protection and Industrial Safety
- DOE-WVDP Facility Representatives (2)
- DOE-WVDP Lessons Learned Coordinator
- DOE-WVDP Records Coordinator

**Observations**

- Main Process Plant Building MPPB Tour and Walkdown
- Lag Storage Areas LSA-3/LSA-4 Complex Tour and Walkdown
- Remote Handled Waste Facility Walkdown
- Low Level Waste Treatment Building Walkdown
- Plan-of-the-day meetings
- Pre-job briefing for Alarm Panel Testing
- Use of Open Items Tracking System

## **Appendix C Deficiencies**

In addition to the findings presented in Section 6, EA identified some important deficiencies, listed below, and other lower level concerns (e.g., minor compliance or performance issues) not specifically identified in this report as deficiencies, which should be addressed consistent with site-specific corrective action management procedures.

- WVDP-177, WVDP Fire Protection Manual, allows the use of limited combustible materials to be permanently installed for facility construction or modifications, contrary to NFPA 801, Standard for Fire Protection for Facilities Handling Radioactive Materials.
- WVDP-178, WVDP Pre-Fire Plan does not identify the “dead zones” within the WVDP where radio communications typically fail due to inadequate reception, contrary to NFPA 1620, Standard for Pre-Incident Planning.
- Facility/building assessments are not conducted annually for the MPPB and LSA Complex, two nuclear facilities at the WVDP site that DOE considers high hazard facilities. (DOE Order 420.1C, Attachment 2, Chapter II, section 3.f (2)).
- Combustible timbers are stacked outside the LSA-3/LSA-4 within 30 feet from the building in violation of SHIP-228.
- WVNS-FHA-011, Fire Hazards Analysis Main Process Building/Vitrification Facility does not contain an analysis of the epoxy based coating (Amerlok 400) and Carboline-based products in the MPPB to ensure these products meet interior finish criterion (i.e., flame spread-smoke generation).
- Although the MPPB facility is in a transition mode, WVNS-FHA-011, Fire Hazards Analysis Main Process Building/Vitrification Facility is not a Transitional FHA, which addresses the transient state of fire protection systems in the MPPB during D&D, as specified in Sections 5.4.1 and 7.1.3.1 of DOE-STD-1066-2012.
- WVNS-FHA-015, Fire Hazards Analysis for the LSA-3/LSA-4 Complex does not include a discussion on the location(s) of the nearest available fire hydrant(s), as specified in Section 4.2.7.3.2 of DOE-STD-1066-2012.
- Self-identified inconsistencies existed between the fire scenarios in WVNS-DSA-001, Documented Safety Analysis for Waste Processing and Support Activities and WVNS-FHA-015, Fire Hazards Analysis for the LSA-3/LSA-4 Complex, but had not been corrected by CHBWV in a timely manner.
- The configuration management program has not adequately integrated all elements of the fire protection system requirements and performance criteria, such as incorporation of manufacturer’s pump curves, equipment nameplates, and maintenance recommendations.