

## U.S. Department of Energy

## Office of River Protection

P.O. Box 450, MSIN H6-60 Richland, Washington 99352

APR 1 7 2006

06-ESQ-033

Mr. J. P. Henschel, Project Director Bechtel National, Inc. 2435 Stevens Center Richland, Washington 99352

Dear Mr. Henschel:

CONTRACT NO. DE-AC27-01RV14136 – ASSESSMENT REPORT A-06-ESQ-RPPWTP-001 FIRE PROTECTION PROGRAM IMPLEMENTATION, FEBRUARY 6 THROUGH 17, 2006

This letter forwards the results of the U.S. Department of Energy (DOE), Office of River Protection (ORP), assessment of the Bechtel National, Inc. (BNI) Fire Protection Program Implementation, conducted from February 6 through 17, 2006 (attached). This assessment evaluated the implementation of BNI Fire Protection Program.

The assessors concluded BNI had implemented most fire protection elements as expected by DOE, with the exception of robust fire hazard controls in project warehouses and weaknesses identified in the implementation of fire protection system maintenance, where improvement is needed to protect DOE property. The assessors identified five Findings and six Observations.

BNI is requested to respond to the cited Findings with appropriate corrective actions and schedule for completion. Due to the significance of the lack of formalized fire protection facility assessments indicating a weakness with the integrated safety management system feedback and improvement loop for fire safety, a response to Observation A-06-ESQ-RPPWTP-001-O03 is also required. In addition, due to potential interior finish concerns involving plywood construction at the Marshalling Yard Warehouse, a response to Observation A-06-ESQ-RPPWTP-001-O06 is also required. Furthermore, you are requested to provide ORP with your strategy and identification for which fire systems will go in lay-up or operational modes as discussed in Observation A-06-ESQ-RPPWTP-001-O04. A response to the other Observations is not required.

Mr. J. P. Henschel 06-ESQ-033

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APR 17 2006

If you have any questions, please contact me, or your staff may call Robert C. Barr, Director, Office of Environmental Safety and Quality, (509) 376-7851.

Sincerely,

Roy . Schepens, Ma

Office of River Protection

ESQ:CPC

Attachment

cc w/attach:

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BNI Correspondence

Attachment 06-ESQ-033 A-06-ESQ-RPPWTP-001

## U.S. DEPARTMENT OF ENERGY Office of River Protection Environmental, Safety and Quality

ASSESSMENT:

Fire Protection Program Implementation

REPORT:

A-06-ESQ-RPPWTP-001

FACILITY:

Bechtel National, Inc. Waste Treatment and Immobilization Plant Facilities

LOCATION:

Hanford Site

Dates:

February 6 through 17, 2006

ASSESSORS:

Craig P. Christenson, Lead Assessor

Brian A. Harkins, Assessor Robert W. Griffith, Assessor

APPROVED BY:

Patrick P. Carier, Team Lead

Verification and Confirmation

## **Executive Summary**

The U.S. Department of Energy (DOE), Office of River Protection (ORP) conducted an assessment of the Bechtel National, Inc. (BNI) Fire Protection Program from February 6 through 17, 2006. This assessment evaluated the BNI Fire Protection Program and its implementation.

The assessors concluded BNI had implemented most fire protection elements as expected by DOE, with the exception of robust fire hazard controls in project warehouses and weaknesses identified in the implementation of fire protection system maintenance, where improvement is needed to protect DOE property and liabilities. As a result, the assessors identified the following Findings:

A-06-ESQ-RPPWTP-001-F01 -- Storage controls have not been established for the Marshalling Yard & Waste Treatment and Immobilization Plant (WTP) Site T-52 Warehouses to maintain the storage types and arrangements within the hydraulic delivery capabilities of the fire sprinkler systems. (Requirement NFPA 13, Chapter 5)

A-06-ESQ-RPPWTP-001-F02 -- Impaired fire barriers in the Marshalling Yard Warehouse would allow a fire to spread rapidly throughout the facility. (Requirement: NFPA 80, Chapter 15)

A-06-ESQ-RPPWTP-001-F03 -- Fire alarm system equipment testing is not performed by qualified and experience personnel and tests are not documented as required by NFPA 72. (Requirement NFPA 72, Section 10.2.2.5)

A-06-ESQ-RPPWTP-001-F04 -- A fire system impairment program has not been implemented consistent with the requirements of NFPA 25. (Requirement NFPA 25, Chapter 14)

A-06-ESQ-RPPWTP-001-F05 -- Inspection, testing, and maintenance of exit signs, emergency lighting, fire alarm systems, sprinkler systems in Marshalling Yard Warehouse is not conducted as required by National Fire Protection Association Codes. (Requirement NFPA 25, Chapter 10; NFPA72, Chapter 10; and NFPA 101, Section 4.6.12)

BNI is requested to respond to the cited Findings with appropriate corrective actions and schedule for completion.

In addition, the assessors identified six Observations indicating a need for programmatic improvement: BNI Management policy for fire protection does not include offsite WTP support facilities; BNI fire protection engineers do not conduct formalized fire protection facility assessments; DOE Fire Hazard Analyses Guidance is not fully incorporated; BNI has poorly implemented Fire Watch Requirements; wood construction in the Marshalling Yard Warehouse requiring life safety code evaluation for interior finish use; and installed fire systems are not put into service.

Observations were typically issues based on DOE fire protection guidelines rather than regulatory or contractual noncompliances. However, due to the significance of the lack of formalized fire protection facility assessments indicating a weakness with the integrated safety management system feedback and improvement loop for fire safety, a response to this Observation (A-06-ESQ-RPPWTP-001-O03) is required. In addition, due to potential interior finish concerns involving plywood construction at the Marshalling Yard Warehouse, a response to this Observation is also required (A-06-ESQ-RPPWTP-001-O06). Furthermore, you are requested to provide ORP with your strategy and identification for which fire systems will go in lay-up or operational modes (A-06-ESQ-RPPWTP-001-O04). A response to the other Observations is not required.

Details are contained in the attached report.

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## List of Acronyms

AFI	Assessment Follow-Up Item
BNI	Bechtel National, Inc.
BOF	Balance of Facilities
CAR	Corrective Action Report
DOE	U.S. Department of Energy
E&NS	Environmental and Nuclear Safety
FHA	Fire Hazard Analysis
IT&M	Inspection, Testing, and Maintenance
ITS	Important-to-Safety
LAW	Low-Activity Waste
NFPA	National Fire Protection Association
ORP	Office of River Protection
WTP	Waste Treatment and Immobilization Plant

## NFPA Standards

NFPA 13	Standard for the Installation of Sprinkler Systems
NFPA 25	Inspection, Testing, and Maintenance of Water-Based Fire
	Protection Systems
NFPA 72	National Fire Alarm Code®
NFPA 80	Standard for Fire Doors and Fire Windows
NFPA 101	Life Safety Code®

# Bechtel National, Inc, (BNI) Fire Protection Program Implementation Program Assessment

### 1.0 Details

The assessors investigated various performance objectives, using evaluation of documentation and interviews with the Contractor as the primary methods of data gathering to evaluate key fire protection assessment elements. The elements included programmatic and facility implementation areas within fire protection as specified in DOE G-420.1B-0, "DOE Implementation Guide for use with DOE Order 420.1 and 440.1 Fire Safety Program."

To evaluate fire protection program implementation, the assessors conducted physical tours of select Waste Treatment and Immobilization Plant (WTP) operating facilities, including the WTP Simulator Building, Marshalling Yard Building, Energy Northwest Leased Facilities, T-52 Warehouse, T1 Office Support Building, Site Fabrication Shop, Low-Activity Waste (LAW) Building, and the Fireproofing Buildings.

## 1.1 Performance Objective FP1

This performance object was to determine if the contractor addressed essential fire protection program elements required by contractual requirements.

To evaluate this area, the assessors:

- Reviewed key BNI procedures and policies;
- Conducted interviews with staff Fire Protection Engineers, Environmental and Nuclear Safety (E&NS) Management, and Construction Management; and
- Reviewed in-process LAW facility preliminary fire hazard analysis (FHA).

Overall the assessors concluded BNI met the performance objective but noted areas for improvement which are identified as the following Observations:

A-06-ESQ-RPPWTP-001-O01 - BNI Management policy for fire protection does not include offsite WTP support facilities. U.S. Department of Energy (DOE) fire related liabilities exist in offsite WTP support facilities, such as in the Marshalling Yard Warehouse Building, Energy Northwest Lease Warehouse, and other temporary/non-permanent facilities. Since a fire in any of these facilities could negatively impact on personnel life safety, property loss, or schedule to complete the WTP facility, BNI should widen their policies and procedures to clearly include any areas for the project where DOE liability or risk exists as a result of fire.

A-06-ESQ-RPPWTP-001-O02 - DOE Fire Hazard Analyses Guidance is not fully incorporated by BNI. The preliminary fire hazard analyses currently under development for the WTP do not include descriptions for technical areas specified in the DOE fire protection guidance contained in DOE G 420.1A. This includes DOE guidance to analyze and describe fire hazards created by direct flame impingement, hot gases, fire-fighting water damage, and document the technical bases for determining recovery potential following a fire.

### Conclusions for Performance Objective FP1

### **Essential Fire Protection Program Elements**

The WTP Contractor Fire Protection Program is defined in accordance with contract and Safety Requirement Document requirements and Site contractor implementing mechanisms are compliant with DOE expectations. The assessors reviewed a number of the BNI, WTP fire protection program procedures, and determined to a large degree the procedures address the majority of these written programmatic requirements as expected by DOE. BNI has a signed fire protection policy statement from senior management incorporating the basic DOE fire protection program objectives necessary to minimize the occurrence and consequences of a fire and maintain property losses from fire within limits established by DOE. However, the project policy statement is applicable specifically to the "WTP facility" and may not necessarily be directed applied to other project areas where Government property could be exposed to fire hazards, impacting the cost and programmatic delivery of the facility (A-06-ESQ-RPPWTP-001-001).

The BNI fire protection program document describes and delineates the basic roles and responsibilities of the overall fire protection program to Area Managers, Engineering, Operations, Construction, the fire department, etc., and additional project procedures are provided to address various hazards on the site, including but not limited to, hazardous work permits, combustibles, welding compressed gas cylinders, and fire prevention. While it was not the scope of this assessment to review specific design documents for the WTP, the assessors reviewed the engineering process to see if BNI had a process for qualified fire protection engineers to be involved in the design of the WTP. The assessors determined WTP facilities are being designed with suppression and alarm systems and BNI fire protection engineers are actively involved in design document reviews and procedure development. Interviews also verified BNI fire protection engineers are involved in the oversight of the design process and engineering related specifically to the WTP suppression and fire alarm systems.

The assessors reviewed the written exemption and equivalency process BNI has for reviewing and recommending approval of fire safety related exemptions and equivalencies. The process requires a qualified fire protection engineer to be included in the review prior to submission to the DOE Office of River Protection (ORP). Although BNI has submitted an equivalency request and has involved their fire protection engineers, ORP has yet to approve any of these requests for various technical and programmatic reasons.

BNI is also developing formalized fire hazard analyses for the WTP which are being written by fire protection engineers as required by DOE. The assessors reviewed the in-progress preliminary FHA for LAW and determined DOE FHA guidance is not fully incorporated. This

includes DOE guidance to analyze and describe fire hazards created by direct flame impingement, hot gases, fire-fighting water damage, and document the technical bases for determining recovery potential following a fire (A-06-ESQ-RPPWTP-001-O02).

## 1.2 Performance Objective FP2

This performance object was to evaluate whether fire protection program commitments are implemented by BNI and whether an adequate number of technically competent, experienced, and fully qualified personnel are assigned to address the fire protection commitments.

To evaluate this area, the assessors:

- Reviewed BNI organization structure and conducted interviews of BNI fire protection engineers, technicians, managers, and construction personnel;
- Reviewed key fire protection program procedures and documents;
- Conducted physical facility tours of select WTP operating facilities to determine the level of effective implementation of the fire protection program;
- Interviewed BNI fire protection engineers and technicians to evaluate fire related engineering and design review process; and
- Reviewed a large number of E&NS Program Assessments and BNI Fire Safety Walk downs from 2002 through 2006 (documented in various memorandums, reports, and e-mail, 2002 through 2006).

Overall, the assessors concluded BNI did not meet the performance objective mainly due to deficiencies in analyzing fire hazards and implementing controls in the non-nuclear related project facilities and weaknesses identified in the implementation of fire protection system maintenance.

The assessors identified the following Findings and Observations:

### Findings:

A-06-ESQ-RPPWTP-001-F01 -- Storage controls have not been established for the Marshalling Yard & WTP Site T-52 Warehouses to maintain the storage types and arrangements within the hydraulic delivery capabilities of the fire sprinkler systems (Requirement: National Fire Protection Association [NFPA] 13, Chapter 5).

### Marshalling Yard Warehouse

Although the fire protection systems in the Marshalling Yard and T-52 warehouses have installed sprinkler systems, the systems are not designed to control fires for all of the commodities stored in the facilities. The Marshalling Yard Warehouse building was designed for use as a vehicle repair garage, having a sprinkler system designed for an NFPA 13, "Ordinary

Hazard Class II (combustibility of contents are moderate to high, stockpiles do not exceed 12 ft, and fires with moderate to high rates of heat release are expected)." However, the building is now being used as a warehouse and has stockpiles in excess of 20 ft containing materials which would release high challenge rates of heat in a fire. These materials include plastic computers and monitors fully encapsulated on pallets and high piled storage in wooden crates on rack storage. NFPA considers these Class III and IV commodities, requiring a more robust hydraulically designed system than currently installed.

It is predicted that a fire involving the high fire challenge materials in the Marshalling Yard Warehouse is expected to quickly overcome the installed sprinkler system, spread to the combustible roof structure and completely destroy the building and its contents.

The Marshalling Yard Warehouse storage also includes, unique valves, stainless steel pumps, transformers, equipment which has special quality assurance reviews, and other unique one-of-a kind plant equipment, for installation at the WTP site. A fire in this facility could deleteriously impact the overall cost and programmatic construction schedule of the WTP facility because this equipment would be damaged or completely destroyed in a fire.

### T-52 Warehouse

The T-52 warehouse is a multi-level structure located on the WTP construction site and is currently being used to stage immediate use equipment and materials to support WTP construction. The assessors observed large quantities of plastic bins in boxes stacked fairly high in the upper area of the facility mezzanine of this facility, rubber "elephant trucks" (rubber rolls used for placing concrete), stacked on pallets and totally encapsulated by shrink wrap placed on rack storage, and other combustible plastic materials which are considered Class IV commodities by NFPA 13. However, the sprinkler systems in T-52 are designed to only handle a Class III commodity with the current water supply, which would not supply enough water to extinguish materials involving Class IV commodity fires. The assessors determined the T-52 sprinkler system is capable of handling a Class IV commodity fire, but only once the WTP fire water pump house and water tank supply are placed into service. Currently the WTP fire water pump house and water tank supply has not been placed into operation.

### Energy Northwest Leased Warehouse

The assessors also toured the Energy Northwest Leased facility warehouse (know by Energy Northwest as the "Warehouse 2-4"), which contains WTP property. The assessors did not note any concerns for the storage arrangements for the sprinkler systems installed in this facility.

## Analyzing Fire Hazards and Developing Storage Controls

It was not within the time frame or scope of this assessment to fully analyze fire hazards and determine the appropriate controls. Therefore a facility documented assessment, including analysis by a qualified fire protection engineer, should be commissioned by BNI that includes strategies to continue using the Marshalling Yard Warehouse with modification of the storage and its arrangement. Similarly, BNI should also develop similar controls and strategies for the

T-52 and Energy Northwest Leased facilities to ensure delivery capacities of the installed fire sprinkler systems are not exceeded by warehouse commodities.

A-06-ESQ-RPPWTP-001-F02 -- Impaired fire barriers in the Marshalling Yard Warehouse would allow a fire to spread rapidly throughout the facility (Requirement: NFPA 80, Chapter 15).

The assessors observed fire barriers with fire doors which will not all automatically close in a fire and unprotected openings in the barriers which would allow a fire to quickly spread throughout the Marshalling Yard Warehouse. Fire walls are typically installed in a facility to limit the spread of fire and damage to one area. However, since these important fire features are currently not functional along with the concerns for the fire sprinkler systems noted above, it is expected a fire in this building would quickly spread to the combustible roof structure and complexly destroy the building and its contents.

BNI should evaluate the Marshalling Yard Warehouse fire barriers as a control method consistent with warehouse storage control considerations.

A-06-ESQ-RPPWTP-001-F03 -- Fire alarm system equipment testing is not performed by qualified and experience personnel and tests are not documented as required by NFPA 72 (Requirement: NFPA 72, Section 10.2.2.5).

NFPA 72, Section 10.2.2.5 requires fire alarm maintenance personnel to be qualified and experienced in the inspection, testing, maintenance of fire alarms systems, and NFPA 72, Section 10.6.2.3, requires a record of all inspections, testing, and maintenance to be provided following NFPA 72. The contractor is not meeting these requirements.

Deficiencies with fire protection system testing were previously identified by ORP Facility Representative "Inspection Report" A-05-AMWTP-RPPWTP-003-28 dated July 2005. ORP assessment follow-up item (AFI), A-05-AMWTP-RPPWTP-003-A01, was used to track the issues and the contractor issued Corrective Action Report 05-192 with two Recommendations and Issues Tracking System items (05-799 and 05-801). The assessors interviewed WTP site maintenance during this assessment and were told that corrective actions for the 2005 inspection report were in place and actions were corrected. However, the assessors reviewed a fire alarm system battery test at the T1 Office Building and determined the following:

- Four out of five multi-meters being used for the test were out of calibration;
- The workers did not have work instructions with them while they conducted the activity and no instruction was in place on how to actually perform the battery load voltage test;
- No personnel qualified in the inspection, testing, and maintenance of fire alarm systems was present to oversee or conduct the activity during the test.

Examples of qualifications required by NFPA 72 include:

1) Factory trained and certified;

- 2) National Institute for Certification in Engineering Technologies fire alarm certified;
- 3) International Municipal Signal Association fire alarm certified;
- 4) Certified by a state or local authority; or
- 5) Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.
- There were no instructions on how to return the fire panel to service or any process to check to ensure the panel was correctly returned to service after the test was completed;
- The testing did not appear to meet the testing requirements of NFPA 72, Table 10.4.2.2 5(e) because the maximum load required was not being applied during the test;
- Results of the testing were not being documented in a retrievable form consistent with NFPA 72. Test results must be retrievable for one year and a record needs to incorporate basic information about the test including the date, what was done, frequency, and the results;
- This Finding also indicates ineffective corrective action; and
- Because the same issues were identified during this assessment, AFI A-05-AMWTP-RPPWTP-003-A01 from 2005 will be closed and a new Finding will be established by this assessment.

A-06-ESQ-RPPWTP-001-F04 -- A fire system impairment program has not been implemented consistent with the requirements of NFPA 25 (Requirement: NFPA 25, Chapter 14).

NFPA 25, Chapter 14 requires measures which must be taken during the impairment of a suppression system to ensure increased risks are minimized and the duration of the impairment is limited. Such measures include:

- Impairment Coordinator;
- Impairment Tag System (Not the same as lock and tag);
- Preplanning Impairment actions and procedures including compensatory measures, fire watches, management and worker notifications, fire department notifications, etc.; and
- Verification of System Working Order and restoration of system to service.

The assessors determined that some measures are in place to address fire hydrant impairments but there is no overall program in place to address impairments for all fire systems within the WTP.

A-06-ESQ-RPPWTP-001-F05 -- Inspection, testing, and maintenance of exit signs, emergency lighting, fire alarm systems, sprinkler systems in Marshalling Yard Warehouse is not conducted as required by National Fire Protection Association Codes (Requirements: NFPA 25, Chapter 10; NPFA 72, Chapter 10; and NFPA 101, Section 4.6.12).

The assessors reviewed inspection, testing, and maintenance (IT&M) records for fire protection features of the Marshalling Yard Warehouse and determined that fire sprinkler and alarm systems are not be conducted at the frequencies required by NFPA. A quick review of the sprinkler and fire alarm records and interviews with BNI indicate the monthly, semi-annual, quarterly IT&M for sprinklers and fire alarms are not being done and the records for the annual maintenance were not of adequate quality because the records noted "operational system defects" without identifying what the defects were and whether they were corrected.

The assessors also determined that IT&M of the Marshalling Yard Warehouse life safety systems, including, exit signs and emergency lighting, are not being conducted as required by NFPA 101. Prior to completion of the assessment, BNI conducted some testing, determining that one life safety item was not functional, and repair was initiated.

### **Observations:**

**A-06-ESQ-RPPWTP-001-O03 - BNI fire protection engineers do not conduct formalized fire protection facility assessments.** The DOE assessment program identified in DOE
O 420.1A, "Facility Safety," and the DOE fire protection guide typically requires a contractor to implement a formalized fire protection facility assessment program by qualified fire protection engineers. The DOE facility assessment provides technical fire safety oversight of a facility as the integrated safety management system feedback and improvement loop for fire protection. Since BNI does not integrate fire protection engineers in routinely scheduled assessments following the DOE fire protection guidance, facility oversight management may not be made aware of facility fire protection deficiencies, hazards, and necessary improvements. Although BNI fire protection engineers conduct program assessments and fire safety walk downs at the WTP site on a case by case/ad hoc basis for Construction Safety Assurance, the walk downs are not conducted by a formalized process or procedure, which includes elements and frequency of reviews, based on overall risk to the project.

A-06-ESQ-RPPWTP-001-O04 - Installed fire systems at the WTP have not put into service. BNI has completed installations of fire systems in the steam plant, fire water pump house, and Balance of Facilities (BOF)/Important-to-Safety (ITS) switchgear facilities. However, these systems have not been put into service consistent with BNI procedure Section 3.2.3 of 24590-WTP-GPP-SIND-026, Revision 3, Housekeeping and Fire Prevention and BNI lacks clear strategy and identification for which systems will go in lay-up or operational modes.

## Conclusions for Performance Objective FP2

### Fire Protection Staffing

This Assessment concluded the project is staffed with qualified fire protection engineering resources. One area of deficiency was the lack of qualifications for personnel performing the inspection, testing, and maintenance of fire related equipment (A-06-ESQ-RPPWTP-001-F03).

### Fire Protection Program Implementation

The assessors noted the WTP nuclear facilities, as designed, meet the primary DOE fire protection requirements, including installed fire protection systems and equipment as required by DOE O 420.1A. However, during the facility portion of the assessment, the assessors noted deficiencies associated with other facilities which impact the WTP construction, including fire protection implementation at the Marshalling Yard and WTP Site T-52 Warehouses. While fire protection systems in Marshalling Yard and T-52 Warehouses have installed sprinkler systems, these systems are not designed to control fires for all the commodities currently stored in these facilities and controls have not been established for building management and operations to maintain the commodity within the hydraulic delivery capabilities of the sprinkler systems (A-06-ESQ-RPPWTP-001-F01).

In addition, the assessors observed fire barriers with fire doors which will not all automatically close in a fire and unprotected openings in the barriers which would allow a fire to quickly spread throughout the Marshalling Yard Warehouse (A-06-ESQ-RPPWTP-001-F02).

In response to the deficiencies identified by in this performance objective, BNI issued a plan to assess the WTP storage, which included sprinkler system design, building occupancy, and life safety related concerns. However, the plan does not specifically address evaluation of the Marshalling Yard Warehouse fire barriers. BNI should evaluate the Marshalling Yard Warehouse fire barriers as a control method consistent with other warehouse storage control considerations.

## Inspection, Testing, and Maintenance of Fire Related Equipment

The assessors noted a number of concerns in this area, including fire related systems which have been installed but have not yet been brought into service (systems in the steam plant, BOF/ITS switchgear facilities and the water supply pumping house), fire alarm systems which are not being maintained by qualified personnel as required by NFPA 72, concerns for the uses of leased facilities containing DOE property having fire protection systems where inspection, testing, and maintenance is not being conducted, and a lack of a formalized fire system impairment program consistent with NFPA requirements (A-06-ESQ-RPPWTP-001-F04, F05, and A-06-ESQ-RPPWTP-001-O04).

In the past, ORP has found problems with emergency lighting at the WTP site and BNI has documented these issues in Corrective Action Report (CAR) 24590-WTP-CAR-QA-05-282. The CAR has been closed and the corrective actions were verified by the assessors, during this review and found adequate, closing AFI A-05-AMWTP-RPPWTP-003-A03.

## Fire Protection Design

The assessors concluded the WTP project has a number of fire protection engineers with various levels of experience on the project. While it was not the scope of this assessment to review design documents and specifications for the WTP, the assessors reviewed WTP engineering to determine if BNI has a process in place to ensure fire protection is being incorporated into the design of the WTP and whether or not qualified fire protection engineers are involved in plan and specification review. The assessors determined WTP principle facilities are being designed with suppression and alarm systems and BNI fire protection engineers are actively involved in design document reviews including review and development of procedures and design drawings.

### **Program and Facility Assessments**

The assessors concluded the BNI fire protection engineers perform routine assessments of the overall WTP fire protection program. However the fire protection engineers only conduct fire safety walk downs at the WTP site on a case-by-case/ad hoc basis for Construction Safety Assurance and the walk downs are not conducted by a formalized process or procedure, which includes elements and frequency of reviews, based on overall risk to the project. Since BNI does not integrate the fire protection engineers in routinely scheduled assessments following the DOE fire protection guidance, facility oversight management may not be made aware of facility fire protection deficiencies, hazards, and necessary improvements (A-06-ESQ-RPPWTP-001-003).

### 1.3 Performance Objective FP3

This performance object was to determine if the contractor has implemented comprehensive elements into the fire protection program including, fire safety training to employees, life safety provisions into facilities, and fire prevention methods to minimize facility fire risks and fire loss potential.

To evaluate this area, the assessors:

- Reviewed general personnel fire safety training procedures and interviewed personnel;
- Observed NFPA 101, "Life Safety Code" requirements in new WTP facility design and implementation of NFPA 101 in existing buildings;
- Reviewed fire prevention inspection procedures and conducted physical facility tours to determine implementation of combustible controls including flammable, radioactive, and hazardous materials to minimize the risk from fire; and
- Conducted physical facility tours of select WTP operating facilities to determine if property is protected in accordance with DOE Orders, codes, and standards with the appropriate fire protection systems and methods.

Overall, the assessors concluded BNI met the performance objective but noted concerns for poorly implemented fire watch requirements at the WTP construction site and plywood

construction in the Marshalling Yard Warehouse which has not been evaluated for interior finish use under the Life Safety Code.

### Observations:

A-06-ESQ-RPPWTP-001-O05 – BNI has not implemented robust fire watch requirements. The assessors reviewed procedural implementation of the fire watch program and determined there is no evidence BNI has formally implemented the fire watch program at the construction site. The assessors determined the training requirements for performing the duties of a fire watch are not defined. Interviews with field personnel determined most construction site personnel did not know the qualifications and duties of a person performing fire watch. In addition, personnel in the field do not know the requirements of a fire watch, including the responsibilities and who can perform the actual duties of a fire watch.

A-06-ESQ-RPPWTP-001-O06 – Wood construction in the Marshalling Yard Warehouse has not been evaluated for interior finish use under the Life Safety Code. The assessors observed interior office spaces including walls, ceilings, and other locations such as tool storage area walls throughout the Marshalling Yard Warehouse which were constructed out of untreated plywood and other wooden materials. This construction may not meet requirements of NFPA 101, which requires interior finish to have a flame spread rating of less than 200 and a smoke development less than 450. Once ignited, significant amount of exposed plywood could quickly permit the spread of fire and create massive amounts of smoke deleteriously affecting personnel life safety in this facility. Due to fire characteristic variations of specific plywood manufacturers, BNI should evaluate the actual plywood material installed in the warehouse against NFPA 101, Life Safety requirements.

## Conclusions for Performance Objective FP3

### **General Fire Safety Training**

The Contractor has implemented the necessary fire safety training which includes the required basic elements to employees. Personnel on-the-job site interviewed were knowledgeable of how to identify and report a working fire.

### Life Safety Code Implementation

For the most part, life safety is being incorporated into facility design and operations as required by NFPA 101. Life safety provisions, such as obstructions to egress, exit signs, emergency lighting, and door swings and ease of opening, are generally adequately addressed throughout the majority of operational and construction facilities. However, during the facility portion of the assessment, the assessors noted concern at the Marshalling Yard Warehouse because it contained a significant amount of exposed plywood which could quickly permit the spread fire and create massive amounts of smoke if a fire started. Interior finish in the Marshalling Yard Warehouse may exceed flame spread and smoke developed ratings of the NFPA 101 and these types of materials have not been evaluated by BNI (A-06-ESQ-RPPWTP-001-006).

### **Fire Prevention**

The assessors found evidence of fire prevention inspections (field walk downs) being performed at the construction site facilities and procedures to control combustible, flammable, and hazardous materials to minimize the risk from fire. As discussed in Performance Objective FP.2, documented routine facility assessments are not being conducted by qualified fire protection engineers under a formalized process and procedure throughout all facilities impacting the WTP. The assessors also reviewed procedural implementation of the fire watch program and determined there is no evidence the fire watch program has been formally implemented at the construction site (A-06-ESQ-RPPWTP-001-O05).

### 2.0 Conclusion

Following the review of procedures and records, completion of interviews, and tours of select WTP facilities, the assessors concluded BNI has implemented most fire protection elements as expected by DOE, with the exception of robust fire hazard controls in project warehouses and weaknesses identified in the implementation of fire protection system maintenance. These deficiencies are identified above in five Findings and six Observations, as discussed above.

## 3.0 Items Opened, Closed, and Discussed

## **Opened**

A-06-ESQ-RPPWTP-001-F01	Finding	Storage controls have not been established for the Marshalling Yard and WTP Site T-52 Warehouses to maintain the storage types and arrangements within the hydraulic delivery capabilities of the fire sprinkler systems.
A-06-ESQ-RPPWTP-001-F02	Finding	Impaired fire barriers in the Marshalling Yard Warehouse would allow a fire to spread rapidly throughout the facility.
A-06-ESQ-RPPWTP-001-F03	Finding	Fire alarm system equipment testing is not performed by qualified and experience personnel and tests are not documented as required by NFPA 72.
A-06-ESQ-RPPWTP-001-F04	Finding	A fire system impairment program has not been implemented consistent with the requirements of NFPA 25.
A-06-ESQ-RPPWTP-001-F05	Finding	Inspection, testing, and maintenance of exit signs, emergency lighting, fire alarm systems, sprinkler systems in Marshalling Yard Warehouse is not conducted as required by NFPA Codes.
A-06-ESQ-RPPWTP-001-F06	Finding	Wood construction in the Marshalling Yard Warehouse not compliant with NFPA Life Safety requirements.
A-06-ESQ-RPPWTP-001-O01	Observation	BNI Management policy for fire protection does not include offsite WTP support facilities.
A-06-ESQ-RPPWTP-001-O02	Observation	DOE Fire Hazard Analyses Guidance is not fully incorporated by BNI.
A-06-ESQ-RPPWTP-001-O03	Observation	BNI fire protection engineers do not conduct formalized fire protection facility assessments.
A-06-ESQ-RPPWTP-001-O04	Observation	Installed fire systems at the WTP have not put into service.
A-06-ESQ-RPPWTP-001-O05	Observation	BNI has not implemented robust fire watch requirements.
A-06-ESQ-RPPWTP-001-O06	Observation	Wood construction in the Marshalling Yard Warehouse has not been evaluated for interior finish use under the Life Safety Code.

### Closed

The assessors evaluated BNI actions and closed the following AFIs with a brief justification summary:

A-05-AMWTP-RPPWTP-003-A01

AFI

The same deficiencies were identified during this assessment and new Finding A-06-ESQ-

A-05-AMWTP-RPPWTP-003-A03

RPPWTP-001-F03 will track these issues. Emergency lighting preventive maintenance AFI

procedures have been implemented at the WTP

site.

## Discussed

None.

**Signatures** 

Craig P. Christenson

Lead Assessor

Assessor

Assessor

E-STARS Page 1 of 2

## Task# ORP-ESQ-2006-0035

E-STARS<sup>™</sup> Report Task Detail Report 04/17/2006 0739

TASK INFORMATI	ON		
Task#	ORP-ESQ-2006-0035		
Subject	CONCUR:06-ESQ-033; ASSESSMENT PROTECTION PROGRAM IMPLEMENTA		
Parent Task#		Status	CLOSED
Reference	06-ESQ-033	Due	
Originator	Gano, Becky	Priority	High
Originator Phone	(509) 376-6004	Category	None
Origination Date	03/22/2006 0910	Generic1	annet ann an deir de ann an ann an ann an ann an a
Remote Task#		Generic2	
Deliverable	None	Generic3	
Class	None	View Permissions	Normal
ROUTING LISTS	MGR RDG FILE C.M.FETTO, DEP S.J.OLINGER, DEP R.C.BARR, ESQ P.P.CARIER, ESQ C.P.CHRISTENSON, ESQ J.J.SHORT, PA R.W.GRIFFITH, WED J.R.ESCHENBERG, WTP B.A.HARKINS, WTP RECORD NOTE:		
	Route List		Inactive
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1	Christenson, Craig P - Review - Co	ncur with comments - 03/22	
1	Christenson, Craig P - Review - Co     Instructions:		1
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1	<ul> <li>Christenson, Craig P - Review - Co Instructions:</li> <li>Carier, Patrick P - Review - Concur</li> </ul>	- 03/28/2006 1615	
1	<ul> <li>Christenson, Craig P - Review - Co Instructions:</li> <li>Carier, Patrick P - Review - Concur Instructions:</li> <li>Barr, Robert C - Review - Concur -</li> </ul>	- 03/28/2006 1615 03/28/2006 1615	
1	<ul> <li>Christenson, Craig P - Review - Co Instructions:</li> <li>Carier, Patrick P - Review - Concur Instructions:</li> <li>Barr, Robert C - Review - Concur - Instructions:</li> <li>Griffith, Robert W - Review - Concur</li> </ul>	- 03/28/2006 1615 03/28/2006 1615 ur - 03/22/2006 1431	./2006 1131

E-STARS

	Task# ORP-ESQ-2006-0035		
	Hamel, William F - Review - Cancelled - 04/17/2006 0741     Instructions:		
	Eschenberg, John R - Review - Cancelled - 04/17/2006 0741     Instructions:		
	Short, Jeff J - Review - Cancelled - 04/17/2006 0741     Instructions:		
	Olinger, Shirley J - Review - Concur - 04/10/2006 1607     Instructions:		
	<ul> <li>Schepens, Roy J - Approve - Approved - 04/03/2006 1231 Instructions:</li> </ul>		
ATTACHMENTS			
Attachments	<ol> <li>06-ESQ-033 att Assessment Report A-06-ESQ-RPPWTP-001.doc</li> <li>06-ESQ-033 BNI LTR Assessment Report A-06-ESQ-RPPWTP-001.doc</li> <li>Background Assessment Notes A-06-ESQ-RPPWTP-001.pdf</li> <li>Background BNI Comments w/ORP Dispositions.pdf</li> </ol>		
COLLABORATIO	ON N		
COMMENTS			
Poster	Christenson, Craig P (Christenson, Craig P) - 03/22/2006 1103		
	Concur		
	Concur with comments (cpc 3-22-06)		
Poster	Gano, Becky (Derryberry, Lori) - 04/17/2006 0704		
	CLOSED		
	all have concurred via hard copy		
TASK DUE DAT	E HISTORY		
No Due Date Hi	istory		
SUB TASK HIST	TORY		
No Subtasks			

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### **E-STARS**

## Task# ORP-ESQ-2006-0035

E-STARSTM Report Task Detail Report 03/22/2006 0914

TASK INFORMATI			
Task#	ORP-ESQ-2006-0035		
Subject	CONCUR:06-ESQ-033; ASSESSMENT REPORT A-06-ESQ-RPPWTP-001 FIRE PROTECTION PROGRAM IMPLEMENTATION, FEBRUARY 6 - 17, 2006		
Parent Task#		Status	Open
Reference	06-ESQ-033	Due	
Originator	Gano, Becky	Priority	High
Originator Phone	(509) 376-6004	Category	None
Origination Date	03/22/2006 0910	Generic1	
Remote Task#		Generic2	}
Deliverable	None	Generic3	
Class	None	View Permissions	Normal
Instructions	Correspondence is being routed for concurrence via hard copy instead of electronically. Once you		

receive the correspondence, please approve or disapprove electronically via E-STARS and route to next person on the routing/concurrence list.

ESQ OFF FILE

ESQ RDG FILE MGR RDG FILE C.M.FETTO, DEP S.J.OLINGER, DEP R.C.BARR, ESQ P.P.CARIER, ESQ C.P.CHRISTENSON, ESQ J.J.SHORT, PA R.W.GRIFFITH, WED

J.R.ESCHENBERG, WTP **B.A.HARKINS, WTP** 

RECORD NOTE:

Instructions.

#### **ROUTING LISTS**

Route List Active Christenson, Craig P - Review - Awaiting Response Instructions: Carier, Patrick P - Review - Awaiting Response Instructions: Barr, Robert C - Review - Awaiting Response Instructions: Griffith, Robert W - Review - Awaiting Response Instructions: Harkins, Brian A - Review - Awaiting Response Instructions: Hamel, William F - Review - Awaiting Response Instructions: Eschenberg, John R - Review - Awalting Response

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	• Short, Jeff J - Review - Awaiting Response Instructions:  48/06
	Olinger, Shirley J - Review - Awaiting Response  Instructions: 19 50 + 10
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ATTACHMENTS	
Attachments	<ol> <li>06-ESQ-033 att Assessment Report A-06-ESQ-RPPWTP-001.doc</li> <li>06-ESQ-033 BNI LTR Assessment Report A-06-ESQ-RPPWTP-001.doc</li> </ol>
COLLABORATION	
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No Comments	
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SUB TASK HISTOR	· · · · · · · · · · · · · · · · · · ·
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# **BACKGROUND**

(PLEASE SCAN)

LETTER # 06-65Q-033

Assessment Note Number: A-06-ESQ-RPPWTP-001

Assessors: Craig P. Christenson, Lead Assessor

Brian A. Harkins, Assessor Robert W. Griffith, Assessor

Dates of Assessment: February 6 through 17, 2006

Areas/Items Inspected: Fire Protection Program Implementation, Bechtel National,

Inc. (BNI), Waste Treatment Plant (WTP) Facilities

The DOE Office of River Protection (ORP) assessors evaluated fire protection program at the BNI WTP Facilities, using evaluation of documentation and interviews with the Contractor defined personnel as the primary methods of data gathering as delineated in the attached fire protection program criteria review and approach document (CRAD) and facility tours to observe effective program implementation. The fire protection CRAD is based on key assessment elements specified in DOE G-420.1B-0, DOE Implementation Guide for use with DOE Order 420.1 and 440.1 Fire Safety Program, which include the following:

### 1. Programmatic:

- Comprehensiveness of the fire protection program.
- Procedures for engineering design and review.
- Procedures for maintenance, testing, and inspection.
- Fire protection engineering staff (number, qualifications, training).
- Management support.
- Exemptions and documented equivalencies.

### 2. Facility Implementation:

- Fire protection of safety class equipment.
- Life safety considerations.
- Fire protection of high value property.
- Fire suppression equipment.
- Completeness of fire hazards analyses.
- Fire barrier integrity.
- Completeness of fire loss potential (MPFL/MCFL) determinations.
- Fire safety training.
- Inspection, testing, and maintenance reports.
- Adequacy of facility assessments reports.
- Administrative controls.
- Temporary protection and compensatory measures.
- Conformance with applicable Orders, codes and standards.

The assessors do Criteria.	cumented the results of the assessment in Attached Performance Object			ojective
Submitted By: _	/s/ Craig P. Christenson	Date:	03/20/06	

### Attachment

## **Performance Objective Criteria**

Fire Protection Program Implementation Bechtel National, Inc. (BNI), Waste Treatment Plant (WTP) Facilities February 6 through 17, 2006

### PERFORMANCE OBJECTIVE FP.1

Fire Protection elements are addressed by basic program features of the Fire Protection Program required by contractual requirements.

#### Criteria:

- 1. The Waste Treatment and Immobilization Plant (WTP) Contractor Fire Protection Program is defined in accordance with contract and Safety Requirement Document requirements (24590-WTP-SRD-ESH-01-001-02, DOE O 420.1A, 10 CFR 830B).
- 2. Site contractor implementing mechanisms are compliant with DOE expectations (DOE O 420.1-1):
  - Policy statement confirms management commitment to the Fire Protection Program complying with applicable requirements.
  - Comprehensive program description exists.
  - Robust, written Fire Safety Procedures and plans exist.
  - The Program incorporates functions and principles of Site Integrated Safety Management System.
- 3. Fire Hazard Analyses (FHA) are being prepared for each nuclear facility and the results integrated into the Safety Analysis, the Documented Safety Analysis (DSA) and Technical Safety Requirements (TSR) as required. (DOE G-420.1/B-0)
- 4. Administrative controls and compensatory measures are adequately identified and meet the intent for which they are established and there is a formalized process for maintaining administrative controls and compensatory measures. (DOE O 420.1A)

### Approach:

### Record Review:

Site contract list; Site Contractor fire protection program policy and implementing documentation; Records of any fire safety equivalencies and exemptions.

### Interviews:

WTP fire protection program managers, professional engineers, and FP system engineers. Line managers through whom fire protection program personnel report.

### Observations:

Verify the implementation are current compared to existing hazards and basis documents. Existing hazards for which the administrative controls or compensatory measures should be field verified.

### PROCESS:

#### **Records Reviewed:**

#### **BNI Documents:**

- 24590-WTP-GPP-SIND-009, Rev.3, Safety Watches, September 28, 2005
- 24590-WTP-GPP-SIND-013, Rev. 3, Hazardous Work Permit, April 30, 2004
- 24590-WTP-GPP-SIND-026, Rev. 3, Housekeeping and Fire Prevention, December 30, 2004
- 24590-WTP-GPP-SIND-035, Rev. 2, Welding and Cutting Safety
- 24590-WTP-GPP-SIND-051, Rev. 1, Marshalling Yard Emergency Action and Fire Prevention Procedure, December 23, 2004
- 24590-WTP-GPP-SRAD-042, Rev. 0, Control of Combustibles, March 1, 2003
- 24590-WTP-GPP-SRAD-043, Rev.0, Hot Work Permit, March 1, 2003
- 24590-WTP-GPP-SRAD-044, Rev. 0, Fire Patrol and Fire Watch, March 1, 2003
- 24590-WTP-GPP-SRAD-049, Rev. 0, Non-Statutory Fire Protection Exemptions and Equivalencies, May 15, 2003
- 24590-WTP-GPP-SRAD-057, Rev.0, Welding and Cutting Safety, March 1, 2003
- 24590-WTP-GPP-SRAD-058, Rev.0, Compressed Gas Cylinders, March 1, 2003
- 24590-WTP-GPP-SRAD-059, Rev. 0, Fire Prevention, March 1, 2003
- 24590-WTP-GPP-SRAD-063, Rev. 0, Inspection, Testing and Maintenance of Fire Doors and Fire Dampers, March 1, 2003
- 24590-WTP-GPP-SRAD-064, Rev. 0, Inspection of Fire Rated Walls, Ceilings, Floors and Fire Penetrations, March 1, 2003
- 24590-WTP-PL-ESH-02-004, Rev. 2, WTP Fire Protection Program, January 1, 2005
- 24590-WTP-PL-ESH-02-009, Rev. 0, Fire Safety Management Assessment Plan CY04-07, December 29, 2003
- 24590-WTP-PL-IS-01-001, Rev. 5, Nonradiological Worker Safety and Health Plan, November 30, 2004
- 24590-WTP-RPT-CON-05-007, Rev. 0, List of Applicable NFPA Codes and Standards to Construction Activities Involving Non-Permanent Plant Installed and Maintenance
- 24590-WTP-RPT-FP-04-0002, Rev. 1, List of Applicable NFPA Codes and Standards to Design
- 24590-WTP-RPT-OP-05-002, Rev. 0, List of Applicable NFPA Codes and Standards to Commissioning
- 24590-WTP-SRD-ESH-01-001-02, Rev. 3j., Safety Requirements Document, Volume II, August 17, 2004
- 24590-WTP-3DP-G04T-00913, Rev. 4, Engineering Department Project Instructions, September 30, 2005
- 24590-WTP-3DP-G04B-00046, Rev. 14, Engineering Drawings, February 2, 2006
- BNI document 24590-WTP-PL-ESH-02-004, WTP Fire Protection Program, Rev. 2, dated January 1, 2005.
- BNI document 24590-WTP-MAR-ENS-05-0026, Management Assessment on Fire Hazards Analysis Methodology, Rev. 0, dated October 28, 2005.
- BNI document 24590-WTP-RPT-ENS-05-005, WTP Preliminary Fire Hazards Analysis General Information, Rev. 0, undated draft for review.
- BNI document 24590-LAW-RPT-ESH-01-001, Preliminary Fire Hazards Analysis for the Low-Activity Waste Building, Rev. 2, draft document dated February 6, 2005.

- 24590-WTP-MAR-ENS-05-0030, Rev. 0 (Aug 05), Fire Safety Self Assessment for August 2005
- WTP Fire Safety Walkdowns documented in various memorandums, reports, and e-mail, 2002 through 2006

### **DOE** and Other Documents:

- U.S. Department of Energy, DOE O 420.1A, Facility Safety, Contract Requirements Document, Attachment 2, May 20, 2002
- U.S. Department of Energy, DOE G-420.1/B-0, Implementation Guide for use with DOE Orders 420.1 and 440.1 Fire Safety Program, September 30, 1995
- DOE-STD-1066-97, DOE Standard Fire Protection Design Criteria, March 1997
- DOE-STD-1088-95, DOE Standard Fire Protection for Relocatable Structures, June 1995
- U. S. Department of Energy, Richland Operations Office, A-05-SED-FH-025, Report on the Assessment of Fluor Hanford, Inc. Fire Protection Program, November 2005.
- U. S. Department of Energy Contract No. DE-AC27-01RL14136, Waste Treatment and Immobilization Plant Contract, December 2005
- U.S. Department of Energy (under contract of ICF Kaiser Hanford), Facility Fire Protection Assessment of Building 1171, May 1, 1995
- A-05-AMWTP-RPPWTP-003-18, ORP Facility Representative Inspection Notes, Representative Review of Intumescent fire proofing, July 12 19, 2005
- A-05-AMWTP-RPPWTP-002-02, ORP Facility Representative Inspection Notes, Representative Review of Intumescent fire proofing LAW, March 8-28, 2005
- A-05-AMWTP-RPPWTP-003-28, ORP Facility Representative Inspection Notes, Facility Representative Review of inspection, testing, and maintenance of fire alarm systems and water-based fire protection systems, July 18 - 29, 2005
- HNF-SP-1180, Hanford Fire Department Needs Assessment and Master Plan, June 2002
- RL DOE Memorandum SES:DGS/05-SES-0165, Limited Scope Needs Assessment of Fluor Hanford, Inc. (FHI) Hanford Fire Department (HFD), June 14, 2005
- 29 Code of Federal Regulations (CFR) 1926, Occupational Safety and Health Safety and Health Regulations for Construction

#### **Personnel/ Positions Interviewed:**

BNI Fire Protection Engineers
BNI Radiological and Fire Safety Manager
ORP Facility Representatives
Hanford Fire Marshal
Marshalling Yard Manager
Simulator Manager
Material Specialist
WTP Utility Manager
WTP Field Safety Assurance Manager
WTP Maintenance Manager

LAW Area Safety Representative LAW Area Superintendent Warehouse Supervisors Property Administrator Safety Assurance Manager Contract Manager

### **Evolutions/Operations/Shift Performance Observed:**

Toured the following facilities to observe overall fire protection program implementation:
WTP Simulator Building
Marshalling Yard Building
Energy Northwest Leased Facilities
WTP T-52 Warehouse
WTP Site T1 Office Support Building
WTP Site Fabrication Shop ("Combo-shop")
WTP LAW
WTP Fireproofing Buildings (extended storage)

### **RESULTS:**

Discussion of Results:

Criterion 1 and 2: The Waste Treatment and Immobilization Plant (WTP) Contractor Fire Protection Program is defined in accordance with contract and Safety Requirement Document requirements and Site contractor implementing mechanisms are compliant with DOE expectations.

This area required the assessment team to evaluate whether the Waste Treatment and Immobilization Plant (WTP) Contractor Fire Protection Program is defined in accordance with contract and Safety Requirement Document (SRD) requirements and the Site Contractor implementing mechanisms are compliant with DOE expectations.

U.S. Department of Energy Contract for the WTP, Section J, Attachment E specifies the latest edition of the SRD as a portion of requirements appropriate for work and hazards on the WTP. Section 4.5 of the SRD specifies, "WTP facilities and activities (including design and construction) shall be characterized by the level of fire protection that is sufficient to fulfill the requirements of the best protected class of industrial faculties" and specified DOE O 420.1A, Facility Safety as an implementing standard. DOE O 420.1 provides general programmatic requirements for the contractor to develop, implement, and maintain an acceptable fire protection program including the following:

- A policy statement implementing the DOE fire protection program with managements support,
- A comprehensive written fire protection criteria for program responsibilities and aspects,

- Written procedures governing the use of combustible, flammable, and other materials from the risk of fire.
- A system to ensure DOE fire protection program are documented and incorporated in the plans and specifications,
- Fire hazard analyses for nuclear facilities are coordinated with the authorization bases documents,
- · Access to qualified and trained fire protection staff,
- A baseline needs assessment for emergency response,
- Written prefire strategies,
- A documented self assessment program, including facility and program aspects of the fire protection program,
- A program to identify and address fire protection related appraisal findings and recommendations, and
- A process for reviewing and recommending approval of fire safety related exemptions and equivalencies.

To assess the written Bechtel National Inc. (BNI) Fire Protection Program, the Assessment Team reviewed a number of key BNI procedures and policies and conducted interviews with staff fire protection engineers and Environmental and Nuclear Safety Management (E&NS), and Construction Management. The majority of the BNI fire protection engineering technical expertise resides within the E&NS and the engineering organizations within Bechtel. E&NS is responsible for the overall WTP fire protection written program and certain implementation, including but not limited to, the development of the fire hazard analyses and self assessment program, while engineering is responsible for the design of specific fire protection features in the facilities. The Assessment Team determined compliance with fire safety construction requirements of 29 Code of Federal Regulations (CFR) 1926 for the construction portion of the WTP is "not included within" the WTP fire protection program of E&NS and engineering but is covered by Construction who has a separate program for fire prevention and fire safety referencing 29 CFR 1926.

The assessment team reviewed a number of the BNI, WTP fire protection program procedures and determined to a large degree the procedures address the majority of these written programmatic requirements as expected by DOE. The BNI/WTP has a signed fire protection policy statement from senior management providing the basic DOE fire protection program objectives to minimize the occurrence and consequences of a fire and maintain property losses from fire within limits established by DOE. However, the project policy statement is applicable specifically to the "WTP facility" and may not necessarily be directed to other project areas where Government property could be exposed to fire hazards, impacting the cost and programmatic delivery of the facility (A-06-ESQ-RPPWTP-001-O01)

The program document describes and delineates the basic roles and responsibilities of the overall fire protection program to Area Managers, Engineering, Operations, Construction, the fire department, etc., and additional project procedures are provided to address various hazards on the site, including but not limited to, hazardous work permits, combustibles, welding compressed gas cylinders, and fire prevention. While it was not the scope of this assessment to review design documents and specifications for the WTP, the Assessment Team reviewed the

engineering process to see if BNI had a process in place to ensure fire protection is being incorporated into the design of the WTP and whether or not qualified fire protection engineers are involved in plan and specification review. The Team determined WTP facilities are being designed with suppression and alarm systems and BNI fire protection engineers are actively involved in design document reviews and procedure development. Interviews also verified BNI fire protection engineers are involved in the design review process and engineering specifically tied to suppression and fire alarm subcontractor installation work.

A specific written procedure related to the development of fire hazard analyses had not been issued by BNI at the time of the assessment (note: BNI issued a procedure on March 8, 2006 after the field portion of this assessment was completed and it was not reviewed by the assessment team). However, as noted below, the assessment team found the draft Low Active Waste (LAW) facility and General Information volume preliminary fire hazard analyses (PFHAs) contained descriptions and analyses, with some exceptions, which were generally consistent with the requirements and guidance from applicable DOE directives and industry codes and standards.

Construction has dedicated safety personnel conducting fire prevention reviews but they are not experts in fire protection engineering. BNI has a number of qualified fire protection engineering staff but due to the delineation between the written BNI roles and responsibilities between E&NS, Engineering and Construction there is a concern for access to the more qualified fire protection engineers to obtain their technical expertise and oversight of fire safety during construction. Access to the qualified fire protection engineers may be under utilized as an effective integrated safety management system feedback loop during the construction phase. The fire protection engineers perform routine assessments of the overall WTP fire protection program. However the fire protection engineers only conduct fire safety walk downs at the WTP site on a case by case/ad hoc basis for Construction Safety Assurance and the walk downs are not conducted by a formalized process or procedure, which includes elements and frequency of reviews, based on overall risk to the project. This is identified as an Observation in Performance Objective FP.2.

DOE fire protection guidance specifies facility specific assessments conducted by qualified fire protection engineers based on risk to the DOE. BNI should consider adopting a similar program and process for WTP, including off construction site support buildings where DOE property and personnel liability might exist. This includes "non-permanent" plant structures, leased facilities, and temporary facilities that may contain one of a kind equipment, high value permanent plant equipment or have life safety fire related concerns as a fire in a temporary facility, such as T-1, Marshalling Yard Warehouse, WTP Warehouse, and Energy Northwest Leased facilities which could impact schedule, cost, or workers for the WTP.

As another example, the Marshalling Yard Emergency Action and Fire Prevention Procedure contains roles and responsibilities for the facility emergency director and emergency organization, however, oversight of these facilities by a qualified fire protection engineer is not included in this procedure. The DOE assessment program identified in DOE 420.1A and the fire protection guide typically requires a comprehensive fire protection program to include facility oversight by qualified fire protection engineers through the facility assessment process as the

integrated safety management system feedback and continuous improvement loop for facility fire protection. Since BNI does not integrate these personnel in routinely scheduled assessments following the DOE fire protection guidance, facility oversight management may not be made aware of facility fire protection deficiencies, hazards, and necessary improvements.

The Assessment Team reviewed the inspection, testing, and maintenance program and determined that personnel performing the inspection, testing, and maintenance of fire alarm systems do not meet all of the qualified and experienced requirements of NFPA 72. Specifically, qualified personnel must have one of the following qualifications: (1) Factory trained and certified; (2) National Institute for Certification in Engineering Technologies fire alarm certified; (3) International Municipal Signal Association fire alarm certified; (4) Certified by a state or local authority; and (5) Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems. Electricians, without specific training in fire alarm systems are performing the inspections and tests. This issue was previously identified by the ORP Facility Representative, in July 2005. Bechtel responded by planning for oversight of the electricians by a fire alarm manufacturers representative. However, during this review there was evidence BNI did not provide this oversight while conducting battery maintenance on the T-1 fire alarm system batteries. This is further documented in the assessment performance objective FP.2.

The Assessment Team determined that a written baseline needs assessment (BNA) establishing the minimum required capabilities of fire fighting forces for the WTP has been written. The Assessment Team recognized that another Hanford contractor actually provides the fire department emergency services to the WTP and performed the written baseline needs assessment under a separate Hanford contract. BNI has conducted a self assessment of the fire fighting resources to the WTP, including a review of the BNA. Since an assessment of the fire department emergency services was recently completed by the DOE Richland Operations Office (RL), this assessment did not evaluate the fire department area.

DOE Order 420.1A requires BNI to have a documented fire protection self-assessment program, which includes program and facility aspects of the fire protection program. The DOE guide for DOE O 420.1A clarifies assessments must be conducted by qualified fire protection engineers for the principle objective to identify significant fire safety deficiencies which would prevent the achievement of DOE fire safety policy objectives.

The assessment team determined BNI is performing program related assessments addressing the elements contained in the DOE fire protection guide. The BNI program assessment are conducted by the fire protection engineers every month and cover a different functional area until all elements are evaluated over a period and observations resulting from these assessment are tracked until completed. However, as noted above, the assessment team determined that BNI is not conducting facility assessments by a formalized process or procedure, which includes elements and frequency of reviews, based on overall risk to the project.

The assessment team reviewed the written exemption and equivalency process BNI has for reviewing and recommending approval of fire safety related exemptions and equivalencies. The process requires a qualified fire protection engineer in the review prior to submission to ORP. Although BNI has submitted an equivalency request and have involved their fire protection engineers, ORP has yet to approve any of these requests.

Criterion 3: Fire Hazard Analyses (FHAs) are being prepared for each nuclear facility and the results integrated into the Safety Analysis, the Documented Safety Analysis (DSA) and Technical Safety Requirements (TSRs) as required.

Requirements and guidance for the performance of fire hazards analyses (FHAs) can be found in the following documents:

- DOE Order 420.1A, Fire Safety, dated May 20, 2002
- DOE Standard DOE-STD-1066-97, Fire Protection Design Criteria, dated March 1997
- DOE Guide G 420.1-1, Nonreactor Nuclear Safety Design Criteria and Explosives Safety Criteria Guide for use with DOE O 420.1, Facility Safety, dated March 28, 2000
- National Fire Protection Association Standard NFPA 801, Standard for Fire Protection for Facilities Handling Radioactive Materials, 2003 Edition, including Annex B, Fire Hazards Analysis

The requirements and guidance in these documents formed the basis for the assessment of BNI's preliminary FHAs. These documents, with the exception of DOE G-420.1, are specifically applicable to the design and analysis of the WTP and are identified as the applicable implementing codes and standards for the project's fire safety criteria (24590-WTP-SRD-ESH-01-001-02, Safety Requirements Document, Volume II, Safety Criteria 4.5, Rev. 3y, dated December 9, 2005). DOE G-420.1 provides guidance for acceptable implementation of the requirements of DOE O 420.1A. Although the Guide is not a requirements basis for the WTP design, a documented basis for discrepancies with the guidance stated therein should exist to provide a defensible basis for the WTP design, analysis, and construction. The same considerations hold true for the guidance provided in Annex B of Standard NFPA 801-2003.

To assess the adequacy of BNI's development and documentation of Preliminary Fire Hazards Analyses (PFHAs), the assessment team evaluated the in-process Low Activity Waste facility PFHA and the General Information (GI) volume for the in-process PFHAs. These PFHAs are scheduled for issuance to ORP on March 31, 2006, along with the updated Preliminary Safety Analysis Reports for the project. The Assessment Team concluded that it would more productive to review the next generation of PFHAs, rather than the issued/approved versions, which are over two years old.

The draft LAW and General Volume PFHAs were assessed for their descriptive text, fire hazards/fire safety and safe shutdown/safe state analyses, and for general attributes, as follows:

### Top-Level Requirements:

- FHAs are prepared for each nuclear facility.
- FHA results are integrated into the PSARs.

### Lower-Level Requirements:

• The PFHAs should adequately describe:

- o facility construction (DOE G-420.1)
- o processes performed and their potential for a fire or explosion (SRD, SC 4.5-3)
- o fire protection features, including detection and suppression equipment (DOE G-420.1, SRD, SC 4.5-3)
- o critical process equipment (DOE G-420.1)
- o fire hazards (DOE G-420.1)
- o facility/fire area operations (DOE G-420.1)
- o life safety considerations (DOE G-420.1)
- o emergency planning (DOE G-420.1)
- o fire department response (DOE G-420.1)
- o recovery potential (DOE G-420.1)
- o security and Safeguards considerations related to fire protection (DOE G-420.1)
- o assumptions (DOE G-420.1)
- codes and standards to be used for the design of the fire protection systems (NFPA 801, Annex B)
- The PFHAs should contain an acceptable analysis that:
  - o analyzes facilities as a whole and on a fire area basis (SRD, SC 4.5-3)
  - accounts for all radiological, hazardous, and combustible materials, including estimates of their heat content – including transient combustibles associated with storage and maintenance activities (SRD, SC 4.5-3, DOE G-420.1)
  - addresses hazards unique to DOE facilities and not addressed by industry codes & standards these hazards should be protected by isolation, segregation or use of special fire control systems (DOE O 420.1A/G-420.1)
  - o accounts for the sources of heat and flame (SRD, SC 4.5-3)
  - considers credible fire scenarios and evaluates adequacy of fire protection measures (SRD, SC 4.5-3)
  - o considers buildings and installations close to process buildings that contain flammable, combustible, or reactive liquid or gas storage (SRD, SC 4.5-3)
  - considers acceptable means of separation or control of hazards, the control or elimination of ignition sources, and the suppression of fires (NFPA 801)
  - considers the storage and use of radioactive materials, and their release under fire or explosion conditions (NFPA 801)
  - o assesses the risk from fire and related hazards (direct flame impingement, hot gases, smoke migration, fire-fighting water damage, etc.) (DOE G-420.1)
  - o evaluates natural hazards impact on fire safety (DOE G-420.1)
  - o analyzes the protection of essential safety class systems (DOE G-420.1)
  - o analyzes the potential for fire spread between two fire areas (DOE G-420.1)
  - o assumes and evaluates consequences of a single, worst-case automatic fire protection system malfunction (DOE G-420.1)
  - o for high-bay locations, considers smoke/hot gas stratification effects (DOE G-420.1)
- The PFHA should contain safe shutdown/safe state analysis that confirms the facility can be placed in a safe state during and after all credible fire and explosion events (SRD, SC 4.5-3)

- General considerations:
  - o The PFHA should be performed under the direction of a qualified FPE. (DOE O 420.1A)
  - o FHAs should be prepared for all nuclear facilities and those with unique fire safety risks. (DOE O 420.1A)
  - o PFHAs should document Maximum Possible Fire Loss (MPFL). (SRD, SC 4.5-3)

The assessment team determined the draft LAW and General Information volume contained descriptions of facility construction (Section 3.5), processes performed (Section 4.1.X), most fire protection equipment (Section 3.6), fire hazards (Section 4.1.X), operations (Section 4.1.X), life safety considerations (Section 3.5), emergency planning (GI volume Section 3.2), fire department response (GI volume Section 3.2.1), security and safeguards considerations related to fire protection (GI volume Section 3.2), assumptions (Appendix B), and codes and standards used for the design of the fire protection systems (throughout Section 3). However, concerns were identified for the adequacy of the PFHA descriptions involving the potential for fires or explosions for processing performed within a fire area, fire detection system features, critical process equipment, and recovery potential.

The assessment team met with BNI Environmental and Nuclear Safety (E&NS) fire protection personnel to discuss their responses to these concerns. BNI E&NS personnel agreed to:

- look further at and ensure that PFHA Sections 3 and/or 4 provide descriptions of the fire or explosion potential associated with process operations performed in a fire area consistent with the requirements of Safety Requirements Document (SRD) Safety Criterion 4.5-3,
- describe in PFHA Section 3 the generic locations of fire detection equipment intended to satisfy the requirements of the building codes, NFPA 72, etc., and to describe any additional fire detection equipment in the fire area descriptions provided in PFHA Section 4, and
- review the draft PFHAs to ensure that critical process equipment in a fire area is described in accordance with the guidance of DOE G-420.1.

In addition, BNI E&NS personnel were in general agreement that the bases for their determinations concerning recovery potential for fires in a given fire area were not well documented in the PFHA.

However, because it may take a significant effort and time to develop the descriptions of the considerations made by the PFHA analysts that lead to their recovery potential conclusions, this information may not be added to the PFHAs until the revision following the March 31, 2006 submittal to DOE.

The assessment team determined the draft LAW and General Information volume contained analyses of the facility as a whole and on a fire area basis (Section 4); accounted for sources of heat and flame (Sections 4.1.X); considered credible fire scenarios and evaluated the adequacy of fire protection measures (Sections 4.1.X); considered buildings and installations close to the process buildings that contain flammable, combustible, or reactive liquid or gas storage (Sections

4.1.X); analyzed the separation and control of fire hazards, ignition sources, and fire suppression (Sections 4.1.X), considered the potential for the fire-related release of radioactive materials (Sections 3.9.8 and 4.1.X), assessed the impact of natural phenomena hazards (NPH) on fire safety (Section 3.9.7), evaluated the potential for fire spread between adjacent fire areas (Sections 4.1.X), and analyzed the consequences assuming a single, worst-case loss of an automatic fire protection system (Sections 4.1.X). However, concerns were identified concerning the adequacy of the PFHA analyses involving a definitive accounting of radioactive, hazardous and combustible materials present in the facilities/fire areas, including estimates of their heat content; a definitive statement about the existence of and controls for unique fire hazards (i.e., those not addressed by industry codes and standards); the risk from fire-related hazards, including direct flame impingement, hot gases, fire-fighting water damage, etc.; and the effects on fire safety due to the stratification of smoke and hot gases in building high-bay locations.

The assessment team met with BNI Environmental and Nuclear Safety (E&NS) fire protection personnel to discuss their responses to these concerns. BNI E&NS personnel expressed their belief that the accounting of radioactive and combustible materials and the potential for unacceptable radioactive or toxic releases associated with fire events are adequately described in the draft PFHAs. However, it was agreed that the description of hazardous materials in fire areas and the potential for the involvement of these materials in or exacerbation of the fire event may not be adequately described. BNI E&NS personnel agreed to review the draft PFHAs in this regard and, if necessary, to strengthen the PFHAs descriptions/analyses in the next or following PHFA revision. BNI E&NS personnel also agreed to ensure the PFHAs include a definitive statement about the lack of unique fire hazards (i.e., those not addressed by industry codes and standards). BNI E&NS personnel agreed to check the draft PFHAs to determine if they clearly describe and, if necessary, analyze the fire hazards created by direct flame impingement, hot gases, and fire-fighting water damage. Given the near-term schedule for submittal of the revised PFHAs, it may not be possible to fully analyze and describe these effects until the following PFHA revision. ORP will review this item at a later date to ensure that these PFHA attributes are included in future PFHA submittals. (A-06-ESQ-RPPWTP-001-O02)

The assessment team found the analysis of facility safety shutdown/safe state following a fire or explosion event was documented in draft LAW PFHA Appendix B. The extent of safe shutdown/safe state analysis is limited by the availability of design information, particularly in the electrical, instrumental and control design areas. A complete safe shutdown/safe state analysis may not be possible until issuance of the final FHA. The assessment team did not identify any deficiencies with the shutdown/safe state analysis.

The BNI E&NS personnel responsible for developing the WTP PFHAs and performing the associate fire hazards and fire safety analyses meet the definition of qualified fire protection engineers as defined by the Society of Fire Protection Engineers (SFPE). Based on meeting the SFPE requirements, the assessment team concluded that BNI PHFA personnel were adequately qualified.

The last PFHA-related topic reviewed for this Performance Objective was the existence and adequacy of a documented analysis of Maximum Possible Fire Loss (MPFL). The assessment

team reviewed BNI document 24590-WTP-U1C-FPW-00001, Maximum Possible Fire Loss (MPFL) for LAW, HLW, PTF, BOF, and Laboratory Facilities, Rev. B, dated June 1, 2005. The assessment team concluded the MPFL analysis was responsive to DOE specified MPFL requirements (DOE O 420.1A and DOE-STD-1066-97) and SRD Safety Criterion 4.5-3. While not reviewed in detail, the MPFL analysis was found to provide good documentation of the bases for the MPFL values determined for potential facility/fire area fire-related losses, including documented assumptions and references to information developed outside of the project. The MPFL analysis concluded that fire protection systems and features included in the WTP design are appropriate to meet the DOE monetary loss limits and that facility fire areas contain appropriate fire protection features for the fire hazards associated with process equipment and flammable and combustible materials located therein. The Assessment Team did not identify and Findings or Observations in this area. The MPFL analysis will be reviewed further in conjunction with the revised PFHA submittals scheduled for March 31, 2006.

Criterion 4: Administrative controls and compensatory measures are adequately identified and meet the intent for which they are established and there is a formalized process for maintaining administrative controls and compensatory measures.

The Assessment Team reviewed the documented WTP Fire Protection Program (24590-WTP-PL-ESH-02-004) and determined that it:

- contained a Fire Protection Policy Statement expressing BNI senior management's commitment to fire safety in the design, construction, and operation of the WTP, consistent with the requirements of DOE O 420.1A,
- was being updated consistent with the evolution of the project's design, the issuance of updated DOE and industry fire protection requirements and guidance documents, and consistent with BNI's formal document issuance and control processes,
- identified the fire protection program implementation responsibilities of the significant organizational elements responsible for project fire safety, including E&NS, Engineering, Operations, Project Management, Quality Assurance, and the Hanford Fire Department, and
- adequately addressed the programmatic elements important to ensuring fire safety in the design and construction of the WTP, including requirements for fire hazards analysis; reporting of fire-related events; emergency planning; fire prevention at the construction site; control of ignition sources; provisions for hot work and compensatory fire watches during project construction activities; the interface with the Hanford Fire Department for the provision of fire protection, emergency, and HAZMAT response to events at the WTP site; inspection, testing and maintenance of fire protection systems and equipment; tracking of fire protection systems and equipment impairments; assessments of the WTP fire protection program; and, the interface with the Hanford Fire Department (HFD) for the preparation of pre-fire plans for use in the HFD response to fire and other emergencies at the WTP site.

It was considered noteworthy that BNI has already prepared a set of fire protection administrative controls for use during the operational phase of the project (e.g., the series of WTP-GPP-SRAD documents identified above). While these administrative controls will have to

be revisited and possibly updated as the project approaches the WTP commissioning phase, it is considered a good practice to at least have considered the basic requirements for these administrative controls during the early stages of project design and construction.

The Assessment Team also evaluated controls associated with Construction fire prevention. See Performance Objective FP.3 for the Assessment Teams evaluation for this area.

### Conclusion

### Written Program and Program Implementation

The Assessment Team determined that for the most part the BNI program procedures, policies, and practices address the requirements as expected by DOE. However there were concerns noted that BNI is not conducting routine facility assessments by qualified fire protection engineers under a formalized process or procedure throughout all facilities impacting the WTP. The BNI written program does not appear to implicitly address facility assessments of non-radiological and existing site facility construction by qualified fire protection engineers and the fire protection engineers conduct fire safety walk downs at the WTP site only on a case by case/ad hoc basis for Construction Safety. Furthermore, the fire protection engineer walk downs are not conducted by a formalized process or procedure, which includes elements and frequency of reviews, based on overall risk to the project.

In addition, the assessment noted a perception that the BNI Management policy for fire protection may only extend to the WTP construction site and not the rest of the project where DOE fire related liabilities exist, such as in the Marshalling Yard Warehouse Building, Energy Northwest Lease Warehouse, and other temporary/non-permanent facilities. Since a fire in any of these facilities could negatively impact on personnel life safety, property loss, or schedule to complete the WTP facility, BNI should widen their policies and procedures to clearly include any areas for the project where DOE liability exists.

### Fire Hazard Analyses

The assessment team found the draft LAW and General Information volume PFHAs contained descriptions and analyses that were generally consistent with the requirements and guidance from applicable DOE directives and industry codes and standards. BNI E&NS personnel were in general agreement that the bases for their determinations concerning recovery potential for fires in a given fire area were not well documented in the PFHA. However, because it may take a significant effort and time to develop the descriptions of the considerations made by the PFHA analysts that lead to their recovery potential conclusions, this information may not be added to the PFHAs until the revision following the March 31, 2006 submittal to DOE.

### **Administrative Controls and Compensatory Measures**

BNI has written administrative controls and compensatory measures in place to support the fire protection design and construction of the Waste Treatment and Immobilization Plant.

Discussion on the controls associated with construction activities are in the assessment Performance Objective Area FP3.

**Issues:** 

**Findings:** 

None for this Area.

### **Observations:**

A-06-ESQ-RPPWTP-001-O01 - BNI Management policy for fire protection does not include off site WTP support facilities. DOE fire related liabilities exist in off site WTP support facilities, such as in the Marshalling Yard Warehouse Building, Energy Northwest Lease Warehouse, and other temporary/non-permanent facilities. Since a fire in any of these facilities could negatively impact on personnel life safety, property loss, or schedule to complete the WTP facility, BNI should widen their policies and procedures to clearly include any areas for the project where DOE liability or risk exists as a result of fire.

A-06-ESQ-RPPWTP-001-O02 - DOE Fire Hazard Analyses Guidance is not fully incorporated by BNI. The preliminary fire hazard analyses currently under development for the WTP do not include descriptions for technical areas specified in the DOE fire protection guidance contained in DOE G 420.1A. This includes DOE guidance to analyze and describe fire hazards created by direct flame impingement, hot gases, fire-fighting water damage, and document the technical bases for determining recovery potential following a fire.

### PERFORMANCE OBJECTIVE FP.2

Fire Protection program commitments are implemented. Adequate numbers of technically competent, experienced, and fully qualified personnel are assigned to address the fire protection commitments.

### Criteria:

- 1. Site Fire Protection program is staffed with adequate numbers of technically competent, experienced, fully qualified personnel including fire protection engineers, technicians. (DOE O 420.1A, 4.2.1).
- 2. The fire protection program is effectively implemented and maintained at each facility including facility specific controls or attributes. (DOE O 420.1A).
- 3. Fire protection systems and equipment are designed, installed, and maintained to provide the level of protection, functionality, and the reliability specified in contract and safety requirement document requirements. Procedures are in place for performing inspection, testing, and maintenance of fire protection systems and the Contractor has a schedule for performing inspection, testing, and maintenance of the fire protection systems. (DOE O 420.1A Sec 4.2.2, NFPA 25 and NFPA 72).
- 4. Contractor engineering disciplines ensure the requirements of the Fire Protection Program are incorporated into facility design and construction. This includes a documented review by a qualified fire protection engineer of plans, specifications, procedures, and acceptance tests. (DOE O 420.1A, Section 4.2.1.4)
- 5. WTP contractor assessments of the fire protection program are sufficiently comprehensive and accomplished at the required periodicity. Assessments verify continued robust implementation of a compliant fire protection program implements all fire protection commitments in the SRD. Issues are identified, tracked and resolved in a manner to ensure satisfactory correction and prevent reoccurrence. (DOE O 420.1A sec 4.2.1, 10 CFR 830 A)
- 6. The Contractor performs periodic fire protection facility assessments at the required frequencies and a fire protection program self assessments at least every 3 years. (DOE O 420.1A)
- 7. Recommendations or findings from assessments or evaluations, both internal and external, are tracked and dispositioned in a formal manner.

### Approach:

### Record Review:

Selected contractor fire protection assessments and fire safety survey results;; Maintenance records for fire protection systems Corrective action records for fire protection related issues.

### Interviews:

Contractor fire protection professional engineers, system engineers, and managers; facility managers and selected operators; Maintenance personnel, including managers who work on fire protection systems. Line managers through whom fire protection personnel report.

### Observations:

Fire Protection system surveillances and preventive maintenance activities associated with selected facilities; Contractor fire protection self assessments if available; Walk down selected facilities with emphasis on installation and operability of all elements of the fire protection systems including physical systems and components and combustion control and storage programs.

### **PROCESS:**

### **Records Reviewed:**

### **BNI Program and Procedures:**

- 24590-WTP-GPP-SIND-009, Rev.3, Safety Watches, September 28, 2005
- 24590-WTP-GPP-SIND-013, Rev. 3, Hazardous Work Permit, April 30, 2004
- 24590-WTP-GPP-SIND-026, Rev. 3, Housekeeping and Fire Prevention, December 30, 2004
- 24590-WTP-GPP-SIND-035, Rev. 2, Welding and Cutting Safety
- 24590-WTP-GPP-SIND-051, Rev. 1, Marshalling Yard Emergency Action and Fire Prevention Procedure, December 23, 2004
- 24590-WTP-GPP-SRAD-042, Rev. 0, Control of Combustibles, March 1, 2003
- 24590-WTP-GPP-SRAD-043, Rev.0, Hot Work Permit, March 1, 2003
- 24590-WTP-GPP-SRAD-044, Rev. 0, Fire Patrol and Fire Watch, March 1, 2003
- 24590-WTP-GPP-SRAD-049, Rev. 0, Non-Statutory Fire Protection Exemptions and Equivalencies, May 15, 2003
- 24590-WTP-GPP-SRAD-057, Rev.0, Welding and Cutting Safety, March 1, 2003
- 24590-WTP-GPP-SRAD-058, Rev.0, Compressed Gas Cylinders, March 1, 2003
- 24590-WTP-GPP-SRAD-059, Rev. 0, Fire Prevention, March 1, 2003
- 24590-WTP-GPP-SRAD-063, Rev. 0, Inspection, Testing and Maintenance of Fire Doors and Fire Dampers, March 1, 2003
- 24590-WTP-GPP-SRAD-064, Rev. 0, Inspection of Fire Rated Walls, Ceilings, Floors and Fire Penetrations, March 1, 2003
- 24590-WTP-PL-ESH-02-004, Rev. 2, WTP Fire Protection Program, January 1, 2005
- 24590-WTP-PL-ESH-02-009, Rev. 0, Fire Safety Management Assessment Plan CY04-07, December 29, 2003
- 24590-WTP-PL-IS-01-001, Rev. 5, Nonradiological Worker Safety and Health Plan, November 30, 2004
- 24590-WTP-RPT-CON-05-007, Rev. 0, List of Applicable NFPA Codes and Standards to Construction Activities Involving Non-Permanent Plant Installed and Maintenance
- 24590-WTP-RPT-FP-04-0002, Rev. 1, List of Applicable NFPA Codes and Standards to Design

- 24590-WTP-RPT-OP-05-002, Rev. 0, List of Applicable NFPA Codes and Standards to Commissioning
- WTP Fire Safety Walkdowns documented in various memorandums, reports, and e-mail, 2002 through 2006
- 24590-WTP-PL-ENS-06-0002, Analysis of WTP Storage Vulnerability to Fire Loss Management Assessment Plan, March 8, 2006

### **BNI Program Assessment Reports:**

- 24590-WTP-MAR-ENS-04-0003, Rev.0 (Feb 04), Fire Safety Self Assessment for February 2004
- 24590-WTP-MAR-ENS-04-0008, Rev. NA (March 04), Fire Safety Self Assessment for March 2004
- 24590-WTP-MAR-ENS-04-0010, Rev. 0 (May 04), Fire Safety Self Assessment for May 2004
- 24590-WTP-MAR-ENS-04-0012, Rev. 0 (April 04), Fire Safety Self Assessment for April 2004
- 24590-WTP-MAR-ENS-04-0017, Rev. 0 (June 04), Fire Safety Self Assessment for June 2004
- 24590-WTP-MAR-ENS-04-0020, Rev. NA (July 04), Fire Safety Self Assessment for July 2004
- 24590-WTP-MAR-ENS-04-0023, Rev. 0 (Aug 04), Fire Safety Self Assessment for August 2004
- 24590-WTP-MAR-ENS-04-0033, Rev. NA (Oct 04), Fire Safety Self Assessment for October 2004
- 24590-WTP-MAR-ENS-04-0037, Rev. 0 (Sept 04), Fire Safety Self Assessment for September 2004
- 24590-WTP-MAR-ENS-04-003, Rev.0 (Jan 04), Fire Safety Self Assessment for January 2004
- 24590-WTP-MAR-ENS-05-0002, Rev. 0 (Jan 05), Fire Safety Self Assessment for January 2005
- 24590-WTP-MAR-ENS-05-0003, Rev. 0 (Nov 04), Fire Safety Self Assessment for November 2004
- 24590-WTP-MAR-ENS-05-0004, Rev. 0 (Dec 04), Fire Safety Self Assessment for December 2004
- 24590-WTP-MAR-ENS-05-0007, Rev. 0 (Feb 05), Fire Safety Self Assessment for February 2005
- 24590-WTP-MAR-ENS-05-0015, Rev. 0 (Mar 05), Fire Safety Self Assessment for March 2005
- 24590-WTP-MAR-ENS-05-0018, Rev. 0 (May 05), Fire Safety Self Assessment for May 2005
- 24590-WTP-MAR-ENS-05-0020, Rev. 0 (April 05), Fire Safety Self Assessment for April 2005
- 24590-WTP-MAR-ENS-05-0025, Rev. 0 (June 05), Fire Safety Self Assessment for June 2005

- 24590-WTP-MAR-ENS-05-0028, Rev. 0 (July 05), Fire Safety Self Assessment for July 2005
- 24590-WTP-MAR-ENS-05-0030, Rev. 0 (Aug 05), Fire Safety Self Assessment for August 2005
- 24590-WTP-MAR-ENS-05-0038, Rev. 0(Nov 05), Fire Safety Self Assessment for November 2005

### **DOE** and Other Documents:

- U.S. Department of Energy, DOE O 420.1A, Facility Safety, Contract Requirements Document, Attachment 2, May 20, 2002
- U.S. Department of Energy, DOE G-420.1/B-0, Implementation Guide for use with DOE Orders 420.1 and 440.1 Fire Safety Program, September 30, 1995
- U. S. Department of Energy Contract No. DE-AC27-01RL14136, Waste Treatment and Immobilization Plant Contract, December 2005
- U.S. Department of Energy (under contract of ICF Kaiser Hanford), Facility Fire Protection Assessment of Building 1171, May 1, 1995
- A-05-AMWTP-RPPWTP-003-18, ORP Facility Representative Inspection Notes, Representative Review of Intumescent fire proofing, July 12 19, 2005
- A-05-AMWTP-RPPWTP-002-02, ORP Facility Representative Inspection Notes, Representative Review of Intumescent fire proofing LAW, March 8-28, 2005
- A-05-AMWTP-RPPWTP-003-28, ORP Facility Representative Inspection Notes, Facility Representative Review of inspection, testing, and maintenance of fire alarm systems and water-based fire protection systems, July 18 - 29, 2005
- Sherwin Williams MSDS for Macropoxy® 646
- 24590-WTP-PWO-CMNT-06-0092 Simulator Building Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0103 Fireproofing Shop Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0105 Fireproofing Shop Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0023 2652WTP Warehouse Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0104 Fireproofing Shop Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0020 Combo Shop Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0016 HLW Craft Change House Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0015 PTF Craft Change House Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0016 HLW Craft Change House Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0004 Main Construction Site Office Fire Protection System weekly inspection work package.

- 24590-WTP-CAR-QA-06-013, CAR on Preventative Maintenance Issues
- 24590-WTP-CAR-QA-05-282, CAR on Emergency Lighting Issues
- 24590-WTP-CAR-QA-05-192, CAR on Fire Protection Issues

### Personnel/ Positions Interviewed:

**BNI Fire Protection Engineers** BNI Fire and Radiological Program Manager **ORP** Facility Representatives Hanford Fire Marshal Marshalling Yard Manager Simulator Manager Material Specialist WTP Utility Manager WTP Field Safety Assurance Manager WTP Maintenance Manager LAW Area Safety Representative LAW Area Superintendent Warehouse Supervisor Property Administrator Safety Assurance Manager Contract Manager

### **Evolutions/Operations/Shift Performance Observed:**

Toured the following facilities to observe overall fire protection program implementation:
WTP Simulator Building
Marshalling Yard Building
Energy Northwest Leased Facilities
WTP T-52 Warehouse
WTP Site T1 Office Support Building
WTP Site Fabrication Shop ("Combo-shop")
WTP LAW
WTP Fireproofing Buildings (extended storage)

### **RESULTS:**

### Discussion of Results:

Criterion 1: Site Fire Protection program is staffed with adequate numbers of technically competent, experienced, fully qualified personnel including fire protection engineers, technicians.

To evaluate this area the Assessment Team reviewed the BNI organization and conducted interviews of BNI fire protection engineers, technicians, managers and construction personnel. The assessment determined the WTP project has a number of fire protection engineers with

various levels of experience on the project within Environmental and Nuclear Safety Management (E&NS) and Engineering. Within the WTP Construction organization there are no qualified fire protection engineers, but rather, Construction relies upon the technical expertise of the other WTP project fire protection engineers on a case by case basis. The project also has a technician within the Engineering organization who has experience in fire sprinkler system design and he is primarily focused on the subcontractor's fire sprinkler designs for the main WTP nuclear facilities. Several of the fire protection engineers within WTP have their professional engineer's registration license, including one engineer who is principally involved in the engineering review of the WTP site and facility fire alarm system subcontractor designs. The Team determined the project is staffed with qualified fire protection engineering resources.

One area of concern identified by the Assessment Team was in the qualifications of personnel performing the inspection, testing, and maintenance of fire related equipment. This issue is discussed in Criterion 3 of this Performance Objective.

# Criterion 2: The fire protection program is effectively implemented and maintained at each facility including facility specific controls or attributes.

To conduct this review the assessment team reviewed a number of program procedures and conducted physical tours of select WTP operating facilities to determine the level of effective implementation of the WTP fire protection program within the confines of the Safety Requirements Document and Nonradiological Worker Safety and Health Plan. Generally, these documents require the contractor to implement a level of fire protection commensurate with the DOE fire protection program specified by DOE Order 420.1A, Facility Safety, which includes incorporation of a number of key the National Fire Protection Association (NFPA) Standards.

The BNI program implements many of the basic program elements into their operational facilities and facilities which are undergoing construction, including but not limited to, installed automatic fire suppression systems, fire alarm systems arranged to transmit an alarm signal to summon emergency fire fighting forces, emergency lighting and exit signs, compliance to most of the elements of the life safety code, fire resistive and/or non-combustible, and a reliable water supply with hydrants and adequate capacity to support suppression systems and manual fire fighting.

The Team noted the key WTP nuclear facilities, as designed, meet these primary DOE fire protection requirements, including those listed above. However, during the facility potion of this review the team noted some deficiencies associated with other WTP facilities which impact the WTP construction, including the Marshalling Yard Warehouse and the WTP site T-52 Warehouse.

By performing a quick walk down of the Marshalling Yard Warehouse and the WTP site T-52 Warehouse the Team determined the sprinkler systems in these two warehouses are not designed to handle fires involving the material stored in the warehouse.

BNI leases the Marshalling Yard Warehouse from the Tri-City and Olympic Railway. The building was previously utilized as a vehicle maintenance facility for passenger vehicles, light and

heavy duty trucks, busses, and heavy equipment including railroad locomotives. There were also areas for small parts storage, a body shop, a paint shop, a tire shop, vehicle alignment, a machine shop, a weld shop, and supporting office areas and evidence of this was obvious during the assessment team tour.

By reviewing the hydraulic information located on the sprinkler system risers found within in the Marshalling Yard Warehouse and reviewing a previous fire protection assessment record, when this building was previously owned by DOE, the Assessment Team determined the sprinkler systems installed in these facilities were not hydraulically designed for fire protection involving the current storage. There are a total of eight, wet pipe systems controlled by post indicator valves, located approximately 40 ft. from the Marshalling Yard Warehouse. Individual systems in this building were originally designed using NFPA 13 for ordinary hazard, pipe schedule criteria but later were calculated providing a discharge density of 0.15 gallons per minute (gpm) over a hydraulically remote area of 4,000 square feet (sq. ft.), which satisfies the criteria of NFPA 13 for ordinary hazard, group 2. The Team also identified other design information about this system including, sprinkler head spacing at 100 sq. ft. and is staggered, and two anti-freeze systems which protected a paint shop, spray booth exhaust stack and the adjacent boiler room (these areas were designed using extra hazard pipe schedule criteria).

During the Assessment Team tour of the Marshalling Yard Warehouse, the Team observed commodity storage in excess of ordinary hazard group 2. Ordinary hazard group 2 is defined by NFPA 13 as occupancies where the quantity and combustibility of contents are moderate to high, stockpiles do not exceed 12 ft, and fires with moderate to high rates of heat release are expected.

The Team observed storage stockpiles in excess of 20 feet in the Marshalling Yard Warehouse and materials which would release high challenge rates of heat in a fire, including plastic computers and monitors fully encapsulated on pallets and high piled storage in wooden crates on rack storage.

NFPA 13 considers the storage in the Marshalling Yard Warehouse, a Class III and Class IV commodity requiring a more hydraulically capable delivery sprinkler system than currently installed in the Warehouse to extinguish a fire. A fire involving the high fire challenge materials in the warehouse is expected to quickly overcome the installed sprinkler system, spread to the combustible roof structure and complexly destroy the building and its contents.

The Marshalling Yard Warehouse contains storage including, unique valving, stainless steel pumps, transformers, equipment which has also undergone special quality assurance reviews, and other unique/one-of-a kind plant equipment, for installation at the WTP site. A fire in this facility could deleteriously impact the overall cost and schedule of the WTP facility because this equipment would be damaged and/or completely destroyed in a fire. Since it was not within the time frame or scope of this assessment to fully analyze the fire hazards and determine the appropriate controls, additional documented review by a qualified fire protection engineer should be commissioned to include strategies to continue using the Marshalling Yard Warehouse facility with modification of the storage and its arrangement.

The Team also observed a similar concern in the WTP Sight T-52 Warehouse, but to a lesser extent. In the T-52 facility, similar storage conditions exist but the sprinkler systems are

designed to handle a Class III commodity with the current water supply. The Team determined the sprinkler system is capable of handling a Class IV commodity fire, but only once the WTP fire water pump house and supply are brought on line (the WTP fire water pump system has not been brought on line which is discussed in Criterion 3). The Team observed large quantities of plastic bins in boxes stacked fairly high in the upper area of the facility mezzanine of T-52, rubber "elephant trucks", which are rubber rolls used for placing concrete, stacked on pallets and total encapsulated by shrink wrap placed on rack storage, and other combustible plastic materials which are considered Class IV commodities under NPFA 13.

The Team also toured the Energy Northwest Leased facility warehouse (also know by Energy Northwest as the 'Warehouse 2-4'), which contains WTP property. However the Team did not note any concerns for the storage arrangements for the sprinkler systems installed in this facility.

The Team interviewed the warehouse managers and fire protection engineers and determined no guidelines or storage restrictions on storage types, arrangements, or heights are currently in place at the warehouse facilities. Since it was not within the time frame or scope of this assessment to fully analyze the fire hazards and determine the appropriate controls for these facilities, additional documented review by a qualified fire protection engineer should be commissioned to develop guidelines for the warehouse management to protect the conditions for which the fire systems would be effective per NFPA 13. (A-06-ESQ-RPPWTP-001-F01)

The Team also observed fire barriers in the Marshalling Yard Warehouse which have been incapacitated and large openings placed into the fire walls appearing to increase the fire hazards of facility. Fire walls are typically installed in a facility to limit the spread of fire and damage to one area. However, since these features are currently not functional along with the concerns for the fire sprinkler systems noted above, it is expected a fire in this building would quickly spread to the combustible roof structure and complexly destroy the building and its contents. The BNI Fire Protection Engineers should also evaluate these conditions in a formalized assessment. (A-06-ESQ-RPPWTP-001-F02)

In response to the deficiencies identified by in this performance objective, BNI issued a plan to assess the WTP storage, which included sprinkler system design, building occupancy, and life safety related concerns. However, the plan does not specifically address evaluation of the Marshalling Yard Warehouse fire barriers. BNI should evaluate the Marshalling Yard Warehouse fire barriers as a control method consistent with other warehouse storage control considerations.

Criterion 3: Fire protection systems and equipment are designed, installed, and maintained to provide the level of protection, functionality, and the reliability specified in contract and safety requirement document requirements. Procedures are in place for performing inspection, testing, and maintenance of fire protection systems and the Contractor has a schedule for performing inspection, testing, and maintenance of the fire protection systems.

To conduct this review the Assessment Team reviewed a number of program procedures and conducted physical tours of select WTP operating facilities to determine if fire protection systems are appropriately designed, installed, and maintained.

As noted above in Criterion 2, the Team observed installed automatic fire suppression systems and fire alarm systems arranged to transmit an alarm signal to summon emergency fire fighting forces are being designed and installed at each of the primary WTP nuclear facilities and the balance of facilities. For the most part, as fire protection system construction is completed they undergo an acceptance test and are brought into service consistent with 24590-WTP-GPP-SIND-026, Rev. 3, Housekeeping and Fire Prevention, which states "As the sprinkler systems are being installed, they will be placed in service as soon as practical as specified by NFPA 241". However, the Team noted concerns for three particular systems which have been installed but have not yet been brought into service, including fire sprinkler systems in the steam plant, switchgear facilities (Balance of Facilities and Importance to Safety) and the water supply pumping system in the fire water pump house. (A-06-ESQ-RPPWTP-001-O04)

Installed fire protection systems that have been brought into service are required to have frequent inspection, testing, and maintenance performed in accordance with NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water Based Suppression Systems, and NFPA 72, National Fire Alarm Code.

During the facility walk downs, the Assessment Team observed quarterly fire panel testing (battery load voltage test) being conducted in Building T1. The Assessment Team noted the electrician doing the work was not qualified in the inspection, testing, and maintenance of fire alarm systems. Four out of five multi-meters being used for the test were out of calibration. The workers did not have work instructions with them while they conducted the activity and no instruction has been developed on how to perform the battery load voltage test. No personnel qualified in the inspection, testing, and maintenance of fire alarm systems was present to oversee the activity during the test and there were no instructions on how to return the fire panel to service or any process to check to ensure the panel was correctly returned to service after the test was completed. Results of the testing were not being documented in a retrievable form, and testing did not appear to meet the testing requirements of NFPA 72, Table 10.4.2.2 5(e) because the maximum load required was not being applied during the test.

NFPA 72 Section 10.4.2.2 requires fire alarm systems and other systems and equipment associated with fire alarm systems and accessory equipment to be tested in accordance with NFPA 72, Table 10.4.2.2. NFPA 72, Section 10.2.2.5 requires fire alarm maintenance personnel to be qualified and experienced in the inspection, testing, maintenance of fire alarms systems and NFPA 72, Section 10.6.2.3 requires a record of all inspections, testing, and maintenance to be provided following NFPA 72. The contractor is not meeting these requirements. (A-06-ESQ-RPPWTP-001-F03)

Similar issues with fire protection system testing were identified by Office of River Protection (OPR) Facility Representative *Inspection Report* A-05-AMWTP-RPPWTP-003-28 in July 2005 while conducting review of the BNI fire protection system inspection, testing, and maintenance processes. The issues were documented by the contractor in Correction Action Report 05-192, and two Recommendations and Issues Tracking System items (05-799 and 05-801). Assessment follow-up item A-05-AMWTP-RPPWTP-003-A01 was used to track the issues identified by OPR in July 2005. Because the same issues were identified during this assessment, the issue of

fire alarm system inspection, testing, and maintenance is a finding within this assessment and follow-up item A-05-AMWTP-RPPWTP-003-A01 will be closed.

The assessors reviewed inspection, testing, and maintenance (IT&M) records for fire protection features of the Marshalling Yard Warehouse and determined that fire sprinkler and alarms systems are not be conducted at the frequencies required by NFPA 25 and NFPA 72. A quick review of the sprinkler and fire alarm records and interviews with BNI indicate the monthly, semi annual, quarterly IT&M for sprinklers and fire alarm are not being done and the records for the annual maintenance were not of adequate quality because the records noted "operational system defects" without identifying what the defects were and whether they were corrected. The Assessment Team also determined inspection, testing, and maintenance of exit signs, emergency lighting in the Marshalling Yard Warehouse is not being conducted as required by NFPA 101. Prior to completion of the assessment, BNI conducted some testing and determined that one life safety item was not functional (A-06-ESQ-RPPWTP-001-F05).

Finally, the Assessment Team found concerns with the lack of a fire system impairment program in accordance with Chapter 14 of NFPA 25. NFPA 25 provides implementation measures during the impairment of a suppression system to ensure increased risks are minimized and the duration of the impairment is limited. Some elements of impairments are in place in the field but there is no overall program in place to address fire system impairments. (A-06-ESQ-RPPWTP-001-F04)

Criterion 4: Contractor engineering disciplines ensure the requirements of the Fire Protection Program are incorporated into facility design and construction. This includes a documented review by a qualified fire protection engineer of plans, specifications, procedures, and acceptance tests.

As noted in Criterion 1 above, the assessment determined the WTP project has a number of fire protection engineers with various levels of experience on the project within Environmental and Nuclear Safety Management (E&NS) and Engineering organizations. While it was not the scope of this assessment to review design documents and specifications for the WTP, the Assessment Team interviewed WTP engineering to see if BNI had a process in place ensuring fire protection is being incorporated into the design of the WTP and whether or not qualified fire protection engineers are involved in plan and specification review. The Team determined WTP principal facilities are being designed with suppression and alarm systems and BNI fire protection engineers are actively involved in design document reviews including review and development of procedures and design drawings.

Interviews also verified BNI fire protection engineers and technician are involved in the design review process and engineering specifically in suppression and fire alarm subcontractor installation work. As submittal shop drawings for the sprinkler systems and fire alarm systems for each WTP facility are provided to BNI, WTP Engineers and Technicians review those drawings for compliance against contract specifications, drawings, and NFPA Codes and Standards.

Criteria 5&6: WTP contractor assessments of the fire protection program are sufficiently comprehensive and accomplished at the required periodicity. Assessments verify continued robust implementation of a compliant fire protection program which implements all fire protection commitments in the SRD. Issues are identified, tracked and resolved in a manner to ensure satisfactory correction and prevent reoccurrence. The Contractor performs periodic fire protection facility assessments at the required frequencies and a fire protection program self assessments at least every 3 years.

To evaluate this criterion the Assessment Team reviewed a large number of Engineering and Nuclear Safety (E&NS) Program Assessments and BNI Facility Tour WTP Fire Safety Walk downs, documented in various memorandums, reports, and e-mail, 2002 through 2006.

The assessment team determined fire protection engineers perform routine assessments of the overall WTP fire protection program. However the fire protection engineers only conduct fire safety walk downs at the WTP site on a case by case/ad hoc basis for Construction Safety Assurance and the walk downs are not conducted by a formalized process or procedure, which includes elements and frequency of reviews, based on overall risk to the project. (A-06-ESQ-RPPWTP-001-O03)

Due to the delineation between the written BNI roles and responsibilities between E&NS, Engineering and Construction, the Assessment Team noted a concern with access to the more qualified fire protection engineers for their technical expertise and oversight of fire safety during construction, and fire protection engineer oversight may be under utilized as an effective integrated safety management system feedback loop during the construction phase. DOE fire protection guidance specifies facility specific assessments conducted by qualified fire protection engineers based on risk to the DOE. BNI should consider adopting a similar program and process for WTP, including off construction site support buildings where DOE property and personnel liability might exist (e.g. "non-permanent" plant structures, leased facilities, and temporary facilities may contain one of a kind equipment, high value permanent plant equipment or have life safety fire related concerns as a fire in a temporary facility, such as T-1, Marshalling Yard Warehouse, WTP Warehouse, or Energy Northwest Leased facility could impact schedule, cost, or workers for the WTP).

As another example, the Marshalling Yard Emergency Action and Fire Prevention Procedure contains roles and responsibilities for the facility emergency director and emergency organization. However, oversight of these facilities by a qualified fire protection engineer is not included in this or any other company procedure. The DOE assessment program identified in DOE O 420.1A and the DOE fire protection guide typically requires a comprehensive fire protection program to include facility oversight by qualified fire protection engineers through the facility assessment process as the integrated safety management system feedback and continuous improvement loop for facility fire protection. Since BNI does not integrate these personnel in routinely scheduled assessments following the DOE fire protection guidance, facility oversight management may not be made aware of facility fire protection deficiencies, hazards, and necessary improvements.

# Criterion 7: Recommendations or findings from assessments or evaluations, both internal and external, are tracked and dispositioned in a formal manner.

The assessment team reviewed the Nuclear Safety (E&NS) Program Assessments and determined each of the findings and recommendations are being tracked and completed.

Other documented problems associated with fire related issues have been found such as in emergency lighting from past reviews and are documented in Corrective Action Report (CAR) 24590-WTP-CAR-QA-05-282. As noted in Performance Objective FP3 of this assessment, the CAR has been closed and the corrective actions were verified by the inspector during this review and found adequate.

### Conclusion:

### **Fire Protection Staffing**

This Assessment concluded the project is staffed with qualified fire protection engineering resources. One area of concern was in the qualifications of personnel performing the inspection, testing, and maintenance of fire related equipment. This concern is discussed in more detail in Criterion 3 and noted below in the Inspection, Testing and Maintenance of Fire Related Equipment summary.

### **Fire Protection Program Implementation**

This Assessment noted the WTP nuclear facilities, as designed, meet the primary DOE fire protection requirements, including installed fire protection systems and equipment as required by DOE O 420.1A.

However, during the facility portion of this review the team noted some deficiencies associated with other facilities which impact the WTP construction, including fire protection implementation at the Marshalling Yard Warehouse and the WTP Site T-52 Warehouse. While fire protection systems in Marshalling Yard Warehouse and WTP Site T-52 Warehouse have installed sprinkler systems, these systems are not designed to control fires for all the commodities currently stored in these facilities and controls have not been established for building management and operations to maintain the commodity within the hydraulic delivery capabilities of the sprinkler systems.

Since it was not within the time frame or scope of this assessment to fully analyze the fire hazards and determine the appropriate controls, additional documented review by a qualified fire protection engineer should be commissioned which includes strategies for continued use of the Marshalling Yard facility with modification of the storage and its arrangement.

### Inspection, Testing and Maintenance of Fire Related Equipment

The Assessment noted a number of concerns in this area, including fire related systems which have been installed but have not yet been brought into service (systems in the steam plant,

Balance of Facilities (BOF)/Important to Safety (ITS) switchgear facilities and the water supply pumping house), fire alarm systems which are not being maintained by qualified personnel as required by NFPA 72, concerns for the uses of leased facilities containing DOE property having fire protection systems where inspection, testing, and maintenance is not being conducted, and a lack of a formalized fire system impairment program consistent with NFPA requirements. NFPA provides measures which must be taken during the impairment of a suppression system to ensure increased risks are minimized and the duration of the impairment is limited. Some elements of impairments are in place in the field but there is no program in place to address impairments.

### **Fire Protection Design**

This Assessment concluded the WTP project has a number of fire protection engineers with various levels of experience on the project. While it was not the scope of this assessment to review design documents and specifications for the WTP, the Assessment Team reviewed WTP engineering to see if BNI had a process in place to ensure fire protection is being incorporated into the design of the WTP and whether or not qualified fire protection engineers are involved in plan and specification review. The Team determined the WTP principle facilities are being designed with suppression and alarm systems and BNI fire protection engineers are actively involved in design document reviews including review and development of procedures and design drawings.

### **Program and Facility Assessments**

The Assessment Team concluded the BNI fire protection engineers perform routine assessments of the overall WTP fire protection program. However the fire protection engineers only conduct fire safety walk downs at the WTP site on a case by case/ad hoc basis for Construction Safety Assurance and the walk downs are not conducted by a formalized process or procedure, which includes elements and frequency of reviews, based on overall risk to the project. Since BNI does not integrate the fire protection engineers in routinely scheduled assessments following the DOE fire protection guidance, facility oversight management may not be made aware of facility fire protection deficiencies, hazards, and necessary improvements.

### **Assessment Tracking and Corrective Actions**

The assessment concluded recommendations or findings from assessments or evaluations, both internal and external, are generally tracked and dispositioned.

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**Findings:** 

**Analyzing Fire Hazards and Implementing Controls:** 

A-06-ESQ-RPPWTP-001-F01 -- Storage controls have not been established for the Marshalling Yard & WTP Site T-52 Warehouses to maintain the storage types and arrangements within the hydraulic delivery capabilities of the fire sprinkler systems (Requirement: NFPA 13, Chapter 5).

A-06-ESQ-RPPWTP-001-F02 -- Impaired fire barriers in the Marshalling Yard Warehouse would allow a fire to spread rapidly throughout the facility (Requirement: NFPA 80, Chapter 15).

### Fire System Inspection, Testing, and Maintenance:

A-06-ESQ-RPPWTP-001-F03 -- Fire alarm system equipment testing is not performed by qualified and experience personnel and tests are not documented as required by NFPA 72 (Requirement: NFPA 72, Section 10.2.2.5).

A-06-ESQ-RPPWTP-001-F04 -- A fire system impairment program has not been implemented consistent with the requirements of NFPA 25 (Requirement: NFPA 25, Chapter 14).

A-06-ESQ-RPPWTP-001-F05 -- Inspection, testing, and maintenance of exit signs, emergency lighting, fire alarm systems, sprinkler systems in Marshalling Yard Warehouse is not conducted as required by National Fire Protection Association Codes (Requirements: NFPA 25, Chapter 10; NPFA72, Chapter 10; and NFPA 101, Section 4.6.12).

### Observations:

A-06-ESQ-RPPWTP-001-O03 - BNI fire protection engineers do not conduct formalized fire protection facility assessments.

A-06-ESQ-RPPWTP-001-O04 - Installed fire systems at the WTP have not put into service.

### PERFORMANCE OBJECTIVE FP.3

The Contractor has implemented comprehensive elements into the fire protection program includes, fire safety training to employees, life safety provisions into facilities, and fire prevention methods to minimize facility fire risks and fire loss potential.

### Criteria:

- 1. General fire safety training is provided to all personnel (DOE O 420.1A)
- 2. The Contractor requires implementation of NFPA 101, *Life Safety Code* in new facility projects and renovations and enforces NFPA 101 in existing buildings. (DOE O 420.1A) Periodic fire prevention inspections are performed in facilities and procedures are being implemented to control combustible, flammable, radioactive, and hazardous materials to minimize the risk from fire. (DOE O 420.1A) Property, including high value equipment, is protected in accordance with Department of Energy Orders, codes, and standards with the appropriate fire protection systems and methods. Fire loss potentials (MPFL/MCFL) determinations are complete and reasonable (DOE O 420.1A).

### Approach:

### Record Review:

- 1. Review the Contractor Site orientation and refresher training provided for all employees. Ensure fire safety is discussed and is adequate.
- 2. Validate the Contractor's Fire Protection Program and/or Engineering practices manual dictates the use of NFPA 101 in both new and existing facilities.
- 3. Validate a procedure or formal methodology for performing periodic fire and life safety inspections on all Facilities and Areas exists. Review the procedure or other document to ensure adequate instruction is provided to ensure all buildings are inspected to appropriate criteria, as defined by the Fire Protection Program document.
- 4. Validate the Contractor has a policy or programmatic statement restricts smoking in areas of high fire concern (inside Facilities, wildland areas, near flammable liquids storage tanks, etc.).
- 5. Validate the Contractor is performing hot work in accordance with a permitting system. Obtain and review the permitting process procedure to ensure requisite standards particularly NFPA 51 and 29 CFR 1926 are being implemented.

### Interviews:

- 1. Interview Contractor personnel to ensure the principles taught in the initial and refresher training is retained by Contractor personnel.
- 2. Interview inspection personnel (like the Fire Protection Engineer for the project) to determine the extent to which life safety infractions occur. Ensure the number and frequency of infractions is low (as determined by the team lead) and timely correction of the concerns is performed.

### Observations:

Tour Facilities under contractual obligation to the Contractor (number and location as specified by the team lead) to field verify compliance conditions with NFPA 101, Life Safety Code. Particular attention should be paid to exit signs, emergency lighting, obstructions to egress, door swings and ease of opening, and violation of fire barriers defined for life safety (generally stairs, shafts, horizontal exits, etc.). Validate through observation if the fire prevention policy or programmatic statement is being implemented and the program implementation is mature to control combustible, flammable, radioactive, and hazardous materials to minimize the risk from fire. If possible, observe a permitted welding area and a field welding operation to determine if the hot work process is being followed.

Validate adequate fire protection is specified via engineering design controls or is currently in place for the following conditions:

- Automatic suppression for all structures where required by the SRD.
- Automatic suppression for all structures where required by the Building Code, NFPA Code, or DOE Standard (DOE-STD-1066-97).
- Although not directly stated in the SRD, DOE typically requires automatic fire suppression where (see DOE G-420.1B-0):
  - The Maximum Possible Fire Loss exceeds \$1 Million.
  - Redundant automatic suppression, including redundant water supplies, for all structures where the Maximum Possible Fire Loss exceeds \$50 Million.
  - Redundant automatic suppression plus physical separation via 3 hour fire barriers for all structures where the Maximum Possible Fire Loss exceeds \$150 Million.
  - Automatic suppression is provided in locations housing safety class equipment.
  - Redundant automatic suppression in cases where no redundant capabilities to safety class equipment exist.
  - Automatic suppression for locations housing high value property.

### **PROCESS:**

### Records Reviewed:

- 24590-HLW-HWP-CON-05-001 Hazardous Work Permit
- 24590-HLW-HWP-CON-05-002 Hazardous Work Permit
- 24590-HLW-HWP-CON-05-003 Hazardous Work Permit
- 24590-HLW-HWP-CON-05-004 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-001 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-003 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-004 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-005 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-006 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-007 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-008 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-009 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-010 Hazardous Work Permit

- 24590-PTF-HWP-CON-05-001 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-001 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-002 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-003 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-004 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-005 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-006 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-007 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-008 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-009 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-010 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-011 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-012 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-016 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-017 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-018 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-019 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-020 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-021 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-022 Hazardous Work Permit
- 24590-LAW-HWP-CON-05-023 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-052 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-053 Hazardous Work Permit
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- 24590-WTP-HWP-CON-05-060 Hazardous Work Permit
- 24590-WTP-HWP-CON-05-061 Hazardous Work Permit
- 24590-WTP-GPP-SIND-026, Rev 3, Housekeeping and Fire Prevention
- 24590-WTP-GPP-SIND-009, Rev 3, Safety Watches
- 24590-WTP-GPP-SIND-013\_3, Hazardous Work Permit
- 24590-WTP-PL-IS-01-001, Rev 5, Non-radiological Worker Safety and Health Plan
- New Employee Training Slides on Fire Prevention
- New Employee Training Slides on Work Permits
- 29 CFR 1926.151, Fire Protection and Prevention
- 29 CFR 1926.352, Welding and Cutting
- NFPA 25, Inspection, Testing, and Maintenance of Water-based Fire Protection Systems
- NFPA 72, National Fire Alarm Code
- NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations 2004 Edition
- NFPA 101, Life Safety Code, 2000 Edition

- Training list of personnel receiving fire extinguisher training
- Sherwin Williams MSDS for Macropoxy® 646
- 24590-WTP-PWO-CMNT-06-0092 Simulator Building Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0103 Fireproofing Shop Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0105 Fireproofing Shop Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0023 2652WTP Warehouse Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0104 Fireproofing Shop Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0020 Combo Shop Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0016 HLW Craft Change House Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0015 PTF Craft Change House Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0016 HLW Craft Change House Fire Protection System weekly inspection work package.
- 24590-WTP-TWO-CMNT-06-0004 Main Construction Site Office Fire Protection System weekly inspection work package.
- 24590-WTP-CAR-QA-06-013, CAR on Preventative Maintenance Issues
- 24590-WTP-CAR-QA-05-282, CAR on Emergency Lighting Issues
- 24590-WTP-CAR-QA-05-192, CAR on Fire Protection Issues

### **DOE and Other Documents:**

- U.S. Department of Energy, DOE O 420.1A, Facility Safety, Contract Requirements Document, Attachment 2, May 20, 2002
- U.S. Department of Energy, DOE G-420.1/B-0, Implementation Guide for use with DOE Orders 420.1 and 440.1 Fire Safety Program, September 30, 1995
- U. S. Department of Energy Contract No. DE-AC27-01RL14136, Waste Treatment and Immobilization Plant Contract, December 2005
- U.S. Department of Energy (under contract of ICF Kaiser Hanford), Facility Fire Protection Assessment of Building 1171, May 1, 1995
- A-05-AMWTP-RPPWTP-003-18, ORP Facility Representative Inspection Notes,
   Representative Review of Intumescent fire proofing, July 12 19, 2005
- A-05-AMWTP-RPPWTP-002-02, ORP Facility Representative Inspection Notes, Representative Review of Intumescent fire proofing LAW, March 8-28, 2005
- A-05-AMWTP-RPPWTP-003-28, ORP Facility Representative Inspection Notes, Facility Representative Review of inspection, testing, and maintenance of fire alarm systems and water-based fire protection systems, July 18 - 29, 2005
- HNF-SP-1180, Hanford Fire Department Needs Assessment and Master Plan, June 2002

- RL DOE Memorandum SES:DGS/05-SES-0165, Limited Scope Needs Assessment of Fluor Hanford, Inc. (FHI) Hanford Fire Department (HFD), June 14, 2005
- Underwriters Laboratory Fire Resistance Directory, 2005
- Design for Code Acceptance, Flame Spread Performance of Wood Products, American Forest and paper Association, Inc., 2002

### **Personnel/Positions Interviewed:**

Building Area Lead for PT/HLW Preservation Maintenance Lead **BNI Fire Protection Engineers** Craft Personnel Craft Supervision Security Officers Material Storage Administrators **Energy Northwest Fire Protection Engineer Energy Northwest Personnel** Marshalling Yard Manager Simulator Manager Material Specialist WTP Utility Manager WTP Field Safety Assurance Manager WTP Maintenance Manager LAW Area Safety Representative LAW Area Superintendent Warehouse Supervisor **Property Administrator** 

### **Evolutions/Operations/Shift Performance Observed:**

- Fire alarm panel battery load voltage test in Building T1
- Fire alarm smoke test in Building T1
- Monthly emergency light and exit sign test in Building T1

Also toured the following facilities to observe overall fire protection program implementation:

WTP Simulator Building

Safety Assurance Manager

Contract Manager

- Marshalling Yard Building
- Energy Northwest Leased Facilities
- WTP T-52 Warehouse
- WTP Site T1 Office Support Building
- WTP Site Fabrication Shop ("Combo-shop")
- WTP LAW
- WTP Fireproofing Buildings (extended storage)

### **RESULTS:**

A review of the new employee training material and the training records verified fire safety training is provided to all personnel. Personnel on the job site interviewed were knowledgeable of how to identify and report a fire.

The Assessment Team also reviewed the Construction Fire Prevention and Protection Plan included within the Nonradiological Worker Safety and Health Plan (24590-WTP-PL-IS-01-001). To implement the elements of the Plan, BNI put in place the following administrative controls to govern the fire protection activities at the WTP construction site:

- 24590-WTP-GPP-SIND-009, Safety Watches
- 24590-WTP-GPP-SIND-013, Hazardous Work Permit
- 24590-WTP-GPP-SIND-026, Housekeeping and Fire Prevention
- 24590-WTP-GPP-SIND-035, Welding and Cutting Safety

The Assessment Team determined these written administrative controls are appropriate for fire safety during the construction of WTP, including controls for housekeeping, control of hot work (e.g., welding and cutting), fire protection/fire fighting equipment (e.g., fire extinguishers, hydrants, etc.), reporting and interfacing with the Hanford Fire Department, control of flammable and combustible liquids, precautions to protect against wild land fires, fire protection design of temporary facilities, and related records documentation and control.

The Assessment Team reviewed the fire prevention inspections (field walk downs) reports and found evidence construction site facilities and procedures are being implemented to control combustible, flammable, and hazardous materials to minimize the risk from fire. The inspections were being conducted by the area managers with assistance from the craft leads, area Safety Assurance Representatives, and Fire Protection Engineers, although documented routine facility assessments are not being conducted by qualified fire protection engineers under a formalized process and procedure throughout all facilities impacting the WTP, as discussed in Performance Objective FP.2.

On February 10, 2006 a small fire in the Low Activity Waste Facility occurred. This fire initiated when a halogen light, which was being used as a heat source to dry curing concrete work, caught a combustible plywood tent enclosure on fire while being unattended. The small fire was approximately two to four feet in diameter with flames no more than two to three inches high. A security guard extinguished the fire using an ABC fire extinguisher and initiated notifications including Hanford Fire Department. The Hanford Fire Department responded to the scene to confirm the fire was completely extinguished. The Assessment Team reviewed the Contractors immediate corrective actions from this event, which included, review of the site for similar applications of lights used to freeze protect concrete to ensure there was no potential for material to come in contact with the lights and site personnel briefings, and determined they were appropriate. The knowledge deficiency of fire safety resulting from this fire was considered corrected since site briefings were conducted.

The WTP Fire Protection Program contained in 24590-WTP-RPT-FP-04-0002 requires the National Fire Protection Association (NPFA) 101, Life Safety Code, to be utilized as an applicable NFPA Code related to the WTP design and 24590-WTP-RPT-CON-05-007 requires BNI to implement NFPA 101 for construction activities involving non-permanent plant installation and maintenance. For the most part, this requirement is being implemented at the construction and facility design level and interviews with the BNI Fire Protection Engineers, review of the preliminary fire hazard analyses, and a walk down of areas toured by the Assessment Team indicates life safety provisions are being considered in the design and construction process.

In evaluating implementation of life safety provisions into the contractors work spaces, a number of WTP facilities were reviewed by the ORP Assessment Team. Life safety elements observed during these facility tours included exit signs, emergency lighting, obstructions to egress, door swings and ease of opening, and fire barriers necessary for life safety (stairs, shafts, horizontal exits, etc.). Life safety provisions, such as obstructions to egress, exit signs, emergency lighting door swings, and ease of opening, are generally adequately addressed throughout the majority of operational and construction facilities. In the past, ORP has found problems with emergency lighting and BNI has documented these issues in Corrective Action Report (CAR) 24590-WTP-CAR-QA-05-282. The CAR has been closed and the corrective actions were verified by the Assessment Team during this review and found adequate, closing assessment follow-up item A-05-AMWTP-RPPWTP-003-A03. The emergency lighting preventive maintenance procedures were revised to correctly implement the required testing of NFPA 101 Section 7.9.3. Emergency lights previously identified as not being inspected have been entered into the PM database tracking system. A program has been established to install emergency lighting during construction to protect personnel in the event of a loss of normal lighting. Repair of emergency lighting has been scheduled and inspection records are being kept in a retrievable form. Therefore, assessment follow-up item A-05-AMWTP-RPPWTP-003-A03 is considered closed.

During the assessment walk downs the Team observed potential life safety deficiencies in the Marshalling Yard Warehouse. The Team observed a large quantity of combustible construction material inside the building which did not appear to meet NPFA 101 flame spread and smoke developed requirements for interior finish. This included an interior office, which was made mostly of wood. During the facility walk downs the team also noted some exits blocked by warehouse storage and the contractor corrected those conditions on the spot.

Regarding the combustible construction material, the Team observed interior office spaces, including walls, and ceilings which were constructed out of untreated plywood, custom made counter tops constructed out of untreated plywood and other wood materials, and other locations such as tool storage areas walls constructed out of large quantities of plywood materials. This construction may not meet requirements of NFPA 101, which requires interior finish to have a flame spread rating of less than 200 and a smoke development less than 450. NFPA 101 bases the flame spread rating and smoke development on the requirements of ASTM E 84, *Standard Test Method for Surface Burning Characteristics*. ASTM E 84 develops a comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame and smoke obscuration versus time for a material tested compared to red oak wood and cement board. The larger the flame spread number the faster surface propagation of flame will occur

and the larger the smoke developed the greater smoke particle generation will occur as a result of surface fire propagation. The limitations were placed into the life safety code as one factor allowing building occupants to safely exit a building under a fire scenario.

BNI leases the Marshalling Yard Warehouse from the Tri-City and Olympic Railway. The building was previously utilized as a vehicle maintenance facility for passenger vehicles, light and heavy duty trucks, busses, and heavy equipment including railroad locomotives. There were also areas for small parts storage, a body shop, a paint shop, a tire shop, vehicle alignment, a machine shop, a weld shop, and supporting office areas. Unfortunately, some construction modifications and changes to the occupancy have occurred sometime in the life of this facility. The facility was transferred from a vehicle maintenance facility to a warehouse and combustible construction, including the additional of quite a bit of plywood, has been introduced into the facility resulting in the addition of materials which may not meet the NFPA 101 requirements.

The assessment team informed BNI of this life safety concern. During the factual accuracy review of the assessment results, BNI responded by stating, "The American Forest & Paper Association, Inc. has tested plywood and none of the products tested exceeded a smokedeveloped index of 450...also, the flame spread was less than 200". The Assessment Team reviewed the American Forest & Paper Association, Inc. data and manufacturer listings contained in the Underwriters Laboratory Building Materials Directory, and concluded that while some plywood products may meet the NFPA interior finish requirement, due to variations of specific plywood manufacturers, not all plywood can actually meet the requirements for interior finish. BNI has not formally evaluated the actual plywood installed in the Marshalling Yard Warehouse against NFPA 101 and should, so personnel life safety in this facility is not compromised (A-06-ESQ-RPPWTP-001-O06).

The Assessment Team also reviewed procedural implementation of the fire watch program contained in WTP procedures, including, Safety Watches (SIND-009), Housekeeping and Fire Prevention (SIND-026), and Hazardous Work Permit (SIND-013) and determined there is little evidence the Fire Watch program has been formally implemented at the construction site. Hazardous Work Permits needed for an activity were found within the special instruction section marked "watch" for the activity. However, personnel interviewed stated while these activities had identified a hazard and had conservatively used a Hazardous Work Permit, a Fire Watch had not been used. Interviews with field personnel determined most people did not know the qualifications and duties of a person performing Fire Watch. The training requirements for performing the duties of a Fire Watch are not defined. Furthermore, personnel in the field do not know the requirements for who can perform the duties of a Fire Watch and responsibilities of the Fire Watch. (A-06-ESQ-RPPWTP-001-O05)

The Assessment Team also considered protection of radioactive materials from fire on the construction site. The only radioactive material on site is the source material used in weld inspections, soil density testing and material identification. The source material has specific handling and storage controls and thus was not reviewed during this assessment.

### Conclusion:

### **General Fire Safety Training**

The Contractor has implemented the necessary fire safety training which includes the required basic elements to employees. Personnel on the job site interviewed were knowledgeable of how to identify and report a working fire.

### Life Safety Code Implementation

For the most part, life safety is being incorporated into facility design and operations as required by NFPA 101. Life safety provisions, such as obstructions to egress, exit signs, emergency lighting, and door swings and ease of opening, are generally adequately addressed throughout the majority of operational and construction facilities. However, during the facility portion of the assessment, the assessors noted concern at the Marshalling Yard Warehouse because it contained a significant amount of exposed plywood which could quickly permit the spread fire and create massive amounts of smoke if a fire started. Interior finish in the Marshalling Yard Warehouse may exceed flame spread and smoke developed ratings of the NFPA 101 and these types of materials have not been evaluated by BNI.

### Fire Prevention

The Assessment Team found evidence of fire prevention inspections (field walk downs) being performed in the construction site facilities and procedures to control combustible, flammable, and hazardous materials to minimize the risk from fire. As discussed in Performance Objective FP.2, documented routine facility assessments are not being conducted by qualified fire protection engineers under a formalized process and procedure throughout all facilities impacting the WTP. The Assessment Team also reviewed procedural implementation of the fire watch program and determined there is no evidence the Fire Watch program has been formally implemented at the construction site.

### **Issues:**

### Observations:

A-06-ESQ-RPPWTP-001-O05 - BNI has not implemented robust fire watch requirements.

A-06-ESQ-RPPWTP-001-O06 - Wood construction in the Marshalling Yard Warehouse has not been evaluated for interior finish use under the Life Safety Code.

# FACTUAL ACCURACY REVIEW OF ORP FIRE PROTECTION PROGRAM IMPLEMENTATION ASSESSMENT OF BNI March 20, 2006

Comment	Commenter/Phone Number	Specific Location in Document (specify report or notes)	Comment	Proposed Wording Revision	ORP Assessment Team Disposition
_	M Perks/37 1-3646	Finding 02	Impaired fire barriers - these fire barriers were in place when the building was used as a transportation repair facility. Fire barriers may be different or non-existent based on the current storage occupancy and property loss involved.	Please consider making this an observation that requires a response. The Fire Barriers are being evaluated as part of our Management Assessment on WTP Storage Vulnerability to Fire Loss, 24590-WTP-PL-ENS-06-0002.	ORP reviewed a copy of 24590-WTP-PL-ENS-06-0002 and noted that while BNI is planning to conduct a Management Assessment on the WTP Storage, the current plan does not specifically address the impaired fire barriers. Added the following to Report Section 1.2 and Assessment Notes for FP.2, "In response to the deficiencies identified by in this performance objective, BNI issued a plan to assess the WTP storage, which included sprinkler system design, building occupancy, and life safety related concerns. However, the plan does not specifically address evaluation of the Marshalling Yard Warehouse fire barriers. BNI should evaluate the Marshalling Yard Warehouse fire barriers as a control method consistent with other warehouse storage control considerations."
2	M Perks/371-3646	Finding 03	There is some fire testing that was performed by qualified personnel, although it is recognized this is a repeat finding (stated later in the report).	Would you consider stating: An instance was found where qualified and experienced personnel did not perform fire alarm system testing and the test was not documented as required by NFPA 72.	There was more than an instance found.  Several factors made up this Finding.  First, ORP noted the electricians doing the work were not qualified in the inspection, testing, and maintenance of fire alarm systems. ORP also noted four out of five multi-meters being used

ORP Assessment Team Disposition	for the test were out of calibration. The workers did not have work instructions with them while they conducted the activity and no instruction had been developed on how to perform the battery load voltage test. No personnel qualified in the inspection, testing, and maintenance of fire alarm systems was present to oversee the activity during the test and there were no instructions on how to return the fire panel to service or any process to check to ensure the panel was correctly returned to service after the test was completed. Results of the testing were not being documented in a retrievable form, and testing did not appear to meet the testing did not appear to meet the testing requirements of NFPA 72, Table 10.4.2.2 5(e) because the maximum load required was not being applied during the test. We were also told this was corrected from a previous finding and it was not. The importance of this finding was illustrated when BNI went to repeat the test using a detailed procedure (developed by a FPE with his oversight), that was not available, when ORP observed the testing, and found the batteries failed the test.	The Finding is that it was not being conducted as required by NFPA. Under Section 1.2, ORP acknowledges that annual fire sprinkler and alarm
Proposed Wording Revision		Would you consider stating:  Not all required inspection, testing, and maintenance of exit signs, emergency lighting, fire alarm
Comment		This finding can be read as if no inspection, testing and maintenance was performed at all.
Specific Location in Document (specify report or notes)		Finding 05
Commenter/Phone Number		M Perks/371-3646
Comment		က

Comment	Commenter/Phone Number	Specific Location in Document (specify report or notes)	Comment	Proposed Wording Revision	ORP Assessment Team Disposition
	·			systems, and sprinkler systems in the Marshalling Yard Warehouse is conducted as required by National Fire Protection Association Codes.	IT&M was done based on the review of the sprinkler and fire alarm records provided by BNI after ORP completed the field work. However, the ORP review of the records specifically indicate the monthly, semi annual, quarterly IT&M for sprinklers and fire alarm are not being done and the records for the annual maintenance were not of accurate quality because the records noted "operational system defects" without identifying what the defects were and whether they were corrected. The report also noted that, "Prior to completion of the assessment BNI conducted some testing and determined that one life safety item was not functional."
4	M Perks/371-3646	Finding 06	Wood construction - the American Forest & Paper Association, Inc. has tested plywood and none of the products tested exceeded a smokedeveloped index of 450. Also, the flame spread was less than 200	Please consider making this an observation that requires a response. The wood construction is being evaluated as part of our Management Assessment on WTP Storage Vulnerability to Fire Loss, 24590-WTP-PL-ENS-06-0002.	Revised to an observation requiring ORP response per discussions with K. Lesko and C. Christenson. Due to fire characteristic variations of specific plywood manufacturers, BNI should evaluate the actual plywood material installed in the warehouse against NFPA 101, Life Safety requirements.
5	K Lesko/371-3110	p6, F05	Suggest rewording "records for the annual maintenance were not of accurate quality"	records for the annual maintenance were not of adequate quality	Revised to state, "records for the annual maintenance were not of adequate quality"
9	K Lesko/371-3110	9d	Add sentence after "Prior to completion of the assessment BNI conducted some testing and determined that one life safety item was not functional"	Prior to completion of the assessment BNI conducted some testing and determined that one life safety item was not functional. A repair was initiated.	Revised to state, "Prior to completion of the assessment BNI conducted some testing, determining that one life safety item was not functional, and initiated a repair."

Comment	Commenter/Phone Number	Specific Location in Document (specify report or notes)	Comment	Proposed Wording Revision	ORP Assessment Team Disposition
7	K Lesko/371-3110	p7, 004	propose rewording of bold description	Installed fire systems at the WTP have not been put into service.	Revised to, "Installed fire systems at the WTP have not been put into service."
∞	K Lesko/371-3110	8.0	Under Program and Facility Assessments	instead of "ES&H fire safety program", reword to "WTP Fire Protection Program"	Revisedof the overall WTP Fire Protection Program".
6	K Lesko/371-3110	p10	Senience "Interior finish in the Marshalling Yard Warchouse exceeds flame spread and smoke developed ratings of the NFPA 101 and these types of materials are not permitted by WTP procedures."	Interior finish in the Marshalling Yard Warehouse may exceed flame spread and smoke developed ratings of the NFPA 101.	Revised to read, "Interior finish in the Marshalling Yard Warehouse may exceed flame spread and smoke developed ratings of the NFPA 101"
10	K Lesko/371-3110	p 6 Assessment note	DOE-STD-1066-99	DOE-STD-1066-97	Revised to DOE-STD-1066-97
<u>-</u>	C. Davis/371-2931	p 6 Assessment note	29 CFR 1910	29 CFR 1926	Revised to 29 CFR 1926
12	K Lesko/371-3110	p 9 Assessment note	BNI has yet to issue a specific written procedure related to the development of fire hazard analyses.  The procedure was issued 3/8/06.	BNI issued a specific written procedure related to the development of fire hazard analyses after completion of the assessment.	Revised to read, "A specific written procedure related to the development of fire hazard analyses had not been issued by BNI at the time of the assessment (note: BNI issued a procedure on March 8, 2006 after the field portion of this assessment was completed and it was not reviewed by the assessment team)."
13	K Lesko/371-3110	p 26 Assessment note	Suggest rewording "records for the annual maintenance were not of accurate quality"	records for the annual maintenance were not of adequate quality	Revised to state, "records for the annual maintenance were not of adequate quality"
41	K Lesko/371-3110	p 28 Assessment note	top of page	instead of "ES&H fire safety program", reword to "WTP Fire Protection Program"	Revisedof the overall WTP Fire Protection Program".

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Comment Commenter/Phone Number Number	Specific Location in Document (specify report or notes)	Comment	Proposed Wording Revision	ORP Assessment Team Disposition
K Lesko/371-3110	p 29 Assessment	T-52 Warehouse	reword to "WTP Site T-52 Warehouse"	Revised to read, "WTP Site T-52 Warehouse"
K Lesko/371-3110	p 31 Assessment note	propose rewording of bold description	Installed fire systems at the WTP have not been put into service.	Revised to read, "Installed fire systems at the WTP have not put into service."
K Lesko/371-3110	p 32 Assessment note	29 CFR 1910	29 CFR 1926	Revised to read, "29 CFR 1926"
K Lesko/371-3110	p 34 Assessment note	29 CFR 1926.151 29 CFR 1926.352	29 CFR 1926 Subpart F&J	The assessor used only Section .151 and .352 of 29 CFR 1926 and did not use the full subparts F & J – no change required.
K Lesko/371-3110	p 34 Assessment note	NFPA 101, Life Safety Code, 2003 Edition	NFPA 101, Life Safety Code, 2000 Edition	Revised to 2000 edition.