Independent Oversight Review of the Fire Protection Program at Pacific Northwest National Laboratory and the Fire Suppression System at the Radiochemical Processing Laboratory

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Office of Safety and Emergency Management Evaluations
Office of Enforcement and Oversight
Office of Health, Safety and Security
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Acronyms

BFA	Building Fire Assessment
BNA	Baseline Needs Assessment
CRAD	Criteria, Review, and Approach Document
CSE	Cognizant System Engineer
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EMSL	Environmental Molecular Sciences Laboratory
FHA	Fire Hazards Analysis
FPE	Fire Protection Engineer
FSS	Fire Suppression System
HFD	Hanford Fire Department
HS-45	Office of Safety and Emergency Management Evaluations
HSS	Office of Health, Safety and Security
ITM	Inspection, Testing, and Maintenance
MPFL	Maximum Possible Fire Loss
NFPA	National Fire Protection Association
OFI	Opportunity for Improvement
PM	Preventive Maintenance
PNNL	Pacific Northwest National Laboratory
PNSO	Pacific Northwest Site Office
POD	Plan of the Day
PSF	Physical Sciences Facility
R&D	Research and Development
RFD	Richland Fire Department
RPL	Radiochemical Processing Laboratory
SC-CH	Office of Science Chicago Office
SR	Surveillance Requirement
TSR	Technical Safety Requirement

Independent Oversight Review of the Fire Protection Program at Pacific Northwest National Laboratory and the Fire Suppression System at the Radiochemical Processing Laboratory

1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Enforcement and Oversight (Independent Oversight), within the Office of Health, Safety and Security (HSS), conducted an independent review of the fire protection program at Pacific Northwest National Laboratory (PNNL) and the fire suppression system (FSS) at the Radiochemical Processing Laboratory (RPL). The review was performed by the HSS Office of Safety and Emergency Management Evaluations (HS-45) and was performed as one part of an ongoing targeted assessment of the management of safety systems at sites that have hazard category 1, 2, and 3 facilities.

The purpose of this Independent Oversight targeted assessment was to evaluate program requirements that ensure adequate controls have been implemented to reduce the risk associated with events resulting from a fire or explosion at nuclear facilities across the DOE complex, including National Nuclear Security Administration sites. Existing HS-45 criteria, review, and approach documents (CRADs) were adapted to establish a focused set of inspection criteria, activities, and lines of inquiry for the targeted assessment. The independent review of PNNL is designed to evaluate core fire protection elements and provide the site and the responsible DOE line management organizations with information for benchmarking their program effectiveness. This independent review also provides some data for an ongoing HSS effectiveness review of the Department's implementation of Commitment #16 of the DOE implementation plan for Defense Nuclear Facilities Safety Board Recommendation 2004-1 regarding verification of Federal nuclear safety assurance capability.

This independent review was performed March 18 – March 29, 2013, concurrent with a DOE Pacific Northwest Site Office (PNSO) assessment at PNNL, and devoted special attention to the RPL Building 325 FSS. This report discusses the background, scope, methodology, results, and conclusions of the review.

2.0 BACKGROUND

PNNL is responsible for implementation of the fire protection program and managing and operating the RPL. PNSO is responsible for oversight of the fire protection program and the RPL. Operations and activities in the RPL involve research and development (R&D) in radiochemical process science and engineering; evaluation, analysis, and testing of radioactive, radiochemical, chemical, and physical material properties; development and experimentation in the design and application of radiation generating devices; and development and conduct of analytical procedures in support of research activities. Because the RPL is an R&D facility, work conducted in the facility changes frequently in conjunction with programmatic objectives.

The Independent 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 and security and other critical functions as directed by the Secretary of Energy. The independent oversight program is described in and governed by DOE Order

227.1, *Independent Oversight Program*, and a comprehensive set of internal protocols, operating practices, inspector's guides, and process guides.

Fire protection was identified as an Independent Oversight targeted review area for 2013 in an HSS memorandum from the Chief Health, Safety and Security Officer to DOE senior line management, entitled *Independent Oversight of Nuclear Safety – Targeted Review Areas Starting in FY 2013*, dated November 6, 2012. This review is further described in the *Plan for the Independent Oversight Targeted Review of the Fire Protection Program at Pacific Northwest National Laboratory and the Fire Suppression System Located in the Radiochemical Processing Laboratory Building 325*, dated March 2013. The March 2013 plan defines the specific focus for this independent review of PNNL.

3.0 SCOPE

For this review, Independent Oversight reviewed the fire protection program at PNNL and assessed the effectiveness of the fire protection program and its implementation by PNNL with specific attention to program implementation at RPL and its FSS. The review included evaluation of key elements of the fire protection program, including the fire hazard analysis (FHA)/documented safety analysis (DSA) integration; baseline needs assessments (BNAs), technical safety requirement (TSR) surveillance and testing, and self-assessments at RPL. The assessment also consisted of an evaluation of the fire protection procedures and interviews with personnel responsible for the program's implementation. The review also evaluated the effectiveness of PNSO oversight of fire protection programs.

4.0 METHODOLOGY

The Independent Oversight review was performed concurrently with the PNSO review of the PNNL fire protection program that included both documentation reviews and site walkdowns of selected representative facilities of the PNNL complex. Independent Oversight reviewed fire protection programmatic elements at RPL (a nuclear facility) and other non-nuclear facilities including the Environmental Molecular Sciences Laboratory (EMSL); Buildings 3410, 3425, 3430, which are part of the Physical Sciences Facility (PSF) complex; and Building 3475, the Laboratory Support Warehouse. The FSS at the RPL, a safety significant system, was reviewed as part of this assessment. The review considered the requirements of 10 CFR 851, *Worker Safety and Health Program*; DOE Order 420.1B, *Facility Safety*; and NFPA codes and standards. Independent Oversight also reviewed PNSO's oversight of fire protection at PNNL.

The following sections of HSS CRAD 45-34, Revision 1, were used for the targeted assessment:

- Section I, Programmatic Elements, FP-1, Program Documentation
- Section I, Programmatic Elements, FP-2, Program Implementation - Fire and Related Safety Hazards
- Section I, Programmatic Elements, FP-3, Program Implementation - Fire Prevention and Protection
- Section II, FHA/DSA Integration, FP-4
- Section IV, TSR Surveillance and Testing, FP-6.

HSS CRAD 45-21, *Feedback and Continuous Improvement Inspection Criteria and Approach-DOE Field Element*, was used to evaluate PNSO Fire Protection Oversight.

In this report, Independent Oversight refers to the results and findings of the concurrent PNSO fire protection review. For clarity, the finding levels and other definitions used by PNSO are quoted below:

- Level 1 Finding Issues of major significance that warrant a high level of attention on the part of line management. Typically, these reflect a gap in addressing requirements or a systemic problem with implementing the requirements. If left uncorrected, this level of finding could negatively impact the adequacy of operations and/or accomplishment of the Office of Science mission.
- Level 2 Finding Issues that represent a non-conformance and/or deviation with implementation of a requirement. Multiple issues at this level, when of a similar nature, may be rolled-up together into one or more Level 1 Findings.
- Level 3 Finding Issues where it is recognized that improvements can be gained in process, performance, or efficiency already established for meeting a requirement. This level of finding should also include minor deviations observed during oversight activities that have been promptly corrected on the spot and verified as completed.
- Strength A mature process or activity that has consistently demonstrated the ability to meet expectations, or a process or activity that efficiently and effectively facilitates and integrates processes, activities, and resources.
- Noteworthy Practice A positive observation, based on objective assessment data, of a particular practice, procedure, process, or system considered so unique or innovative enough that the entire Department might find it beneficial.

5.0 RESULTS

The results of the PNSO fire protection review are documented in the following two reports:

- PNSO Report *Fire Protection Program Review at the Pacific Northwest National Laboratory in 2013 Draft Report*, dated March 2013, resulted in seven level 2 findings, six level 3 findings (OFIs), and three strengths.
- PNSO Report *Safety System Oversight Assessment of the Fire Suppression Systems for Building 325 at Pacific Norwest National Laboratory*, dated March 2013, contains one level 3 finding (OFI) and three strengths.

Independent Oversight agrees with the findings identified in the PNSO reports. The rest of this section discusses the results of the review of the Fire Protection Program at PNNL and the FSS at the RPL. The discussion below summarizes the results from the PNSO and HSS Independent Oversight teams.

5.1 Fire Protection Program Review

PNSO and Independent Oversight reviewed the PNNL Fire Protection Program Description document (dated September 2012) and found it to be in compliance with DOE governing requirements. FHAs for representative facilities were reviewed and were also found to be generally comprehensive and compliant with DOE requirements. However, Independent Oversight and PNSO discovered some deficiencies that are discussed in the following sections.

Radiochemical Processing Laboratory

Section 7 of the FHA for the RPL classifies the facility occupancy as "Industrial" using National Fire Protection Association (NFPA) 101, *Life Safety Code.* However, NFPA 101 requires laboratories using chemicals to comply with NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*. NFPA 45 determines the occupancy differently than NFPA 101, primarily using the quantities of flammable materials. Although NFPA 45 is not referenced in the FHA for determining the occupancy classification, the facility is classified correctly because the facility would also be classified as Industrial under NFPA-45. Regardless, NFPA-45 should have been cited as the appropriate reference. Independent Oversight concurs with the PNSO finding that the FHA for the RPL should correctly address occupancy classification and the need for fire separation requirements that limit the maximum possible fire loss (MPFL) (PNSO Finding 2013-FP-L3-1).

The RPL FHA identifies the value of the MPFL at around $150-172 million, and states that complying with the DOE Order 420.1B requirement to provide fire separation limiting the MPFL below $150 million is unwarranted. DOE Order 420.1B requires a three-hour firewall separation to keep the MPFL below $150 million. The RPL FHA, RPL-RPT-12-007 (page 164), states that installing a three-hour fire barrier will require great expense and facility modification without significant benefit to the reduction of real risk; this rationale should have been used as part of a request for an exemption. Independent Oversight concurs with the PNSO finding that the FHA for the RPL should correctly address occupancy classification and the need for fire separation requirements that limit the MPFL (PNSO Finding 2013-FP-L3-1).

The RPL FHA does not identify a list of applicable Codes of Record that are consistent with the recommendations of NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*. DOE-STD-1066-99, *Fire Protection Design Criteria*, also states that a Codes of Record should be identified. Independent Oversight concurs with the PNSO finding that building FHAs and building fire assessments (BFAs) should document the applicable Codes of Record (PNSO Finding 2013-FP-L3-2).

The RPL fire suppression piping in RPL is generally internally inspected according to the requirements of the NFPA. However, a discrepancy was noted involving the frequency of RPL's piping inspections. Internal inspections are scheduled at ten-year intervals, which is contrary to the five-year inspection requirements described in NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*. However, at the time of this assessment, no systems were noted to be overdue for their five-year internal inspections. Independent Oversight concurs with the PNSO finding that the scheduled frequency for internal inspections of building sprinkler pipes should be every five years in accordance with NFPA 25 (PNSO Finding 2013-FP-L3-5).

Non-Nuclear PNNL Facilities

Review of the EMSL FHA and subsequent interviews with EMSL staff revealed that the FHA was prepared several years ago, during construction, and has not been subsequently updated and maintained. The EMSL facility frequently undergoes facility changes and modifications due to a transient tenant population and frequently changing research activities, support systems, and supporting components. DOE Order 420.1B requires that an FHA be performed (and kept current) for facilities that represent unique fire safety risks; therefore, EMSL does not maintain an FHA as required by DOE Order 420.1B.

Two fire departments serve the PNNL complex; the city of Richland Fire Department (RFD) serves facilities in Richland, while the Hanford Fire Department (HFD) serves the PNNL facilities located on the

Hanford Site including buildings located in the 300 Area. Both fire departments are responsible for preparing a BNA that is consistent with DOE Order 420.1B.

The BNAs document the firefighting capabilities of the respective emergency response organization to suppress all fires and to provide medical and hazardous materials response, and the related staffing, apparatus, facilities, equipment, training, pre-plans, offsite assistance, and procedures. The BNA is required to be updated every three years. At the time of this assessment, neither BNA had been updated within the last three years. The DOE Richland Operations Office directed the HFD to defer the update of their BNA. Despite this direction to HFD, PNNL remains responsible for maintaining a BNA in compliance with the DOE requirements for their buildings in the 300 Area. The PNNL contractor, due to limited resources, chose to defer performing the BNA update for the PNNL site in favor of performing the fire protection program self-assessment. Although PNNL determined that the self-assessment would provide more valuable information than a BNA update, the decision to not comply with contractual requirements was not brought to the site office for approval.

In addition to maintaining their own equipment, HFD is responsible for selected fire protection system testing in buildings in the 300 Area. Tests are performed in accordance with NFPA schedules, including DOE's granted equivalency for scheduling and grace periods. Although HFD's updates of the BNA are out of date, HFD updates pre-incident plans across the Hanford Site every three years. Pre-incident plans for critical facilities including the RPL are updated on an annual basis. Although regularly updated, the pre-fire plan maps of the facilities were deficient in some cases and should be revised to provide more explicit information to comply with the requirements of DOE Order 151.1C and the criteria found in NFPA 1620, Standard for Pre-Incident Planning.

The BNA for the Richland PNNL facilities is also delinquent; however, RFD is currently developing/updating it. Interviews with RFD regarding the status of the BNA report, confirm that the emergency response capabilities are more than adequate. Pre-fire plans are being developed and populated by RFD into a comprehensive computerized database. RFD staffing, apparatus, and the proposed fire station relocation will serve to improve RFD emergency response.

Independent Oversight concurs with PNSO findings that the BNAs are not updated every three years in accordance with DOE Order 420.1B for PNNL facilities (PNNL Finding 2013-FP-L2-5), that 300 Area pre-fire plans do not provide adequate information (PNSO Finding 2013-FP-L3-6), and that PNNL has not verified that the Hanford BNA meets the requirements of DOE Order 420.1B (PNSO Finding 2013-FP-L2-6).

Consistent with recommendations cited in NFPA 801, a list of applicable Codes of Record should be identified in the FHA; DOE-STD-1066-98 also states that Codes of Record should be identified. Contrary to these recommendations, Codes of Record are not delineated in the FHA for the non-nuclear facilities. Independent Oversight concurs with the PNSO finding that the non-nuclear buildings' FHAs and BFAs should document the applicable Codes of Record (PNNL Finding 2013-FP-L3-4**)**.

5.2 Fire and Related Safety Hazards and Self-Assessments

Non-Nuclear Facilities

Consistent with the requirements of DOE Order 420.1B, fire and related safety hazards on site (or within the facility) are required to be identified and evaluated in conjunction with a current and comprehensive FHA and self-assessments. While performing a concurrent walkdown of the EMSL facility, the team of inspectors noted that door chocks are located adjacent to several fire doors that are necessary to preserve the fire wall integrity. Subsequent discussion with facility workers confirmed the periodic use of door

chocks to block doors open during equipment and material movement in and out of protected fire areas, contrary to the requirements of NFPA 80, *Standard for Fire Doors and Other Opening Protectives*, Chapter 5, Section 5.2.13, that state that door openings and the surrounding areas shall be kept clear of anything that could obstruct or interfere with the free operation of the door and that blocking or wedging of doors in the open position is prohibited, door chocks are periodically used to prop fire doors open. Independent Oversight concurs with the PNSO finding that the fire doors in EMSL were not managed in accordance with the requirements of NFPA 80 (PNSO Finding 2013-FP-L2-3).

During the concurrent walkdown of EMSL, the review teams noted that gas cylinders stored in service corridors were labeled as containing oxygen and were stored adjacent to cylinders labeled as flammable. Contrary to the requirements of NFPA 55, Section 7.1.10.2, the storage or use of oxidizing compressed gases that exceed the quantity thresholds for gases requiring special provisions, shall be separated from flammable gas storage cylinders as prescribed in the standard. Subsequently, inspectors determined that the flammable gas cylinders contained gas concentrations not deemed flammable and were in fact mislabeled, and they were removed from the area. However, this determination of gas non-flammability did not occur until after the review team's observation. Independent Oversight concurs with the PNSO finding that several cylinders in the EMSL service corridor were labeled incorrectly as flammable (PNSO Finding 2013-FP-L3-3).

The review teams performed a concurrent walkdown of Building 3425 and observed that combustibles were stored in exit stair tower enclosures. The storage of combustibles in exit stairs is contrary to the requirements of NFPA 101, Section 7.1.3.2.3, which states that an exit enclosure shall not be used for any purpose that has the potential to interfere with its use as an exit. This provision prohibits the use of exit enclosures for storage or for installation of equipment not necessary for safety. The intent of the rule is that the exit enclosure be free of fire safety hazards. Independent Oversight concurs with the PNSO finding that the storage of combustibles in the two Building 3425 stairwell exit enclosures was not managed in accordance with the requirements of NFPA 101 (PNSO Finding 2013-FP-L2-2).

5.3 Fire Prevention and Protection

Fire water is supplied to the RPL from the 300 Area domestic water system, which is operated by another Hanford Site contractor, Washington Closure Hanford. The water source for this system is provided by the City of Richland through two 16 inch water mains at a pressure of approximately 50 to 60 psig. The water is delivered to the new pump house in Building 385, and the pressure is increased using four new domestic water pumps to approximately 115 psig for fire protection and domestic water uses. The new pumps consist of one electric fire pump and one diesel-driven fire pump attached to a new fire loop that surrounds the RPL. Pump controllers automatically maintain pressure in the underground loop to no less than 85 psig. The teams assessed the suppression system hydraulic calculations and concluded that the water supply was robust and provided sufficient pressure margin to all fire water suppression system design areas.

Radiochemical Processing Laboratory

Independent Oversight observed PNNL's engineering proficiency in regards to the RPL fire protection system by interviewing the cognizant system engineer (CSE) and the fire protection engineer (FPE) assigned to the RPL. Both engineers demonstrated adequate knowledge of the RPL FSS and their responsibilities, functions, and authorities in relation to the FSS. The CSE adequately maintains the FSS configuration management and is involved in all modifications, inspections, testing, and maintenance performed on the system. Training records and qualifications were also reviewed for the CSE and FPE and found to be satisfactory.

The RPL CSE and FPE coordinate to ensure that all modifications, impairments, and maintenance on the FSS are properly screened, reviewed, and performed using established procedures. They also ensure that system design basis documentation, as well as supporting documents and procedures, are kept current. Finally, the RPL FPE ensures that the RPL plan of the day (POD) is accurate in listing FSS impairments and scheduled modifications to the system, and confirms his review by signing the POD prior to issue. Independent Oversight agrees with PNSO that the RPL CSE and FPE performance is a strength, as documented in their draft report on the FSSs for the RPL.

Based on findings issued from a previous PNSO assessment that identified the presence of debris in the FSS piping, extensive examinations were performed at the RPLto determine the condition of the piping and to identify the presence of obstructions in the piping flow-path. Some areas of concern were identified and the piping was opened for more detailed visual inspection. Some piping locations exhibited traces of a sludge buildup that was not sufficient to obstruct flow to any sprinkler heads. Selected sprinkler heads were replaced, pipe wall thickness verifications were completed, and over 100 feet of piping was inspected or replaced. Independent Oversight concluded that the enhanced visual inspections and piping and sprinkler head replacements were commendable.

Non-Nuclear Facilities

Both review teams also assessed the water supply and FSS capability at the PNNL PSF warehouse facility. A review of the hydraulic calculations for the PSF warehouse indicates that the suppression system's calculated demand was only 1 psig below the measured available supply pressure. This small pressure margin is contrary to the requirement stated in DOE-STD-1066-99 that requires hydraulically designed sprinkler systems be designed for a supply pressure of at least 10% but not less than 10 psi below the available source supply pressure. Additionally, the available supply pressure used in the hydraulic calculation was not based on a flow test during the summer when demand from the city causes the water supply pressure to PNNL to drop. Given the small pressure margin, the potential exists, and is likely, that the calculated demand of the system exceeds the available supply at certain times of the year. Additionally, NFPA 13, *Standard for the Installation of Sprinklers*, requires that hydraulically designed systems be correctly identified with a hydraulic information code plate affixed to the riser that identifies the hydraulic design flow and residual pressure to the hydraulically most remote area. Data observed on the riser code plate differed from the hydraulic calculation. Also, the hydraulic design code plate on the PSF warehouse sprinkler riser does not show the design information commensurate with the hydraulic calculation design basis. Independent Oversight concurs with the PNSO finding that the PSF warehouse does not have a reliably adequate water supply necessary for the demand of its water suppression system year-round in accordance with DOE Order 420.1B (PNSO Finding 2013-FP-L2-4).

5.4 FHA/DSA Integration

The hazard classification of the RPL was determined in accordance with appropriate DOE standards and orders. The bounding nuclear material inventory associated with the RPL was compared with threshold quantities provided in these documents. The comparison determined the facility to be a Hazard Category 2 nuclear facility. In accordance with DOE Order 420.1B, the conclusions of the FHA are to be incorporated in the DSA for Category 1, 2, or 3 nuclear facilities to provide consistency between fire accidents analyzed in the DSA and the actual fire hazards analyzed in the facility. The FHA for the RPL, RPL-RPT-12-007, was reviewed for consistency with the facility's DSA, PNNL-DSA-325, and to ensure adequacy of the fire protection selected control set for the hazards identified. The documentation and methodology found in CRL-TECH-ESH-009, Rev 1, entitled *Hazards Analysis for the Building 325 Extended Mission DSA*, dated June 2009, together with the hazards as identified in the facility FHA, forms the basis for the current facility Chapter 3, DSA Hazard and Accident Analyses,

and is consistent with the guidance in DOE-STD-3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analysis*. Facility upgrades to support the extended mission include seismic upgrades, addition of modular hot cells and gloveboxes, and other improvements. Some of these physical upgrades are still in the planning and design stage, and are not specifically addressed by the analysis in this document; however, they will be addressed in later updates to this document and the facility DSA.

The facility FHA, in providing input to the DSA, comprehensively and qualitatively identified the fire hazards and assessed the risk from fire within individual fire areas in the facility. Where fire areas are defined, they are bounded by fire-rated construction with openings protected by equivalently rated fire doors and penetration seals. Areas of the RPL that are enclosed with fire-rated construction include the north exit stair, Rooms 520 and 528, and the freight elevator. Walls rated for one-hour fire resistance are provided around Rooms 520 and 528 located in the northeast wing of the RPL facility. A freight elevator serves all three levels in the RPL and is protected by a two-hour fire resistance rated enclosure. Despite adequate identification of fire areas, the review teams identified a concern regarding the separation requirement to limit MPFL as delineated in DOE Order 420.1B (refer to Section 5.1 of this report).

The facility DSA defines the scope of work that is performed in the facility, identifies and analyzes the hazards associated with the work, and establishes the hazard controls upon which the contractor relies to ensure the adequate protection of workers, the public, and the environment. Overall, Independent Oversight determined that for the RPL, the hazards identified in the FHA and the associated controls were appropriately translated and evaluated in the DSA.

5.5 TSR Surveillance and Testing

The Independent Oversight and PNSO reviews of the safety basis determined that TSR safety system surveillance testing satisfactorily confirms that testing is sufficient to verify the performance of safety structures, systems, and components credited controls. Surveillance and test procedures confirm that key operating parameters for the overall system and its major components remain within the safety basis, NFPA, and applicable consensus standards operating limits and the acceptance criteria from the surveillance tests used to confirm system operability are consistent with the safety basis.

Although the TSR surveillance testing program is generally robust, the TSR bases for surveillance requirement (SR) 4.3.1.3 were found to be deficient. The FSS at the RPL consists of five wet-type sprinkler system risers and a dry pipe sprinkler system supplied from the Riser 2 wet system that protects the north exterior loading dock. SR 4.3.1.3 inspects the pressure gauges on the FSS risers to verify adequate water supply pressure. However, the dry pipe is required to be absent of water and pressurized with air by design to prevent freezing during cold weather conditions. The bases for this surveillance states that water flow into the dry pipe system does not render the system inoperable and was intended to address small amounts of water infiltration into the dry pipe that is periodically drained. However, both review teams concluded that frozen water in the dry pipe system could render it unable to perform its safety function. Independent Oversight concurs with the PNSO finding that in the TSR document, the statement justifying the lack of air pressure surveillances for the dry pipe system needs to be clarified so that it does not potentially imply the system, when filled with water, may be considered operable under all conditions (e.g., during freezing weather without compensatory measures). The PNSO report entitled, *U.S. Department of Energy Pacific Northwest Site Office Draft Report Safety System Oversight Assessment of the Fire Suppression Systems for Building 325 at Pacific Northwest National Laboratory March 2013*, presents and discusses the finding about the TSR document.

HFD testing of fire protection equipment in the 300 Area is tracked independently from the rest of PNNL. Building 325 also schedules and tracks its own inspection, testing, and maintenance (ITM) using its own MAXIMO database. IT&M for preventive maintenance (PM) throughout the remainder of PNNL facilities is scheduled and tracked through the PNNL MAXIMO database. In this system, PNNL site supervisors of core teams receive PM forms monthly, which are signed off by the building manager when completed and then marked off in MAXIMO before the documentation is sent to the MERIDIAN database for document retention. A week before the end of the month, a report is run to inform the core team leads about the ITM that has not yet been completed, and then again three days before the end of the month. ITM completion metrics are generated monthly, and building managers are notified of uncompleted items. Review of the database revealed that there has not been any overdue fire protection PMs in the last few months. The Fire Protection Group is involved with the initial setting of the PM frequencies for fire protection PMs.

5.6 PNSO Fire Protection Oversight Program

DOE fire protection oversight is performed by the Facility and Operational Team of PNSO and augmented by the support center from the Office of Science Chicago Office (SC-CH). The agreement between PNSO and SC-CH is defined through the *Fiscal Year (FY) 2013 Matrix Organizational Plan for Nuclear Oversight*. This matrix plan assigns a SC-CH FPE to support PNSO. The SC-CH FPE supports PNSO oversight operational awareness activities by participating in monthly teleconference meetings, assisting PNSO in evaluating upset conditions and impairments, and performing an annual safety system oversight assessment of the fire protection systems at PNNL's Building 325. PNSO Facilities Representatives and PNSO nuclear safety specialists notify the SC-CH FPE of upset conditions and fire system impairments and may request the SC-CH FPE of PNNL to review documents or provide other assistance.

As observed during this review, the SC-CH FPE is qualified to the Department's FPE Functional Area Qualification Standard and displayed technical competence. In addition, the PNSO Facility Representatives and nuclear safety specialists are qualified to applicable Qualification Standards and demonstrated technical competence when performing certain aspects of PNNL fire protection program oversight. Their responsibilities that include reviewing TSR/DSA issues associated with the FSS and fire program, the FHAs, work packages, operational assessments, plans, reports, and management activities associated with the FSS. They also observe meetings, drills, pre-job briefings, inspections, and flushes associated with the FSS.

A yearly safety system oversight assessment of the FSS at the RPL is performed by PNSO. Independent Oversight reviewed the scope and results of these assessments for the prior three years and the present year, and considers them adequate to ensure that the RPL FSS is maintained in an operable condition and in accordance with DOE Order 420.1B, *Facility Safety, the DSA, TSRs, and maintenance procedures*. Over the last four-year period of assessments, four level 2 findings, two level 3 findings (OFIs), and four strengths were identified. The reviews were formal and comprehensive, and the corrective actions to findings were later verified in follow-up inspections.

Overall, the HSS review team found that PNSO performs oversight fire protection issues in an effective manner with its own staff, complemented by the assigned SC-CH FPE.

6.0 CONCLUSIONS

Independent Oversight determined that the PNSO reviews of the PNNL fire protection program and program implementation with a special focus on the RPL (a nuclear facility) were effective. The PNSO reports, one on the overall PNNL fire protection program and the other concerning FSS at the RPL, were

appropriate in scope and detail and Independent Oversight concurred with all of the PNSO findings, and a strength that was identified.

The PNSO review and the concurrent HSS independent review of the fire protection program at the RPL found that the (safety significant) FSS was operable and was in compliance with DOE Order 420.1B, *Facility Safety*, and with the RPL FHA, DSA, and TSRs. The FSS was supplied with an adequate water supply at a pressure that exceeded the requirements and will ensure effective performance of the system when needed. The maintenance program and its implementation for the RPL fire protection system was sound and was shown effective for the components reviewed. Additionally, PNNL dedicates a FPE to the RPL who works in collaboration with the facility CSEs to adequately maintain the configuration of the FSSs.

However, the PNSO reviews identified several findings and areas that need improvement. For example, the clarity of the TSR for testing fire suppression dry piping needs improvement, the HFD BNA needs to be updated, and the RPL FHA should include an approved exception to the three-hour firewall separation and a list of the Codes of Record. Finally, the required scheduling interval for fire suppression piping inspections needs to be changed to a five-year interval.

Independent Oversight also reviewed the PNSO fire protection program oversight processes and determined that many aspects of PNSO oversight were appropriate and that PNSO received appropriate support from SC-CH.

7.0 OPPORTUNITIES FOR IMPROVEMENT

NONE

Appendix A
Supplemental Information

Dates of Review

Planning Visit:	March 11-15, 2013
Onsite Review:	March 18-29, 2013

Office of Health, Safety and Security Management

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Appendix B
Documents Reviewed

- Work Control Procedure ADM-016, Revision 16, December 11, 2012
- F&O Administrative Procedure Equipment ADM-081 Rev. 2 Out-of-Service Guidance, July 22, 2009
- F&O Administrative Procedure ADM-083 Rev. 4 Preventive Maintenance Deferral & Grace Periods, August 13, 2009
- F&O Administrative Procedure ADM-120 Impairments of Fire Protection Systems and Passive Protection Features, October 30, 2010
- F&O Administrative Procedure ADM-CM-057, PG-01, Rev. 0, Engineering Design Standards, September 26, 2012
- F&O Administrative Procedure ADM-CM-058, Rev. 7, Facility Modification Manual, December 20, 2012
- F&O Administrative Procedure ADM-FP-302, Revision 1, Creating or Revising a Facility Chemical Limit Technical Basis, December 01, 2011
- F&O Administrative Procedure ADM-FP-303, Revision 0, Building Fire Assessments, April 1, 2010
- F&O Administrative Procedure ADM-FP-304, Revision 0, Fire Protection Codes and Standards Authority Having Jurisdiction and Equivalencies, November, 1, 2010
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Appendix C
Interviews

- Facilities & Operations Team Lead
- Facilities & Operations Team Facility Representatives
- Facilities & Operations Team Nuclear Safety Specialist
- PNNL Fire Protection Engineer
- PNNL Cognizant System Engineers
- PNNL Authority Having Jurisdiction For Fire Protection
- Richland Fire Department
- Hanford Fire Department
- 300 Area Washington Closure Water Supply Personnel