Office of Enterprise Assessments
Targeted Review
of the
Fire Protection Program at
Y-12 National Security Complex and Pantex Plant

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Acronyms

AHJ	Authority Having Jurisdiction
AMESH&Q	Assistant Manager for Environmental, Safety, Health and Quality
AP	Administrative Procedure
BNA	Baseline Needs Assessment
CFR	Code of Federal Regulations
CLD	Combustible Loading Disposition
CNS	Consolidated Nuclear Security, LLC
CRAD	Criteria, Review, and Approach Document
DCN	Design Change Notice
DIS	Design Information Summary
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessments
EJ	Engineering Judgment
FARS	Fire Alarm Receiving Station
FHA	Fire Hazards Analysis
FPE	Fire Protection Engineer
FPO	Fire Protection Operations
FPP	Fire Protection Program
FSS	Fire Suppression System
FY	Fiscal Year
HAZMAT	Hazardous Material
HDPE	High Density Polyethylene
HPFL	High Pressure Fire Loop
ITM	Inspection, Testing, and Maintenance
MPFL	Maximum Possible Fire Loss
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
NPO	NNSA Production Office
OFI	Opportunity for Improvement
PFP	Pre-Fire Plan
PIP	Pre-Incident Plan
PIV	Post Indicator Valve
SAC	Specific Administrative Control
SAP	System, Application, and Products
SAR	Safety Analysis Report
SME	Subject Matter Expert
SR	Surveillance Requirement
S/RID	Standards/Requirements Identification Document
SSC	Structures, Systems, and Components
STD	Standard
TSR	Technical Safety Requirement
USQ	Unreviewed Safety Question
USQD	Unreviewed Safety Question Determination
Y-12	Y-12 National Security Complex
WI	Work Instruction

**Office of Enterprise Assessments Targeted Review of the
Fire Protection Program at the Y-12 National Security Complex and Pantex Plant**

EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) independent Office of Enterprise Assessments (EA) conducted a targeted review of the Y-12 National Security Complex (Y-12) and Pantex Plant fire protection programs (FPPs). This review was one part of a larger group of targeted reviews of FPPs at nuclear facilities across the DOE complex.

Fire protection was identified as a targeted review area for DOE independent oversight in a 2013 memorandum to DOE senior line management, entitled *Independent Oversight of Nuclear Safety – Targeted Review Areas Starting in FY 2013*, dated November 6, 2012. The review addressed National Nuclear Security Administration Production Office (NPO) oversight, in addition to key FPP elements, such as the baseline needs assessment, pre-incident plans, the exemption and equivalency process, combustible control, fire hazards analysis (FHA), and the National Fire Protection Association inspection, testing, and maintenance program. The assessment further evaluated the FHA and documented safety analysis integration, technical safety requirement surveillance and testing, and configuration management aspects of the FPP and related structures, systems, and components.

In most cases, the contractor, Consolidated Nuclear Security, LLC (CNS), has effectively established and implemented fire protection controls for reducing the risk associated with fire at Y-12 and Pantex. The fire protection engineers and safety basis personnel were knowledgeable of the FPP and the supporting fire systems design and exhibited a high level of knowledge regarding the inherent fire hazards of the facilities. EA also noted two best practices which were related to fire modeling and a risk ranking process directly related to combustible loading.

The most significant long-standing issues in fire protection at both sites are associated with age-related degradation of the exterior underground water piping that supplies the facility fire water suppression systems. Deliberate remedial actions have begun to address fire loop problems, but they do not constitute a systematic health and wellness approach that fully addresses current, near term, and future project commitments. During this review, CNS was addressing these issues, as well as the adequacy of the designs and the physical condition of water supply piping of the fire supply water and suppression systems. At Pantex, CNS was replacing the underground entrance piping (lead-ins) to the high risk facilities. At Y-12, much of the old pipe has been replaced, but several thousand feet of large diameter, original construction cast iron pipe still remain. Of particular concern and challenge is the replacement/repair of the piping sections from the last valve outside the building through the building foundation wall to the connection to the fire protection system inside the building. These remaining building interface sections are cast iron, and the replacement cost and difficulty of performing the necessary construction activities are problematic.

EA identified other deficiencies at each site. At Y-12, storage of combustible liquids exceeded both the quantity to be adequately protected by the existing sprinkler system as analyzed in the safety basis and the limits established by National Fire Protection Association standards. Both Y-12 and Pantex had deficiencies specifically related to fire protection system surveillance testing based on safety performance requirements identified in the safety basis and the FHA. Several surveillance tests had inadequate acceptance criteria that prevented validation of the safety basis performance criteria. Also, at Pantex, the site Fire Department had not demonstrated that they could satisfy a time-based specific administrative control defined in the Technical Specifications Requirements document regarding fire alarm response.

NPO's oversight program is adequate to address the major aspects of the FPPs at Y-12 and Pantex. The

NPO fire protection subject matter experts and Facility Representatives at both sites are active in scheduled assessments and operational awareness activities. However, the sheer number and age of separate fire protection systems at both sites continue to challenge the ability to comprehensively oversee all areas.

Office of Enterprise Assessments Targeted Review of the Fire Protection Program at the Y-12 National Security Complex and Pantex Plant

1.0 PURPOSE

The U.S. Department of Energy (DOE) independent Office of Enterprise Assessments (EA) conducted a targeted review of the Y-12 National Security Complex (Y-12) and Pantex Plant fire protection programs (FPPs). The purpose of the EA targeted review was to evaluate Consolidated Nuclear Security, LLC (CNS) implementation of program requirements and the adequacy of controls designed to reduce the risk resulting from a fire or explosion at nuclear facilities, and the National Nuclear Security Administration (NNSA) Production Office (NPO) oversight of the FPPs. This targeted review was designed to evaluate the selected core fire protection elements and to provide information to the sites and responsible DOE line management organizations for benchmarking their program's effectiveness. This review was conducted 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 onsite portions of this EA targeted review were conducted during September 9-12 and October 20-29, 2014, at Y-12, and January 12-16 and February 2-13, 2015, at Pantex.

Existing EA criteria, review, and approach documents (CRADs) were adapted to establish a focused set of review criteria, activities, and lines of inquiry for the targeted review, in coordination with a facility-specific review plan. This targeted review of the FPPs implemented at the Y-12 9212 Complex and at Pantex Buildings 12-84 (Assembly Bay) and 12-98 (Nuclear Explosive Cell) was designed to evaluate the selected core fire protection elements and to provide information to the site and responsible DOE line management organizations for benchmarking the programs' effectiveness. It is part of a larger set of targeted reviews that are intended to assess the performance and implementation of, and Departmental expectations for, FPPs across the DOE complex.

This report discusses the scope, background, methodology, results, and conclusions of the review. During this review, EA identified 5 findings and 19 opportunities for improvement (OFIs).

2.0 SCOPE

EA's predecessor organization identified fire protection as a targeted review area in 2013. As specified in the plan for the EA targeted review of FPP implementation at the Y-12 National Security Complex and the Pantex Plant, the EA team reviewed and assessed the effectiveness of selected elements of the FPPs implemented by CNS, with specific attention to implementation of selected elements of the FPP at the Y-12 9212 Complex Enriched Uranium Processing and the Pantex 12-98 Cell and Pantex 12-84 Bay buildings.

The evaluated elements of the FPP included program documentation; the authority having jurisdiction (AHJ) determinations and exemption and equivalency processes; baseline needs assessments (BNAs); life safety assessments; pre-incident plans (PIPs); control of ignition sources and combustibles; the fire system impairment process; inspection, testing, and maintenance (ITM) of suppression and alarm systems; and ITM of supporting infrastructure. The review also evaluated integration of the fire hazards analysis (FHA)/documented safety analysis (DSA) and flowdown of the safety basis requirements into the FPP, as well as the CNS self-assessment program and NPO's oversight of the FPP.

3.0 BACKGROUND

CNS manages and operates both the Y-12 and the Pantex Plant under a five-year contract. Before July 2014, Babcox and Wilcox was the prime contractor for both sites. Contract transition was completed on July 1, 2014, when CNS assumed responsibility for operation of both plants. CNS member companies include Bechtel National, Inc., Lockheed Martin, Orbital ATK, and SOC, with Booz Allen Hamilton as a teaming subcontractor.

Oversight of Y-12 and Pantex is the responsibility of NPO. In June 2012, the former Pantex Site Office and Y-12 Site Office were merged into NPO in anticipation of the award of a single management and operating contract for both Pantex and Y-12. The NPO maintains a cadre of staff at both Y-12 and Pantex.

EA's oversight program is designed to enhance DOE safety and security programs by providing DOE and contractor managers, Congress, and other stakeholders with an independent evaluation of the adequacy of DOE policy and requirements and the effectiveness of DOE and contractor line management performance in safety, security, and other critical functions as directed by the Secretary of Energy. The DOE independent oversight program is described in and governed by DOE Order 227.1, *Independent Oversight Program*, and EA implements the program through a comprehensive set of internal protocols, operating practices, inspector guides, and process guides.

4.0 METHODOLOGY

EA reviewed FPP documentation, including the FHA, the safety analysis report (SAR), procedures, and records; conducted interviews with personnel responsible for program implementation and oversight; performed facility and system walkdowns; and observed performance of ITM activities and combustible loading weekly rounds. The review considered the requirements of 10 CFR 830, *Nuclear Safety Management*; 10 CFR 851, *Worker Safety and Health Program*; DOE Order 420.1C, *Facility Safety*; National Fire Protection Association (NFPA) codes and standards; and industry consensus standards.

EA assessed the FPP in five areas: FPP programmatic aspects; fire and related safety hazards analyses; fire prevention and protection structures, systems, and components (SSCs) and controls; FHA/DSA integration; technical safety requirement (TSR) surveillance and testing and ITM; configuration management; the contractor self-assessment program; and NPO line oversight. The assessment of each area used criteria based on program elements from DOE Orders 420.1C and 227.1B.

EA also used the following sections of CRAD 45-34, Revision 1, for the targeted review:

- Section I, Programmatic Elements, FP-1, Program Documentation
- Section I, Programmatic Elements, FP-2, Program Implementation - Fire and Related Safety Hazards and Self Assessments
- Section I, Programmatic Elements, FP-3, Program Implementation - Fire Prevention and Protection
- Section II, FHA/DSA Integration, FP-4
- Section III, Engineered Design Features, FP-5
- Section IV, TSR Surveillance and Testing, FP-6
- Section V, Configuration Management and Control, FP-7.

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

Non-compliances that were identified during the review that did not have a sufficient level of significance to warrant a finding were communicated directly to NPO for resolution through a separate listing.

5.0 RESULTS

5.1 Fire Protection Program

Criterion: *A documented fire protection program (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-1066-12)*

Criterion: *A baseline needs assessment (BNA) of the fire protection and emergency response organization must be conducted and reviewed at least every three years and updated as appropriate. (Note: If no update is necessary, this result must be documented following the review.) The BNA should describe in sufficient detail fire-fighting operations for the respective facilities. (10 CFR 851, DOE Order 420.1C, DOE-STD-1066-12)*

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

Criterion: *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)*

Criterion: *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)*

5.1.1 Program Documentation

Y-12/Pantex (Common)

The FPPs at Pantex and Y-12 provide a level of fire protection consistent with the industrial risks as required by DOE Order 420.1C, *Facility Safety*. The FPPs include those fire protection policies, requirements, technical criteria, FHAs, administrative procedures (APs), and personnel that ensure that DOE objectives relating to fire safety are achieved. The CNS Emergency Services Division facilitates a 24/7 full-service emergency communications center at each site, responsible for monitoring the fire and emergency management systems radio communication and telephone systems, as well as the fire alarm systems. Upon detection of a fire alarm, the Fire Department is dispatched to the alarmed structure for response. On detection of a trouble or supervisory signal, a Fire Department officer is notified to investigate. The programs are characterized by a level of fire protection sufficient to fulfill the requirements for the best protected class of industrial risks ("Highly Protected Risk" or "Improved Risk") as described in DOE Standard (STD) 1066-2012, and protection providing defense-in-depth designed with both active and passive fire protection features.

Y-12

The Y-12 Fire Protection Program Manual (ref. Y-12 *Fire Protection Program Manual*, Y79-001) reflects the requirements of DOE Order 420.1C, *Facility Safety*. The responsibility for the Y-12 FPP resides with the CNS Site Manager of Y-12, who has tasked Safeguards, Security, and Emergency Services with the responsibility for developing the program and assisting with its implementation through various line organizations. CNS line management is responsible for oversight of FPP execution and for adhering to the requirements of the FPP for the facilities and/or operations under its jurisdiction to ensure compliance with DOE-prescribed orders and standards. Line management is responsible for ensuring that the requirements of the FPP are fully implemented.

The Y-12 FPP is implemented through the Fire Protection Standards/Requirements Identification Document (S/RID). The S/RID sub-elements adopt applicable DOE orders and specific NFPA codes and standards. At the time of the EA onsite review, the S/RID process was being replaced such that the requirements will be documented and administered by the new site contractor.

The Y-12 FPP and associated policies and procedures had recently been revised and updated to address many areas, with the goal of maintaining a comprehensive fire safety and emergency response program to protect workers throughout the site commensurate with the nature of the work. In general, the program plan adequately describes the organizational and individual responsibilities. In addition, a mutual aid agreement is established with the City of Oak Ridge through the existing memorandum of understanding with UT-Battelle (at the Oak Ridge National Laboratory) for providing both fire and medical response.

Pantex

The Pantex FPP manual was developed in accordance with applicable Pantex policies and DOE requirements. The manual presents all CNS guidance and requirements pertaining to fire protection as specified in the Pantex *Policy Directive*, DIR-0001. The *Pantex Fire Protection Program Manual*, MNL-00015 reflects the requirements of DOE Order 420.1C, *Facility Safety*, and implements the program requirements through approved Work Instruction (WI) documents that achieve the high level of fire protection necessary to fulfill the requirements for the best-protected class of industrial risks (Highly Protected Risk).

Ultimate responsibility for the FPP plan rests with the CNS General Manager, who has tasked the Engineering Division, System Engineering Department, and FPP with responsibility for developing the program. The FPP manager is the primary person responsible for fire protection related matters within the Pantex Plant (including all subcontractors).

Pantex program documents were being revised during the EA site visit to support the contract transition with CNS assuming responsibility as the prime contractor.

NPO has entered into several memoranda of understanding with offsite organizations and local counties to allow Pantex to request and receive or provide offsite mutual aid for both fire and medical response. The emergency services dispatch program is implemented through PD 02.01.05.04, *Process for Fire Protection Emergency Response*, and the flowdown WIs necessary to meet the applicable NFPA requirements.

Overall, the Pantex FPP and associated policies and procedures are adequate for describing existing organizational and individual FPP responsibilities.

5.1.2 Exemption and Equivalency Process

Y-12

The process for a formal equivalency request or an alternate method of compliance is described in the FPP and resolves non-conformances when compliance with the requirements of non-statutory codes and standards cannot be achieved in the specifically prescribed manner for an issue determined to be more than a minor code deviation. According to the Y-12 FPP manual, the contractor AHJ is responsible for determining the need to process a formal equivalency request for submittal to NNSA NPO.

CNS has identified over 400 fire protection deficiencies, 56 of which are legacy type issues dating from before 2001 that have not been resolved and may require a formal equivalency from NPO. Approximately 70 percent of these items have been evaluated by CNS to be low risk not requiring an equivalency or exemption. NPO had not delegated authority to CNS to approve actions for managing low risk fire protection deficiencies. CNS has submitted a proposed process for managing the non-compliances and determining which ones need NPO approval for resolution. This CNS proposed process was under NPO review. Until the process is approved, the fire protection deficiencies will remain unresolved and tracked as findings through the plant issues management process.

Pantex

Details on how to complete a fire protection equivalency are contained in WI 02.04.02.01.05, *Develop Permanent/Temporary Exemption and Variance Requests.* When compliance deviates from mandatory codes or standards and an alternate method of compliance achieves the desired outcome, the assigned fire protection engineer (FPE) is responsible for preparing an equivalency.

The FPP Manager is responsible for providing equivalency concurrence prior to transmittal to NPO. The contractor has self-identified numerous fire protection issues that have been documented as Engineering Judgments (EJs), many of which have not been evaluated to determine whether an exemption or equivalency is required. The EJs are contained in legacy type documents that are referenced in FHAs. The legacy documents are reviewed during the periodic update of the FHA to identify and properly resolve the EJs, and they are selected and reviewed based on the level of risk associated with the facility. Overall, the process for managing the exemption and equivalency process is adequate, given the expected review and reconciliation of these EJs.

5.1.3 Pre-Fire Plans/Pre-Incident Plans

Y-12

The Y-12 Fire Department is responsible for issuing pre-fire plans (PFPs) in accordance with Y79-54-FDO-028, *Pre-Fire Planning*, dated July 1, 2011. The procedure contains adequate administrative controls to ensure that PFPs are kept current and readily available for reference during Fire Protection Operations (FPO) training and emergency response. The PFP format defined in this procedure applies to current PFP revisions and to new PFPs developed after the implementation of this procedure.

This procedure applies to PFPs developed for specific buildings at Y-12 that require such documentation, as defined in DOE Order 420.1C. The Building 9212 PFP meets all expectations except that it has not been reviewed and/or revised at the required three year intervals.

Pantex

EA reviewed the *Pre-Incident Planning* procedure, PX-AG-008. The procedure contains adequate administrative controls to ensure that PIPs are accurate, current, and readily available for reference during FPO training and emergency response. However, for some PIPs, CNS did not adequately implement the procedure. For example, the PIPs for Buildings 12-84 and 12-98 did not reflect the physical conditions or contain the information required to support a safe and efficient response by the Pantex Fire Department. Specifically, these PIPs did not identify fire rated walls and exits designed with delayed releases as required by PX-AG-008. **(**See **OFI-CNS-PX-01**.)

5.1.4 Control of Combustibles

Y-12

DOE Order 420.1C requires an FPP to include comprehensive, written fire protection criteria or procedures that address use and storage of combustible, flammable, radioactive, and hazardous materials to minimize the risk from fire. DOE-STD-1066-99 reinforces this requirement, stating that a combustible control program is a required element of a FPP and that procedures necessary to implement the established controls shall be developed and documented.

The combustible loading within Building 9212 was acceptable, with one exception. CNS adequately controls the non-sprinklered areas within the southeast portion of the E-Wing basement through quarterly TSR combustible loading surveillances. CNS has also adequately implemented administrative controls for the S110 Exhaust System, due to the absence of sprinkler heads beneath the manifold ductwork. However, EA observed five 55-gallon drums of combustible liquids, two in use and the other three stored in the E-wing basement area, contrary to the Y-12 FPP that allows no more than a 1-day supply of flammable or combustible liquid in approved portable containers to be stored in a single fire area outside an approved storage cabinet. When storage quantities exceed a 1-day supply, the liquids must be stored in an approved flammable liquid cabinet, in a designated flammable liquid storage room or other facility specifically designed and maintained to comply with the applicable requirements of NFPA 30, *Flammable and Combustible Liquids Code*, and 29 CFR 1910.106, *Flammable and Combustible Liquids*.

Although facility management started actions to remove these drums after the onsite portion of this review, the presence of such a significant amount of liquid combustibles indicates that CNS did not adequately implement the combustible control program to minimize the combustible inventory in support of the safety basis analysis. Approximately six months before this review, NPO identified and communicated an issue associated with the staging of the combustible liquids, but CNS had taken no apparent actions to resolve the issue and the potential non-compliance with the Building 9212 safety basis. (See **Finding F-CNS-Y12-01**.)

Pantex

CNS conducts combustible loading dispositions (CLDs) for specific weapons programs and/or facilities that contain nuclear material (i.e., bays and cells, ramps and corridors, and storage facilities) to prevent an unacceptable exposure to thermally sensitive components. These controls are necessary to address facility combustible loading and were established through facility walkdown evaluations and fire modeling. Separation distances have been developed through fire modeling based on the specific fuel packages and existing engineering controls, including automatic fire suppression systems (FSSs) and the potential for exposure to safety related SSCs. Heat release and ignitability categories were established for the various facility fuel packages and are used to determine specific dispositions, including removing or replacing the material, establishing standoff distances, or installing barriers, to manage the risk imposed

by the combustible loading. The CLDs ensure that combustible and flammable material is isolated from activities involving explosives. Adequate controls for areas adjacent to the bays, such as the equipment interlock area between the equipment access blast doors, are described in the shop floor combustible loading document, P7-0040, *Combustible Material Controls*. The fire modeling and risk ranking processes utilized to support implementation of combustible loading controls is noted by the EA review as two best practices.

CNS conducts formal combustibility assessments semi-annually to ensure that these controls are maintained. EA found the combustible loading in the equipment interlock area within the bays to be compliant with P7-0040. Criteria for combustible loading for the interlock areas have been identified, but the operations personnel responsible for these areas have not received adequate formal acceptance criteria to correlate their combustible loading inspection to an amount representative of an Ordinary Hazard Group II hazard when verifying compliance. (See **OFI-CNS-PX-02**.)

5.1.5 Impairments and Compensatory Measures

Y-12

The Y-12 FPP requires facility management to ensure prompt attention to resolving deficiencies that involve impairment of designated passive fire protection features (e.g., fire barriers, fire doors, fire dampers, fire stops, or fireproofing materials), including the potential need for interim compensatory measures. If one or more of the requirements for maintaining a fire barrier is not met, facility management is required to post information at the fire barrier wall, floor, or roof hatch that the required barrier is in a deficient condition, and to ensure that inspection results are entered into the Y-12 system, application, and products (SAP) database.

Neither of these requirements is invoked by facility management procedures. Further, the impairment process lacks consistency. For example, the Emergency Services department has its own manual, *Emergency Services System Operations Work Execution Manual*, Y79-53-ESSO-001, which documents the impairment process. The *Y-12 Fire Protection Program Manual*, Y79-001, provides a general description of how this process is intended to work; however, the EA team observed areas for improvement in implementation, including tracking of impairments. (See **OFI-CNS-Y12-01**.)

CNS has tracked numerous and varied passive fire system deficiencies in the Fire Protection Open Findings list. Deficiencies include fire dampers not being tested, fire dampers requiring access for testing, and fire dampers not installed in ventilation systems. The list is extensive, and although such a list is not required, it lacks some useful information, such as the significance of the deficiencies or whether compensatory measures had been implemented to address the risk. (See **OFI-CNS-Y12-02**.)

Pantex

WI 02.01.05.03.02 establishes measures for the impairment of engineered fire protection systems to define minimum operability, basis, and compensatory actions for nuclear and non- nuclear facilities in accordance with DOE Order 420.1C. The WI applies to facility fire protection engineered systems, including barriers; alarms; notifications; water supply – i.e., sectional post indicator valve (PIV); lead-in PIVs; fire hydrants; and suppression systems. Although the site has a process for prioritizing impairments, EA observed several deficiencies in the implementation of the fire system impairment program and associated WI, including: (See **OFI-CNS-PX-03**.)

- Long-term versus short-term impairments are not defined, and there is no process for prioritizing impairments.

- The Compensatory Measures List and the Impairment List are not aligned. When the two listings were compared, many active fire impairments could not be tracked to a corresponding compensatory measure.
- Active impairments for fire water systems dated back as far as the early 1990s. The information implied that the systems were still providing protection for the respective buildings, but because of the active impairments, they should have been categorized as "out of service" since the systems had been isolated with control valves in the closed position.
- Procedures had not been established to ensure that the Fire Department could quickly recognize which fire hydrants are out of service when initially responding to an alarm condition. The Impairment and Restoration Group is informally marking out-of-service hydrants by bagging them or painting them black.

5.1.6 Fire Alarm Program

Y-12

Under the direction of the FPO Battalion Chief, the fire protection inspectors are dispatched to evaluate fire alarm activations as documented in the *Alarm Room Operations* procedure, Y79-54-FDO-029. This procedure and the response requirements are appropriate for responding to the initial fire alarm. However, requirements for follow-up investigation and performing maintenance do not conform to NFPA 72, *National Fire Alarm and Signaling Code*, requirements. NFPA 72 requires specific response times for investigating supervisory signals, performing maintenance and notifying the AHJ when equipment has been out of service for more than eight hours. However, contrary to NFPA 72, Y-12 has a standing order, SO-Y-12-13-0019, that permits up to 48 hours for initiating corrective maintenance on fire alarm systems. Procedure Y79-54-FDO-029 and Standing Order SO-Y-12-13-0019 do not identify the specific time response requirements for these unique fire alarm signals or reference the applicable NFPA code. (See **OFI-CNS-Y12-03**.)

Pantex

The *Emergency Services Dispatch Center Manual*, MNL-352191, adequately covers fire department response requirements for performing fire impairments, except that it does not identify the response times for investigating supervisory signals, performing maintenance, and notifying the AHJ when equipment has been out of service for more than eight hours. Furthermore, neither the supervisor for special mechanic inspectors nor dispatch personnel were aware of these requirements. (See **OFI-CNS-PX-04**.)

5.1.7 Fire Protection Training

Y-12

NFPA 72, *National Fire Alarm Code*, requires personnel performing ITM services to be adequately trained or certified. EA examined the following NFPA requirements to determine whether personnel performing ITM on fire systems were in compliance:

- Personnel who are factory trained and certified for the specific type and brand of system being serviced
- Personnel who are certified by a nationally recognized certification organization acceptable to the AHJ

- Personnel, either individually or through their affiliation with an organization that is registered, licensed, or certified by a state or local authority to perform service on systems addressed within the scope of this Code
- Personnel who are employed and qualified by an organization listed by a nationally recognized testing laboratory for the servicing of systems within the scope of this Code.

Neither the procedure, *Fire Protection Operations (FPO) Test, Maintenance, and Inspection Role*, nor the Emergency Services Organization *Fire Protection Operations Task-To-Training Matrix* identified these requirements or referenced the applicable NFPA code to demonstrate compliance with these requirements for site personnel. (See **OFI-CNS-Y12-04**.)

Pantex

EA reviewed the training requirements for personnel performing ITM on fire systems. Facility personnel were trained in compliance with NFPA 72 expectations and were factory trained on the fire alarm panels and associated field equipment.

CNS could not provide evidence of any response training for recalling off-duty personnel. The BNA specifies that off-duty personnel are to be called in for Fire Department Support Team activities to support spill response. This requirement applies specifically to a level 3 hazardous material (HAZMAT) or higher event requiring recall of off-duty personnel to supplement on-shift personnel.

5.2 Fire and Related Safety Hazards Analyses

Criterion: *Fire Hazard Analyses (FHA) have been prepared for each nuclear facility and the results coordinated and integrated into the Documented Safety Analysis as required. (DOE Order 420.1C, DOE STD-1066-2012, DOE-HDBK-1163, NFPA 801)*

Criterion: *Fire Hazard Analyses must be reviewed every 3 years by a Fire Protection Engineer and revised as appropriate. (Note: If no revision is necessary, this result must be documented following the review.) (DOE Order 420.1C)*

Criterion: *Fire and related safety hazards on site (or within the facility) have been identified and evaluated in conjunction with a current and comprehensive FHA. (DOE Order 420.1C)*

Criterion: *The FHA and self-assessments address all essential elements for a complete analysis as delineated in DOE Order 420.1 and its implementation guide. (DOE Order 420.1C)*

Criterion: *The information contained in the FHA and assessment is accurate, as required by applicable fire safety criteria. (DOE Order 420.1C)*

Y-12 Building 9212

EA reviewed the FHA for the Building 9212 complex. In general, this FHA comprehensively and qualitatively describes the facility operations, identifies the fire hazards, assesses the risk from fire within individual fire areas in the facility, concisely describes building construction, and identifies fire rated area separations. The FHA complies with the requirements of Y-12 procedure Y17-008, *Fire Hazards Analyses*, dated August 11, 2014. However, EA identified the following problems with regard to the FHA:

- The update methodology prescribed by Y17-008 permits updating using the design change notice (DCN) process, resulting in a significant number of DCNs that could lead to confusion in understanding the FHA. Since the FHA has not been revised since 2011, numerous DCNs have accumulated and are attached to the back end of the FHA; however, FHA page replacements are not attached, so the actual changes to the FHA cannot be easily identified. DOE-STD-1066 requires that the FHA be reviewed and updated as necessary, in conjunction with the annual safety basis documentation updates or during the facility fire protection assessment. NPO previously identified this issue. (See **OFI-CNS-Y12-05**.)

- Some areas of 9212 are not provided with sprinkler systems, but the FHA takes credit for travel distances for a fully sprinklered building that are invoked through NFPA 101, *Life Safety Code*.

- The FHA evaluated combustible materials and potential ignition sources for all the Building 9212 wings. The maximum possible fire loss (MPFL) was evaluated for each wing on the assumption that there is no automatic or manual fire suppression. The most limiting MPFL for the 9212 Complex was $40 million in wing B-1 and C-1, as documented in FHA Section 15.1. This monetary fire loss is low and is not substantiated by detailed analysis. Further, there is no evidence that the cost of mission interruption, cleanup, and decontamination was considered in the analysis. (See **OFI-CNS-Y12-06**.)

Pantex

EA reviewed the FHA for the assembly bays in Building 12-84, *FHA-12084*, and the cells in Building 12-98, *FHA-12098*. In general, the facility FHAs are comprehensive, describe the facility operations, identify the fire hazards, and assess the risk from various fire scenarios.

5.3 Fire Prevention and Protection SSCs and Controls

Criterion: *A complete spectrum of fire prevention controls and procedures are in existence and have been implemented as required by applicable fire safety criteria. (DOE Order 420.1c, Site & Facility DSA)*

Criterion: *Technical, functional, and performance requirements for the systems are specified in (or referenced in) the facility authorization basis documents consistent with the facility fire hazards analysis. Safety/authorization basis documents identify and describe the system safety functions, and these criteria are translated into design calculations and procedures.*

Criterion: *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 authorization basis documents and fire hazards analyses, have been installed and are tested and maintained, as required by applicable fire safety criteria. (DOE Order 420.1C, Site & Facility DSA)*

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

Criterion: *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)*

Criterion*: Items and processes are designed using sound engineering/scientific principles and appropriate standards.*

5.3.1 Fire Protection Controls Implementation

Y-12

EA reviewed fire protection systems at the 9212 Complex to confirm, in part, that they are appropriate for the facility fire scenarios identified in the FHA and the safety basis; that they are designed and installed compliant with the required codes and standards; and that an appropriate ITM program for fire protection features is in place and is being conducted. In the most cases, the systems are adequately designed, installed, maintained, and tested. However, EA identified a few inadequacies:

- Hydraulic calculation DAC-FPD-921200-A004, Rev C, covering riser 9, uses an incorrect, non-conservative k value for sprinkler heads (5.8 versus 5.6). Although the k value calculation input is non-conservative, the resulting water flowrate deviation was not significant and still complies with the hazard rating and respective water demand. (See **OFI-CNS-Y12-07**.)

- Containment of potentially contaminated sprinkler water as required by NFPA 801 and DOE-STD-1066 is inadequate. Liquid runoff from sprinklers and Fire Department hose streams for fires requiring large volumes of water would likely flow to the outside of the building and into the storm sewer system, and eventually to East Fork Poplar Creek and Lake Reality. Even though there is no containment of runoff local to the facility, the water flowing into Lake Reality would be sampled to ensure that all applicable environmental guidelines were met before being released off site.

- EA reviewed the fire alarm upgrade project documentation for Building 9212. The fire alarm systems were being upgraded since components of the old fire alarm system installed in the 1990s were obsolete. The new scope of work conflicted with earlier project descriptions (ref. *System Requirements Document for Y-12 Plant Fire Detection and Alarm System*, Y/EN-4716) and did not address the non-compliant building occupant notification system. Before the upgrade, the facility had a means of manually notifying facility occupants. The project's decision to omit building notification devices was not documented, and no exemption or equivalency exists. This condition is contrary to the requirements of NFPA 72, which requires all new fire alarm systems and additions or alterations to existing systems to include a completed record-of-completion form.

Pantex

EA reviewed fire protection systems at the Pantex complex to confirm, in part, that they are appropriate for the facility fire scenarios identified in the FHA and the safety basis; that they are designed and installed compliant with the required codes and standards; and that an appropriate ITM program for fire protection features is in place and is being conducted. In the most cases, the systems are adequately designed, installed, maintained, and tested.

However, EA identified a deficiency with respect to operator rounds. Specifically, Pantex has established weekly operator rounds at the high pressure fire loop (HPFL) pump houses to verify that the pump house temperature is at or above 40 degrees. The electric heaters in the HPFL pump houses are provided with non-safety electric power, and the heaters are undersized; they are needed for freeze protection, particularly for the small water lines used to sense the pressure drop in the HPFL and automatically start the fire pumps. The basis for the frequency of rounds has not been documented to account for the deficiencies in the pump house building heating system. Based on these deficiencies and the potential for cold weather, the pump room temperature may drop low enough to freeze the small diameter pressure

sensing lines long before a weekly operator round would detect it, potentially preventing the diesel driven fire pump from starting. This condition may be a common mode failure in both pump houses. No analysis was performed to verify that weekly rounds are adequate to address freeze protection of small sensing lines. DOE-STD-3009, Section 4.4 (and DOE-STD-1021, Section 2.3 (a) (b) (c)) expects that any SSC needed to ensure the availability of a preventive or mitigative feature of safety class or safety significant SSC shall be likewise classified. The DSA has not evaluated this potential failure mode of the diesel driven fire pump. As a result of this issue, Pantex has generated operational procedure changes for operator rounds, and DSA changes are in progress. (See **Finding F-CNS-PX-01**.)

5.3.2 Infrastructure Water Supply

Y-12

The water supply system and associated ITM has improved considerably since the previous DOE independent oversight assessment in fiscal year (FY) 2008. New water tanks and a significant amount of underground piping have been installed to replace aged cast iron piping in the main water supply grid. From a physical design perspective, the Y-12 potable water supply system provides potable process water as well as facility fire suppression water through an extensive grid that provides at least two independent flow paths from two elevated storage tanks, meeting the design configuration criteria of DOE-STD-1066. Throughout the grid, the system is provided with sectional control valves consisting primarily of PIVs, wall valves, and outside screw and yoke type valves. The sectional control valves in the grid consist of underground box valves that are not currently locked or supervised.

The potable water upgrade project completed in 2010 replaced much of the cast iron piping on the main grid; however, several thousand feet of large diameter, original construction cast iron pipe remain in the grid itself. Additionally, these projects did not attempt to replace the building interface sections – that is, the piping from the last valve outside the building (PIV) through the building foundation wall to where the connection is made to the particular system inside the building. The remaining building interface laterals are cast iron, and the replacement cost and difficulty of performing the necessary construction activities are problematic. Although it is not unusual for cast iron pipes to last for many years, cast iron has always been susceptible to failure caused by ground settlement, improper installation, and internal and external corrosion. Cast iron pipe statistically has a failure rate greater than four times that of ductile iron pipe.

Several cast iron piping breaks in the recent past involved the lateral piping into the facility and resulted in significant flooding, including a supply pipe failure at Building 9201-1. Based on Report RP-900009-0072-000-0 dated December 2013, *Replacing the Remaining Cast Iron Piping in the Y-12 Potable Water Grid*, cast iron pipe excavated from a 2008 break in the lateral feeding the 9201-1 facility showed severe signs of external corrosion and pitting, as well as quarter-sized holes in the wall of the recovered pipe.

Similarly configured cast iron piping supplying other facilities could result in similar failure modes and flooding. The same report identifies locations of cast iron lateral piping and ranks them according to risk of failure. The facilities identified as having the highest risk are 9212, 9215, and 9204-2E. DOE independent oversight had identified the potential failure possibility and consequences prior to the 9201-1 failure in 2008. Although the report was comprehensive and identified the scope and cost impact, there have been no formal plans to replace the high-risk piping because the effort was not funded as part of the FY 2017 projected budget. However, an $8 million project to re-line some infrastructure piping was prioritized. (See **OFI-CNS-Y12-08**.)

Additionally, in early 2014, Babcock & Wilcox Technical Services Y-12, LLC (the contractor at the time) performed an independent evaluation (RP-YAREA-F-0314) to specifically review and evaluate portions

of the Y-12 water supply system that feed credited fire protection systems in Y-12 nuclear facilities against the ITM requirements specified in NFPA 25. The results of the review indicated that in 16 locations, the water supply for credited sprinkler systems could inadvertently be shut off manually at an unsupervised valve without the facilities' knowledge and without visual or audible indication of such condition (so-called single-point-failure valves). Fifteen of these valves are accessible; the one that is not has a large concrete barricade on top of the valve location. The report recommended new surveillances for these valves to ensure operability of the credited sprinkler systems. The analysis considered valves located upstream from the primary valve; in many cases the primary valve was the facility PIV. Additional valves present on a given water supply line are designated as secondary, tertiary, and quaternary valves. Results of this evaluation identified the existence of 19 single-point-failure valves located upstream of locked and supervised valves. A total of 25 credited sprinkler systems are affected by the 16 single-point-failure valves. No credited systems were identified that did not have at least two supply flow paths upstream of the quaternary valve.

The piping grid physical design configuration is generally acceptable, but the aged cast iron piping continues to present a vulnerability. (See **OFI-CNS-Y12-08**.)

Pantex

The HPFL water supply system consists of four pump houses and their corresponding fire pumps and water tanks. Two of the pump houses were recently added. The HPFL system is generally well designed with respect to its normal and accident operating functions, largely due to its inherent redundancy and looped grid architecture. However, because the underground piping is fragile and degraded (as indicated by excessive leakage due to piping wall thinning and pitting failures), an aggressive pipe replacement and upgrade project is being implemented. The HPFL distribution pipe is largely ductile iron and cast iron pipe, and its failure history and pipe inspections indicate that electrolytic corrosion has accelerated the aging of the pipe, leading to repeated failure; the underground ferrous piping develops leaks due to the aggressive external soil corrosion. The current underground piping consists largely of cement-lined, pressure Class 350 ductile cast iron pipe with mechanical joint fittings, or pressure class 200 high density polyethylene (HDPE) pipe buried to a depth of at least four feet. Upgrades to the underground piping include installing cathodic protection on the ferrous sections of the HPFL as resources are allotted, and replacing the leaking ferrous piping sections with HDPE piping.

The condition and reliability of the HPFL have improved considerably due to the pipe replacement and upgrade project. This project proactively addresses the piping that poses the greatest vulnerability to facilities from a safety basis standpoint. However, despite the ongoing piping replacements, CNS has identified the following items that affect the reliability: (See **OFI-CNS-PX-05**.)

- Some lead-ins for the nuclear facilities still have not been replaced.
- Most of the piping for the non-nuclear facilities has not been replaced and is still largely cast iron pipe. Failures still result from accelerated aging due to electrolytic corrosion.
- Flow measurements are not performed on the HPFL pumps or discharges from the pump facilities.
- Fire pumps are not routinely assessed for vibration through a formal program that would enhance system operability and diagnose failure probability.

5.4 FHA/DSA Integration

Criterion: *Within the scope of the review, the FHA conclusions shall be incorporated into the safety authorization (preliminary safety design review, preliminary DSA, or DSA, as appropriate) and*

demonstrate the adequacy of controls provided by the system to eliminate, limit, or mitigate identified hazards, and define the process for maintaining the controls and controlling their use. (DOE Order 420.1C, DOE-STD-1066-12)

Criterion: *The safety authorization basis is consistent with the fire hazards analysis; demonstrates the adequacy of controls provided by the system to eliminate, limit, or mitigate identified hazards; and defines the processes for maintaining the controls current at all times and controlling their use. (DOE-STD-1066-12, Site and Facility DSA)*

EA reviewed the facility fire hazards and fire scenarios identified in both the Y-12 and the Pantex FHAs and determined that they were consistent and appropriately integrated into the corresponding safety basis documents. In addition, the FHAs and DSAs appropriately identify and describe the fire protection systems, controls, and facility-specific areas and consistently identify the combustible loading, both in situ and transient.

Neither site has a formalized process of integration through a controlled procedure; however, the changes and updates to the FHAs are evaluated through the unreviewed safety question (USQ) process, resulting in maintaining the integration of the FHA conclusions with the DSA. As part of the USQ process, cross-disciplinary reviews are performed by individuals who do not have direct responsibility for processing changes. Comments and questions generated during the review process are resolved with the originating organizations.

The USQ process has been appropriately used as the means to ensure adequate integration between the safety basis and the FHAs being prepared and implemented by the fire protection engineering organization. Furthermore, the change control process is integrated with the USQ process at both sites to ensure that all proposed changes are appropriately evaluated against the DOE approved safety basis and that all credited fire hazard controls remain consistent with approved configuration management documentation.

5.5 TSR Surveillance and Testing and ITM

Criterion: *Surveillance and testing of the system demonstrates that the system is capable of accomplishing its safety functions and continues to meet applicable system requirements and performance criteria.*

Criterion: *Surveillance and test procedures confirm that key operating parameters for the overall system and its major components remain within safety basis, NFPA, and applicable consensus standards operating limits.*

Criterion: *The acceptance criteria from the surveillance tests used to confirm system operability are consistent with the safety basis.*

Criterion: *Instrumentation and test equipment for the system are calibrated and maintained.*

5.5.1 Surveillances and Technical Bases of Fire Suppression Systems

TSR surveillance testing procedures were reviewed at both Y-12 and Pantex to ensure that all SSCs credited in the safety basis to perform a safety function were appropriately required to demonstrate the credited safety function and meet appropriate, documented performance acceptance criteria. For the most part, the demonstration of operability of fire protection safety systems was translated to the facility TSR surveillance testing procedures, and the TSRs generally showed that safety FSS systems and components

were tested and inspected on an acceptable schedule. However, EA identified inadequacies in the implementation of fire protection surveillance testing requirements, including several that could adversely affect water supply to the safety FSSs. The inadequacies were generally in the execution of the TSR surveillance testing procedures or in the surveillance testing procedures and surveillance test acceptance criteria.

At both sites, EA observed evidence of preconditioning during TSR surveillance testing. One of the purposes of TSR surveillance testing and inspections is to determine whether equipment would perform as required under design basis accident conditions. Such conditions must be simulated, to the extent practicable, with testing/inspection in the as-found condition, to ensure valid demonstration of operability. Testing in as-found conditions is important to determine whether such equipment might be degraded and prevent the equipment from performing its safety function in an accident condition, so that corrective actions can be taken to restore the required assurance. Procedures that include warmups, adjustments, and other departures from as-found conditions (commonly termed preconditioning) can invalidate such testing and inspections and thus are generally unacceptable for the intended purpose. However, if the NFPA-required inspections are the basis for the surveillance procedure's acceptance criteria, an evaluation for preconditioning should have been conducted to ensure that the reliability of the safety SSC is maintained and that the safety function is demonstrated in an as-found condition. The commercial nuclear industry has recognized this issue and has provided guidance (ref: Nuclear Regulatory Commission Information Notice 97-16).

Y-12

For a dry pipe riser valve actuation surveillance test to demonstrate that water flowed at the inspectors test valve in the required time, the surveillance procedure required the main drain valve to be opened to flush sediment from the system before the test. Although opening the main drain valve to remove sediment is an appropriate routine maintenance activity consistent with NFPA 25, it results in preconditioning the system from a nuclear safety standpoint and thus prevents performance of the surveillance test in an as-found condition. (See **OFI-CNS-Y12-09**.)

Pantex

The main drain water flow test is performed annually to ensure that there is no reduction in water flow through the system. Procedures for performing this surveillance test incorporate numerous preventive maintenance activities before completing the test, including quickly opening and closing the main drain valve. The sequence of procedure activities performed before the main drain test prevents conduct of the TSR surveillance test in an as-found condition. (See **OFI-CNS-PX-06**.)

Y-12/Pantex (Common)

At both sites, many routine, NFPA-required inspection and maintenance activities are incorporated into the TSR surveillance testing requirement procedure, thereby preconditioning the SSC so the test cannot demonstrate the safety function in an as-found condition. Procedure steps were identified by "In Service Inspection" and "Surveillance Requirement" performance acceptance criteria. Performance acceptance criteria are identified in the safety basis and are demonstrated by the TSR surveillance testing. Both Y-12 and Pantex include many non-safety basis related ITM activities, thereby introducing the potential for improperly performing the safety-related intent of the TSR surveillance procedure. (See **OFI-CNS-Y12-09, OFI-CNS-PX-06**.)

5.5.2 Inadequate Acceptance Criteria and Surveillance Frequency

EA observed several TSR surveillance procedure deficiencies, including incorrect, inadequate, or no acceptance criteria, or unclear acceptance criteria relative to an SSC required operability or functional condition.

Y-12

The TSR surveillance procedure acceptance criteria for the 9212 Dry Pipe Sprinkler System 005 Three Year Valve Trip Test permits too much time for alarm valve actuation and detection of flow at the inspectors test valve. The test considers a 180 second elapsed time before the system alarm valve trips to be acceptable, and water flow at the inspectors test valve at 300 seconds to be acceptable. However, no analysis was performed to demonstrate that the 300 seconds water flow is an acceptable timeframe to contain fire spread, as required by the safety basis. Additionally, from a system design perspective, NFPA 13 Section 7.2.3.6.1 requires that the maximum time of water delivery not exceed 60 seconds for a newly installed system. Additionally, NFPA 25 requires that the time duration be compared to previous tests for trending and indication of degradation, but Y-12 has no site requirement or procedure that requires trending of past performance. (See **OFI-CNS-Y12-10**.)

The backflow preventer surveillance test to verify forward flow for FSS System 007 does not document the flowrate that is used to determine the appropriate acceptance criteria for the test. The vendor provided a data sheet showing the pressure drop versus flowrate through the backflow preventer, and this data sheet is the basis for the TSR acceptance criteria. However, the backflow preventer surveillance test bases its acceptance criteria on calculation DAC-FPD-900009-A002, which was derived for one specific flowrate. The acceptance criteria must be extrapolated from the vendor's curve for the measured flowrate during the surveillance test. (See **OFI-CNS-Y12-11**.)

Pantex

Surveillance Requirement (SR) 4.4.4.2 requires that the pump house temperature be maintained above 40 degrees F and that it is checked weekly during cold weather in order to prevent freezing of water piping, specifically the small water lines used to sense the pressure drop in the HPFL and automatically start the fire pumps. If the pressure sensing lines were to freeze, the safety class fire pumps would not start on an HPFL low water pressure condition. As discussed in Section 5.3.1, there is no formal justification for Pantex's practice of conducting temperature monitoring on a weekly basis, and no analysis has established how long the small water lines would take to freeze. As a result of this issue, NPO took immediate action to formally request CNS to evaluate this issue for a potential inadequacy in the DSA. CNS has established compensatory measures and plans to take further actions to establish the basis for the appropriate surveillance periodicity. (See **Finding F-CNS-PX-01**.)

A deluge full flow test performed every three years is intended to satisfy the operability criteria (ref. SR 4.4.2.9) of an unobstructed flow path from the deluge valve to the nozzle. The minimum actuation time of the deluge system (system evaluation acceptance criteria) identified in Chapter 4 of the DSA was not included in the TSR, the TSR bases, or the TSR surveillance procedure, *TP-MN-06422, Fire Protection Systems Two UVS in Alarm Deluge Systems, Flow Test*. The completed test did not record the needed data to address the criteria in the TSR; therefore, the current procedure does not satisfy the intent of the surveillance requirement. (See **Finding F-CNS-PX-02**.)

The *Technical Safety Requirements for Pantex Facilities*, RPT-SAR-199801, contains specific administrative control (SAC) 5.7.33.1, which requires the Fire Department to respond to bay and cell facilities within a minimum of 60 minutes and establish water flow or attempt to suppress the fire, if an

FSS is not flowing water. Similarly, the BNA requires the deployment of two charged hose lines and flow of a least 300 gal/min within any fire area of any site facility within 60 minutes of initial receipt of alarm. The DSA Chapter 4 evaluation for the SAC specifies that APs will ensure implementation; however, CNS has not implemented a process to demonstrate these performance criteria. (See **Finding F-CNS-PX-03**.)

5.6 Configuration Management

Criterion: *The configuration management process adequately integrates the elements of system requirements and performance criteria, system assessments, change control, work control, and documentation control, as required by DOE Order 420.1C.*

Criterion: *Configuration management is used to develop and maintain consistency among system requirements and performance criteria, documentation, and physical configuration for the systems, structures and components (SSCs) within the scope of the program.*

Criterion: *System design basis documentation and supporting documents are kept current using formal change control and work control processes.*

Criterion: *Changes to system requirements, documents, and installed components are formally designed, reviewed, approved, implemented, tested, and documented.*

Y-12

Overall, EA observed, through review of technical drawings and procedures, that the configuration management program is being maintained and reflects the field conditions for the fire protection SSCs. There were isolated instances of discrepant information, including inconsistencies among safety basis and supporting technical documents, indicating weaknesses in configuration control. For example, various facility documents, such as the DSA, FHA, and system controlled drawings, have conflicting operational status information regarding the excess pressure pumps. The operational status is not clear for the excess pressure pumps installed on fire protection system risers, which were installed to eliminate nuisance alarms from pressure surges from the infrastructure water supply; the DSA states that only systems #6 and #7 have excess pressure pumps, whereas the FPE stated that only system #3 has an operable excess pressure pump. Furthermore, Facility Operations informed EA that no excess pressure pumps were powered or operable, even though EA noted, during the facility walkdown of system #9, that the excess pressure pump was actuated during a main drain valve surveillance test. In addition, the excess pressure pumps were not identified as “out of service” on engineering riser drawings (ref. W003 riser drawing).

Pantex

EA observed documents that did not contain accurate information that fully describes important information or were inconsistent related to safety related SSCs so that a full understanding of safety SSC functions and specifications could be known. For example:

- In one case, the Design Information Summary (DIS) (ref. Fire Alarm System and the Fire Receiving Station, DIS-017) did not match the safety designations for equipment with the sitewide SAR and TSR for safety class equipment relating to the Fire Alarm Receiving Station (FARS). Specifically, the SAR did not document the contribution of a FARS signal to the credited controls specified in the SAR. The *Technical Safety Requirements for Pantex Facilities,* RPT-SAR-199801, designates the HPFL water level alarm indicator as the only safety class signal being sent to the FARS. The DIS-

017, Fire Alarm & Detection System Logic Diagram (ref. Figure 21) indicates that the Pump Room Temperature Monitor Point is also safety class.

- EA reviewed DCP 1100173 and the associated USQ determination (USQD) that added two new pump houses, Buildings 15-33A and 15-34A, and their associated pumps and water storage tanks. Two diesel driven pumps are located in Building 15-34A along with a jockey pump, while one diesel driven pump and one electric motor driven test pump and jockey pump are located in Building 15-33A. All pumps are used to provide water to the HPFL; however, the safety basis credits only the diesel driven pumps to auto-start at a predefined low pressure set point to provide water to the HPFL during a design basis fire scenario. One element of the pump house and tank modification was the installation of an electric motor driven test pump in Pump House 15-33A. Its purpose is to allow various system flow tests to be performed without unnecessary wear and challenges to the new safety class, diesel-driven fire pumps due to repetitive random auto-starts due to system testing. The test pump is part of the HPFL pressure boundary, and it's only credited safety function is to provide a safety class pressure boundary. However, the USQD does not specifically mention this pump, and CNS has not revised the DSA, FHA, or DIS to describe this pump and the associated safety-related components. Further, following completion of the HPFL pump house and tank modification, CNS modified the test pump impeller to address concerns about excessive pump discharge pressure to the HPFL. Although the pump is part of the safety class pressure boundary of the fire protection system, there is no evidence that CNS performed a USQD on this impeller modification or updated the appropriate configuration documentation. (See **OFI-CNS-PX-07**.)

- The Pantex sitewide SAR identifies the signal for the tank water level as a safety class control. However, the portions of the FARS that transmit, receive, and annunciate the tank level signal are not classified as safety class SSCs. (See **Finding F-CNS-PX-04**.) The FARS functional and performance attributes are not referenced in the TSRs for Pantex facilities, RPT-SAR-199801, and FARS is not maintained in accordance with NFPA 72, *National Fire Alarm and Signaling Code*, and NFPA 111, *Stored Electrical Energy Emergency and Standby Power*.

5.7 Contractor Self-Assessment Program

Criterion: *A documented comprehensive self-assessment of the fire protection program is performed by the DOE site office and the facility contractor at least every 3 years, or at a frequency with appropriate justification approved by the DOE head of field element. (DOE Order 420.1B)*

Criterion: *Proper controls are incorporated to prioritize and monitor the status of the fire protection assessments and associated findings until final resolution.*

Criterion: *Processes are developed and implemented that prioritizes and monitor the status of fire protection assessment findings, recommendations, and corrective actions until final resolution. [DOE Order 420.1B, CRD* [Contractor Requirements Document], *Chapter II, 3.b(15)]*

Criterion: *Program issues identified during previous assessments or program reviews have been appropriately resolved, corrective actions have been completed, and are adequate, or a clear path to completion is indicated. [DOE Order 226.1B]*

CNS's assessment of the FPP meets the triennial program assessment requirement of DOE Order 420.1B. The FPE assessments are generally performed well and identify many significant issues and areas for improvement. Identified issues are included in the CNS tracking system and are evaluated to prevent recurrence. Competent and knowledgeable personnel performed the assessments using appropriate review criteria with sufficient rigor and depth. The assessment team members are technically qualified,

and they demonstrated familiarity with their facilities, specifically the fire suppression and water supply systems. In a few cases, the assessment scope was very well defined and included follow-up on prior assessment findings and reviews. The assessments included appropriate performance-based elements, such as walkdowns of portions of assessed systems and components, reviews of as-built drawings, interviews with engineering and operations personnel, review of surveillance test results, and review of design modification packages.

5.8 NPO Line Oversight

Criteria: *Effective oversight processes have been established and implemented with respect to fire protection program implementation.*

Criterion: *DOE field element line management has established and implemented oversight processes that evaluate contractor and DOE programs and management systems, including site assurance systems, for effectiveness of performance (including compliance with requirements). [DOE Order 226.1B 4b (1)]*

Criterion: *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)]*

Criterion: *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)]*

Criterion: *DOE field element staff are adequately trained and qualified to perform assigned oversight activities. (DOE Order 226.1B, DOE Order 360.1C, and DOE Order 426.1 chg 1)*

The NPO management processes to implement line oversight are defined in NPO Procedure NPO-3.4.1.1, *NPO Oversight Process*. The NPO approach to line oversight is risk informed through feedback from the evaluation of identified issues and review of the contractor assurance system. NPO's approach includes both formal assessments and operational awareness activities.

The NPO Functions, Responsibility, and Authorities Manual identifies the Assistant Manager for Environmental, Safety, Health, and Quality (AMESH&Q) as the lead organization responsible for line oversight of the FPP. The AMESH&Q has designated an NPO staff member as the NPO FPP subject matter expert (SME) and has assigned this individual the responsibility for line oversight of FPP implementation. The NPO FPP SME's education is in the area of fire protection engineering; he has completed the DOE technical qualification requirements for the assigned position and has multiple years of experience conducting FPP oversight at NPO.

The FPP SME works collaboratively with other Assistant Manager organizations to evaluate the contractor's FPP implementation at both sites through participation in formal assessments. The NPO FPP SME participated in a Y-12 annual integrated assessment with the nuclear safety specialists and safety system oversight personnel, providing a holistic review of FPP implementation that included both the engineered safety systems and the programmatic requirements. EA found that the most recently completed integrated assessment was of acceptable quality and contained formal review criteria that were addressed through both documentation reviews and observations of field activities.

In addition to the formal integrated assessments, the NPO FPP SME and Facility Representatives conduct operational awareness activities of FPP implementation, and the results are documented in operational awareness reports and Facility Representative "quick check" forms. Furthermore, the FPP SME reviews

the results from the Facility Representatives' operational awareness activities and discusses any identified issues with CNS personnel during interface meetings with the fire protection staff – biweekly at Y-12 and monthly at Pantex. EA noted the field presence of the FPP SME on several occasions at both sites during this review.

NPO has implemented an issues management system to ensure resolution of identified issues and is actively addressing a self-identified concern that the NPO issue management system is inadequate to effectively manage Federal and CNS issues at the two sites. NPO has completed initial corrective actions to implement a new issues management procedure to address this concern. Furthermore, the current NPO issues management process is not ideal for communicating issues across the NPO organization. To allow for a more robust resolution of issues and the identification of cross-cutting issues, NPO has implemented appropriate additional corrective actions, such as the integrated weekly operations call to discuss/review issues with staff and NPO senior management.

NPO is conducting sufficient oversight activities to evaluate multiple elements of FPP implementation. The NPO environment, safety, and health fire protection SMEs are actively involved in conducting oversight of the FPP at both sites. These SMEs evaluate identified deficiencies and routinely discuss areas of concern with CNS. For example, at Pantex, NPO oversight has resulted in a key initiative to focus additional CNS resources on developing fire protection metrics to monitor the system health of the aging Pantex fire protection systems. Efforts to identify and implement fire protection metrics were ongoing at the time of this review.

At Y-12, CNS (and its predecessor) identified approximately 400 low-risk non-compliances with NFPA expectations across the Y-12 facilities over the last few years, but NPO's assistance in resolving these non-compliances has been slow. CNS has proposed a process for managing the non-compliances and determining which ones need NPO approval for resolution. NPO was reviewing this process at the time of this EA review.

6.0 CONCLUSIONS

In most cases, the Y-12 and Pantex contractor, CNS, has effectively established and implemented fire protection controls for reducing the risk associated with fire. The FPEs and safety basis personnel were knowledgeable of the FPP and the supporting fire systems design and exhibited a high level of knowledge regarding the inherent fire hazards of the facilities. EA also noted two best practices which were related to fire modeling and a risk ranking process directly related to combustible loading.

The most significant issue in fire protection at both sites is age-related degradation of the underground infrastructure piping supplying fire protection systems. CNS has taken deliberate steps to address the fire loop systems, but they fall short of a systematic health and wellness approach addressing current, near term, and future project commitments that would fully resolve the fire protection supply system vulnerabilities. CNS is addressing these issues, as well as the adequacy of the design and physical condition of water supply piping of the fire supply water and suppression systems. At Pantex, CNS is replacing the underground entrance piping (lead-ins) to the high risk facilities. At Y-12, much of the old pipe has been replaced, but several thousand feet of large diameter, original construction cast iron pipe still remain. Of particular concern are the piping sections from the last valve outside the building through the building foundation wall to where the connection is made to the fire protection system inside the building. These remaining building interface sections are cast iron, and the replacement cost and difficulty of performing the necessary construction activities are problematic.

EA observed other weaknesses at both sites. At Y-12, storage of combustible liquids significantly exceeded the quantity assumed in the safety basis (which establishes the performance requirements of the FSS), and the quantity of combustibles also exceeded NFPA and the FPP limits. Both Y-12 and Pantex had deficiencies specifically related to surveillance testing intended to demonstrate fire protection systems safety performance requirements identified in the safety basis and the FHA. Several TSR surveillance test procedures have inadequate acceptance criteria that prevent validation of the safety basis performance criteria. Also, at Pantex, the site Fire Department has not demonstrated the ability to comply with a time-based SAC.

NPO has an adequate oversight program that addresses the major aspects of the FPPs at Y-12 and Pantex. The NPO fire protection SME and Facility Representatives at both sites are active in scheduled assessments and operational awareness activities. However, the sheer number and age of separate fire protection systems at both sites continue to challenge the ability to comprehensively oversee all areas.

7.0 FINDINGS

As defined in DOE Order 227.1 *Independent Oversight Program*, findings are significant deficiencies or safety issues 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. Findings may identify aspects of a program that do not meet the intent of DOE policy, DOE orders, or Federal regulations. Corrective action plans must be developed and implemented for EA appraisal findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 227.1 to manage these corrective action plans and track them to completion.

NPO

None

CNS-Y-12

Finding F-CNS-Y12-01: Contrary to NFPA 30, *Flammable and Combustible Liquids Code*; 29 CFR 1910.106, *Flammable and Combustible Liquids*; and Y-12 FPP combustible control requirements, CNS has not adequately implemented the combustible control program to ensure that the combustible inventory is minimized to comply with the credited FSS functional requirements specified in the safety basis analysis for the E-wing basement.

CNS-Pantex

Finding F-CNS-PX-01: Contrary to requirements found in 10 CFR 830 and DOE Guide 423.1-1B, there is no basis for the frequency of TSR surveillance rounds to ensure that the building temperature in the HPFL pump houses is adequate to prevent freezing of the small diameter water sensing line that provides the HPFL low system pressure input for the safety class diesel fire pump auto-start signal.

Finding F-CNS-PX-02: The deluge system full flow test (ref. SR 4.4.2.9) intended to verify an unobstructed flow path from the deluge valve to the sprinkler nozzles did not include or refer to the acceptance criteria for the minimum required actuation time of the deluge system, as determined by the engineering evaluation, *Deluge Fire System Response*, EE-12-008 and the sitewide SAR Section 3.4.A.1.2.3 (ref. AB-SAR-314353).

Finding F-CNS-PX-03: CNS has not demonstrated compliance with SAC 5.7.33.1.

Finding F-CNS-PX-04: Chapter 4 of the sitewide SAR did not include a system evaluation to determine the proper safety designation of the FARS, even though the system supports the electronic processing and annunciation of the safety class tank level signal credited in the sitewide SAR.

8.0 OPPORTUNITIES FOR IMPROVEMENT

This EA review identified the following OFIs. These potential enhancements 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 minor issues identified during the conduct of the review. In some cases, OFIs address areas where program or process improvements can be achieved through minimal effort. It is anticipated that these OFIs will be evaluated by the responsible line management organizations and accepted, rejected, or modified as appropriate, in accordance with site-specific program objectives and priorities.

NPO

None

CNS-Y-12

OFI-CNS-Y12-01: Consider improving the implementation process for fire system impairments to ensure that facility management responsibilities related to fire system impairments include prompt attention to resolution of deficiencies, posting information at fire barrier walls, entering inspection results into SAP, and tracking deficiencies.

OFI-Y12-CNS-02: Consider updating the fire system deficiencies and compensatory measures in the fire protection open findings list. This list should clearly identify the significance of the listed deficiencies and the status of compensatory measures implemented to address the facility risk associated with fire system impairments.

OFI-CNS-Y12-03: Consider revising the Alarm Room Operations procedure, Y79-54-FDO-029, to include all applicable NFPA 72, *National Fire Alarm and Signaling Code*, requirements. Ensure that the procedure includes the correct response times for investigating supervisory signals, initiating maintenance, and notifying the AHJ when equipment has been out of service for more than eight hours.

OFI-CNS-Y12-04: Consider expanding the training requirements for personnel performing ITM services to meet the applicable NFPA 72 requirements.

OFI-CNS-Y12-05: Consider revising the FHA update provisions in Procedure Y17-008 to incorporate DCNs into the body of the FHA text annually.

OFI-CNS-Y12-06: Consider preparing a detailed analysis to substantiate the MPFL documented in the FHA.

OFI-CNS-Y12-07: Consider revising hydraulic calculation DAC-FPD-921200-A004, Rev C, to use the correct k value for sprinkler heads (5.6).

OFI-CNS-Y12-08: Consider improving the fire water underground supply system by:

- Determining how to manage the infrastructure fire protection isolation valves that are subject to failure if manipulated (due to age).
- Addressing facility vulnerabilities in the Area 5 underground fire water supply lead-ins (to process facilities) that are cast iron piping in poor condition.
- Establishing plans to replace the high risk piping to 9212, 9215, and 9204-2E facilities.

OFI-CNS-Y12-09: Consider revising the TSR surveillance procedure to include only the most important nuclear safety areas in order to make TSR documents more operationally useful for controlling facility safety. Ensure that safety basis TSR surveillance testing is performed in the as-found condition and that other NFPA-required maintenance items are performed in a manner that does not precondition the system before SR activities.

OFI-CNS-Y12-10: Consider revising the TSR surveillance procedure acceptance criteria for the 9212 Dry Pipe Sprinkler System 005 Three Year Valve Trip Test to a lower time duration, commensurate with the system's performance during original installation plus effects from system aging.

OFI-CNS-Y12-11: Consider revising the surveillance procedure for the FSS System 007 backflow preventer pressure drop test to include the forward flow rate in order to document all parameters used to determine the surveillance acceptance criteria.

CNS-Pantex

OFI-CNS-PX-01: Consider revising the PIPs for Buildings 12-84 and 12-98 to reflect the physical conditions and other information, including fire rated walls and exits designed with delayed releases, as required by the *Pre-Incident Planning* procedure, PX-AG-008. Consider reviewing all PIPs to ensure that they contain all the required information.

OFI-CNS-PX-02: Consider providing guidance to operations personnel responsible for monitoring the combustible loading within the interlocks areas to help them determine whether the criteria for Ordinary Hazard Group II hazard classification are being met.

OFI-CNS-PX-03: Consider revising WIs that address impairments of engineered fire protection systems to require specifics on how to address the impairments and how to determine the status of the impairments. Ensure that processes are developed and implemented for prioritizing the impairments, aligning compensatory measures with the impairment list, recording extended impairment durations, and identifying impaired fire response equipment (e.g., hydrants) in the field.

OFI-CNS-PX-04: Consider revising the *Emergency Services Dispatch Center Manual*, MNL-352191, to incorporate all applicable requirements of NFPA 72, *National Fire Alarm Code*. Ensure that the manual includes specific response times for investigating supervisory signals, initiating maintenance, and notifying the AHJ when equipment has been out of service for more than eight hours. Also ensure that dispatch center personnel are trained on these requirements.

OFI-CNS-PX-05: Consider implementing an expedited resolution to the HPFL deficiencies documented in DIS-20, Section 5.6.

OFI-CNS-PX-06: Consider revising the TSR surveillance procedure to include only the most important nuclear safety areas in order to make TSR documents more operationally useful for controlling facility

safety. Ensure that safety basis TSR surveillance testing is performed in the as-found condition and that other NFPA-required maintenance items are performed in a manner that does not precondition the system before SR activities.

OFI-CNS-PX-07: Consider developing and/or revising the USQDs related to the electric motor driven test pump in Pump House 15-033A, and ensure that the DSA, FHA, and DIS are revised as necessary to identify and discuss this pump. Ensure that the engineering modification process provides for performing USQDs on all facility modifications and revising safety basis documents to accurately reflect changes to safety-related systems.

9.0 ITEMS FOR FOLLOW-UP

EA will continue to monitor:

- E-wing basement combustible material control implementation (Y-12)
- Basis for allowing continued operation of the non-safety related maintenance test pump to support fire testing (Pantex)
- Updates to the sitewide SAR to correct deficiencies associated with the FARS and the TSR SRs.

Appendix A
Supplemental Information

Dates of Review

Onsite Review: September 9-12, 2014 (Y-12)
October 20-29, 2014 (Y-12)
January 12-16, 2015 (Pantex)
February 2-13, 2015 (Pantex)

Office of Enterprise Assessments – Key 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, Director, Office of Nuclear Safety and Environmental Assessments
Patricia Williams, Director, Office of Worker Safety and Health Assessments

Quality Review Board

William A. Eckroade
John S. Boulden III
Thomas R. Staker
William E. Miller
Michael A. Kilpatrick

Enterprise Assessments NNSA Production Office Site Lead

Jimmy S. Dyke

Enterprise Assessments Reviewers

Jimmy S. Dyke – Lead
Jeffrey L. Robinson
Joseph J. Panchison

Appendix B
Key Documents Reviewed, Interviews, and Observations

Contractor's Documents Reviewed

Y-12

- *RP-YAREA-F-0314*, Water Supply Evaluation for Fire Protection Systems, June 2014
- *Y79-53-ESSO-001,* Emergency Services System Operations Work Execution Manual, 7/29/2013
- *Y79-54-FDO-029,* Alarm Room Operations Procedure, 7/24/2014
- Fire Protection Operations Test, Maintenance, and Inspection Role procedure, rev 5, 3/18/2013
- *SR-PE-900022-A001,* System Requirements Document for Edwards System Technology 3 Fire alarm System Upgrade Project, rev 0, 4/2009
- *Y/EN-4716,* System Requirements Document for Y-12 Plant Fire Detection and Alarm System, Revision 3, 8/1999
- Y/MA-7925, Technical Safety Requirements for the 9212 Complex
- Y/FSD-17, Y-12 National Security Complex Safety Analysis Report, Rev 8, 6/17/2014
- FHA-FH-FPD-921200-A001, Fire Hazards Analysis of Building 9212 Complex, Rev 4, 7/21/2011
- DAC-FPD-921200-A006, *Spill Containment Analysis*, Rev. 0, 11/4/2004
- DAC-FPD-921200-A010, *HF Cylinder Hydrogen Generation*, Rev. 2
- DAC-FPD-921200-A011, *Pipe Schedule Calculation for 9212 Sprinkler Systems* (U), Rev. 3
- Y79-001, *Y-12 Fire Protection Program Manual*, 9/30/2014
- Y57-38-PSS-052, *Telealarm System Alarm Response Procedure*, Rev. 6.4
- PFP-9212, *9212 Pre-Fire Plan*, Rev. 4
- RP-ST-921200-A003, *Evaluation of Seismic Upgrades of SSCs For the 9212 Building Complex*, 12/2005
- Y/DD-708, *Nuclear Criticality Safety Guidelines for Firefighting in the Y-12 Complex*, Rev. 9, 5/4/2009
- Y-12 Memorandum, *Transmittal of Approved Final Corrective Action Plan In Response to Final Report – Office of Independent Oversight Inspection of ES&H Programs at the Y-12 National Security Complex*, 6/2008
- HS-64 Comments on Y-12 Corrective Actions and Supporting Documents for Finding E-1 (Fire System Pipe Break) 2008 HS-64 ES&H Inspection 12/11/2008
- Contractor Assurance System Performance Report, Volume I and Volume II, Organizational Health Metrics, 4th Quarter, FY2013 performance period
- RP-YAREA-F-0301, *B&W Y-12 CY2013 USQD Annual Report*
- RP YAREA-F-0314, *Water Supply Evaluation for Fire Protection Systems*, 6/2014
- DAC-EA-92042E-A035, *Evaluation of 10" Water Pipe Break in 9204-2E (U)*, 5/5/2009

Pantex

- DIS-017, *Fire Alarm System Design Information Summary*, Issue No. 013, 8/26/2014
- DIS-019, *Fire Suppression System Design Information Summary,* Issue 021, 3/12/2014
- DIS-052, *Fire Receiving Station,* Issue No. 012, 10/06/2014
- MNL-352191, *Emergency Services Dispatch Center Manual*, Issue No. 003, 2/24/2014
- CLD-076, *Combustible Loading Disposition,* Issue No. 012, 4/09/2013
- PX-5167, *Combustible Loading Controls Assessment Form*, Issue No. 003, 2/24/2014
- RPT-FD-0001, *Baseline Needs Assessment Report*, Issue No 005, 2/29/2012
- WI 02.01.05.03.02, Providing Fire Protection System Impairment, Issue No. 8
- WI 02.04.02.01.05, Develop Permanent/Temporary Exemption and Variance Request, Issue No.4

- MNL-00015, Fire Protection Program Manual, Issue No. 008, 01/2014
- WI 02.01.05.04, Process for Fire Department Emergency Response, Issue No 6
- AB-SAR-314353, Sitewide Safety Analysis Report, Rev 249, 1/8/2015
- FHA-12084, Fire Hazards Analysis for Building 12-84, Issue 004A, 9/16/2014
- FHA-12098, Fire Hazards Analysis for Building 12-98, Issue 004, 11/10/2014
- FHA-1534A, Fire Hazards Analysis for Building 15-34A, Issue 001, 11/22/2013
- RPT-SAR-199801, Technical Safety Requirements for Pantex Facilities, Rev 345, 11/12/2014
- EC-09-042, Seismic Qualification for Building 12-084 West and 12-099 for Ceiling Supports, Issue 001, 9/24/2009
- OE-05-005, HPFL Operability Evaluation, Issue 001, 8/24/2005

DOE Documents Reviewed
- NPO Letter, *Concerns With Y-12 Operational Discipline*, 8/11/2014
- NPO-1.5, *NPO Operating Philosophies and management System Description*, Rev. 0, 10/31/13
- NPO-2.2.2.1, *Functions, Responsibilities, and Authorities Manual*, Rev. 0, 7/15/2013
- NPO-3.1.2, *NPO Oversight Planning Process*, Rev. 0, 10/9/2012
- NPO-3.4.1.1, *NPO Oversight Process*, Rev. 0, 9/26/12
- NPO Organizational Chart, Rev 8, 1/23/14
- NPO FY14 Site Integrated Assessment Plan, 6/30/2014
- NPO (Y-12) Field Office Report, 10/3/2014
- NPO QIMM Agenda, 9/17/2014
- NPO IWOC Agenda, 9/2014
- NPO FY14 Operations Quick Checks
- NPO FY14 Maintenance Quick Checks
- NASH Biennial Review Exit Slides, 2/27/2014
- NASH Biennial Review of NPO Final Report, 2/2014
- NPO Assessment Report, *Integrated Assessment of 9204-2 and 9206 Nuclear Facilities*, 6/19/2014
- NPO Assessment Report, *YSO Fire protection Program Assessment*, 5/2011
- NPO Operational Awareness Report, *9212 Fire Protection Walk Down*, 8/5/2014
- NPO Operational Awareness Report, *Activity Observation – Annual VSS Walk Down in Building 9212*, 6/3/2014
- NPO Operational Awareness Report, *Walk Down of Equivalency Request for the Unprotected Steel in Building 9212*, 5/1/2014
- Final Report Headquarters Review of Y-12 Fire Protection Employee Concern, 3/2013
- NPO Write Up on Fire Department Employee Concern Review Report

Observations
Walkdown, Buildings 9212 and 9204-2E
Walkdown, Buildings 12-84, 84A, and 98
Integrated weekly operations call
Quarterly issues management meeting

Interviews: Y-12/Pantex (Common)
Fire Protection System Engineer
Fire Chief
Utilities Supervisor
Safety Basis Engineer
Safety Basis Manager
Assistant Manager for Environmental, Safety, Health and Quality

NPO Performance Assurance Manager
NPO Nuclear Safety SME
DOE FPE
DOE Safety System Oversight Representative
NPO Group 1 Facility Representative
NPO Group 2 Facility Representative
NPO Group 3 Facility Representative