




Department of Energy
 Carlsbad Field Office
 P. O. Box 3090
 Carlsbad, New Mexico 88221
APR 20 2015



Mr. V.K. Cannon, Manager
 Quality Assurance
 Nuclear Waste Partnership LLC
 P.O. Box 2078
 Carlsbad, NM 88221-2078

Subject: Surveillance Report S-15-03, NWP Compliance with DOE Order 420.1C,
Facility Safety, Appendix 2, Chapter II, Fire Protection

Dear Mr. Cannon:

Enclosed is the report for the subject CBFO Surveillance S-15-03, performed October 14 - 16, 2014, at the WIPP site near Carlsbad, NM.

The team identified three conditions adverse to quality during the surveillance regarding emergency medical technician licenses not being included in the training records for several individuals, National Fire Protection Association requirements not fully included in required training documents, and an exception application that was flawed. In addition, six Observations and three Recommendations were identified during the surveillance, and are described in the report.

If you have any questions concerning the surveillance, please contact me at (575) 234-7483.

Sincerely,



Martin P. Navarrete
 Senior Quality Assurance Specialist

Enclosure

cc: w/enclosure
 J. Franco, CBFO *ED
 M. Brown, CBFO ED
 W. Mouser, CBFO ED
 E. Garza, CBFO ED
 D. Gadbury, CBFO ED
 J. Ford, CBFO ED
 D. Miehl, CBFO ED
 R. McQuinn, NWP ED
 J. Blankenhorn, NWP ED
 J. Harris, NWP ED
 W. Ledford, NWP ED



APR 20 2015

Mr. Cannon

-2-

S. Punchios, NWP	ED
S. Escareno-Soto, NWP	ED
T. Peake, EPA	ED
L. Bender, EPA	ED
E. Felcorn, EPA	ED
R. Joglekar, EPA	ED
J. Kieling, NMED	ED
S. Holmes, NMED	ED
R. Maestas, NMED	ED
R. Allen, CTAC	ED
P. Martinez, CTAC	ED
B. Pace, CTAC	ED
G. White, CTAC	ED
B.J. Verret, CTAC	ED
S. Thorne, CTAC	ED

WIPP Operating Record

CBFO QA File

CBFO M&RC

*ED Denotes Electronic Distribution

CBFO SURVEILLANCE REPORT

Surveillance Number: S-15-03 **Date of Surveillance:** October 14 – 16, 2014

Surveillance Title: NWP Compliance with DOE Order 420.1C, *Facility Safety*,
Appendix 2, Chapter II, Fire Protection

Organization: Nuclear Waste Partnership LLC (NWP)

Surveillance Team:

Martin P. Navarrete	Carlsbad Field Office (CBFO) Management Representative
B.J. Verret	Team Leader, CBFO Technical Assistance Contractor (CTAC)
Steve Thorne	Team Member, CTAC
Rick Castillo	Team Member, CTAC

Surveillance Scope:

Surveillance S-15-03 was conducted to evaluate NWP compliance with DOE Order 420.1C, *Facility Safety*, Appendix 2, Chapter II, Fire Protection. Surveillance scope included documentation review (which included the 2012 revision 0 and the 2014 revision 1 of the *Baseline Needs Assessment for the Waste Isolation Pilot Plant*, DOE/WIPP 11-3471), personnel interviews, and verification of implementation and effectiveness of applicable NWP plans and procedures.

Program Elements/Criteria Assessed:

1. Application of relevant International Building Code criteria
2. Pre-fire activities (pre-incident plans)
3. Standard operating procedures for Waste Isolation Pilot Plant (WIPP) site firefighting personnel
4. Status and reliability of the WIPP fire protection water supply
5. Status and reliability of WIPP fire suppression systems
6. Status and reliability of WIPP fire barriers
7. Status and reliability of WIPP emergency notification systems (fire alarms, fire reporting, voice evacuation notification)
8. Adequacy of emergency egress and illumination
9. Adequacy of means to prevent accidental release of significant quantities of products of combustion (POCs) and firefighting water to the environment
10. Means to address fire and related hazards that are unique to the WIPP site and not addressed by industry codes and standards
11. Adequacy of fire protection systems to ensure Vital Safety System functions are not adversely impacted by fire or by inadvertent fire protection system operation
12. Status of issues related to fire "department" baseline needs assessment (BNA)
13. Review of implementation of applicable fire protection requirements for facilities, activities and programs

14. Review of roll-down of applicable fire protection requirements into contractor requirement documents
15. Managing and tracking fire protection and life safety systems
16. Other items as identified by the surveillance team

Surveillance Results:

The surveillance team interviewed NWP personnel and examined electronic and paper copies of reports and records. Training records reviewed for Emergency Services, Fire Protection, Fire Brigade, Emergency Response Team, and Mine Rescue Team personnel were found to be in compliance with the requirements of the NWP training program with the exception of three missing EMT license renewal certificates which is detailed in Condition Adverse to Quality 1, CAR 15-010. The team verified the training records selected were legible, accurate and complete, and were identified on the Records Inventory and Disposition Schedule (RIDS) as required.

1. Application of Relevant International Building Code Criteria

WP 12-FP.01, WIPP Fire Protection Program, Rev. 14, establishes applicable building code requirements as they relate to the fire protection program. Section 9.0, "General Building Requirements", stipulates that all new facilities, as a minimum will be designed in accordance with the International Building Code (IBC), as well as DOE Standard 1066 (Fire Protection), and applicable NFPA standards.

Per the Program criteria, all existing facilities require that:

- o Modifications to a building layout be evaluated by the fire protection engineer (FPE).
- o Building occupancy limits to be established by the FPE, as necessary.

The program includes provisions for Fire Protection Engineering approval prior to occupancy and for conditions that may be out of compliance with life safety. These provisions and criteria are consistent with the IBC provisions for code administration. It is concluded that current provisions in WP 12-FP.01 for applying IBC criteria is satisfactory.

2. Pre-Fire Activities (pre-incident plans)

WP 12-FP.01, includes provisions for Pre-Incident planning. Section 5.0, "Emergency Firefighting Capabilities and Pre-Incident Planning describes elements of a surface response plan and an underground response plan. However, it does not cite the required standard, NFPA 1620, Standard for Pre-Incident Planning. Further, it does not cite the required involvement of the Fire Protection Engineer and Cognizant Engineer.

WP-12-FP3004, "Developing and Modifying Pre-incident Plans", Revision 3 was reviewed. Per this procedure, the pre-incident plan is used by responding personnel in effectively managing emergencies for the protection of occupants, responding personnel, property, and the environment. Per this procedure, emergency management personnel, in conjunction with the WIPP Fire Protection Engineer (FPE), and Cognizant Engineer (CE), develop and approve pre-incident plans for new WIPP structures, and structures that have been modified such that a new plan is needed. This procedure

references NFPA 1620 with regard to legend symbols. However, there is no reference to incorporate the required elements that are stipulated by NFPA 1620.

WP 12-ER4911, "Underground Fire Response" Revision 15, was reviewed. This emergency response procedure was reviewed. While it cites WP 12-FP.01, it does not include NFPA 1620 as reference document. Also, WP 12-ER4911 does not include a "Special Hazards" section as stipulated by NFPA 1620, chapter 8. This section stipulates identification and documentation of special hazards that present extraordinary life safety challenges, operations challenges, or other challenges to emergency responders. Special hazards that are explicitly noted include radioactive materials, special atmospheres, flammable and combustible liquids and hazardous material inventory.

WP 12-ER.04, "WIPP Fire Response Guide", Revision 0 was reviewed. This standard operating guide (SOG) provides operational guidance for response to building fires within the property protection area of WIPP. It provides appropriate information for trained personnel responding to fires. However, there is no reference to pre-incident plans or to NFPA 1620.

WP-12-ER4908, "Surface Fire Response", Revision 11 was reviewed. This Emergency Operating Procedure does not reference pre-incident plans or NFPA 1620.

DOE/WIPP 11-3471, "Baseline Needs Assessment for the Waste Isolation Pilot Plant", Revision 2, was reviewed. In this document, it notes that, "In a review of the pre-incident plans and procedures, it was determined that there is information lacking and drawings are not being updated in a timely manner. Recommendation 2014-04 of the BNA recommends the following: "Update WP 12-FP3004...to reflect the applicable requirements outlined in NFPA 1620...". Recommendation 2014-05 recommends the following: "Perform Pre-Incident Plans for the UG to aid emergency responders".

It is concluded that the requirements of NFPA 1620 have not been fully incorporated into the fire protection program and applicable related documents and procedures. This deficiency has resulted in less than satisfactory pre-incident plans. Incorporation of NFPA 1620 as applicable for Pre-incident Planning, into the WIPP Fire Protection Program is required (CAR 15-031).

3. SOPs for Site Firefighting Personnel

WP 12-FP.01, section 5.3, "Pre-Incident Planning", stipulates that standard operating procedures must be established to enhance the effectiveness of manual fire suppression activities for incipient, developing fire, and fully involved fires. Applicable operating procedures related to fire emergency response that were reviewed as part of this assessment include, WP 12-ER4911, "Underground Fire Response" Revision 15, WP 12-ER.04, "WIPP Fire Response Guide", Revision 0, WP12-ER4908, "Surface Fire Response", Revision 11, WIPP 12-ER.07, WIPP Wildland/Interface Fire Guide, Revision 11, and WP 12-ER.13, WIPP Drills and Exercises, Revision 0. As required by DOE 420.1C, the BNA is a mandatory assessment document for this element. It was also reviewed.

It is concluded from review of these documents that the basic criteria currently provided is not satisfactory. SOPs must provide sufficient detail and must delineate appropriate

actions based on baseline staffing, training, equipment that must be available. Also, as site firefighting personnel are the first responders to emergency medical, hazardous materials and technical rescue events, SOPs for these events are also required. (CAR 15-031)

Additionally, there are several noteworthy related recommendations already identified in the BNA that address these issues. These are as follows:

1. Recommendation 2014-01: Implement the scope of NFPA 600 to provide the minimum requirements for organizing, operating, training, and equipping industrial fire brigades.
2. Recommendation 2014-02: Provide IC training to all emergency responders in accordance with the National Incident Management System (NIMS) – Federal Emergency Management Association (FEMA) Incident Command System (ICS) during emergencies to ensure consistency in emergency response.
3. Recommendation 2014-04: Update WP 12-FP3004, Developing and Modifying Pre-Incident Plans to reflect the applicable requirements outlined in NFPA 1620, Standard for Pre-Incident Planning.
4. Recommendation 2014-05: Perform Pre-Incident Plans for the UG to aid emergency responders.
5. Recommendation 2014-06: Conduct drills for FB members per NFPA 600 in order to be in compliance with the requirements.
6. Recommendation 2014-10: Identify the appropriate Hazmat training for adoption for the WIPP site...
7. Recommendation 2014-11: Determine applicable technical rescue elements for WIPP and establish training in accordance with NFPA 1006, Standard Technical Rescuer Professional Qualifications for onsite response and EST offsite response.
8. Recommendation 2014-14: Revise WP 04-AD3029, Waste Isolation Pilot Plant Fire Brigade Staffing procedure to ensure management is notified and impacts to site operations are reviewed.
9. Recommendation 2014-15: Provide additional ESTs to bring total emergency response personnel to eight per shift.
10. Recommendation 2014-16: Staff two ESTs members per shift UG during operations.
11. Recommendation 2014-18: Develop an UG emergency response plan.
12. Recommendation 2014-19: Implement hazardous materials response protocols based on NFPA 471, Recommended Practice for Responding to Hazardous materials Incidents for ESTs responding onsite per the HWP and offsite.
13. Recommendation 2014-20: Implement technical rescue response protocols that are applicable to the site or offsite response based on NFPA 1670, Standard on Operations and Training for Technical Search and Rescue Incidents for ESTs.
14. Recommendation 2014-21: Provide direction and training for UG spill response, to include the utilization of UG rescue truck and UG fire suppression vehicle including the hazmat mitigation equipment installed.
15. Recommendation 2014-22: Establish mutual aid protocols for hazmat response and level of response needed.
16. Recommendation 2014-23: Staff one paramedic per shift.
17. Recommendation 2014-26: Procure a vehicle with trailer hitch so the Hazmat trailer may be utilized for Hazmat responses.
18. Recommendation 2014-27: Procure electric UG fire suppression vehicles to be located strategically spaced intervals in the UG to expedite fire emergency operations in accordance with the evaluation for underground response vehicles.

19. Recommendation 2014-28: Develop training program on the use of the UG fire suppression vehicles and 300-pound wheeled extinguisher (located at oil storage) to outline roles and responsibilities on its use and actions to be taken during an emergency.

There are 28 new recommendations and 9 "OPEN" recommendations from the 2012 BNA. Implementation of the BNA recommendations are expected to result in satisfactory SOPs for site firefighting personnel and need to be completed/dispositioned on a priority basis (Observation 1).

4. Status and Reliability of WIPP Fire Protection Water Supply

DOE 420.1C, Attachment 2, Chapter II, Fire Protection, stipulates that a reliable and adequate water supply and distribution system must be provided for fire suppression, as documented through appropriate analysis. WP 04-FP1201, Site Fire Water Supply System Operations, provides a technical description of the fire water supply, including the two fire pumps, a jockey pump, the buried distribution piping, post indicator valves (PIVs) and fire hydrants. This water also supplies 27 facility sprinkler systems.

As indicated in the WIPP FHA, the fire pumps are configured to start on demand via a drop in pressure from the fire water main. This drop in pressure may be activated by either the opening of a fire hydrant or by the activation of a sprinkler system. The initial fire pump is the electric-motor-driven pump and the other pump is diesel-engine driven. Both pumps are rated for 1,500 gpm at 125 pounds per square inch (psi). The fire pumps' minimum requirement is to develop 1,500 gpm at 105 psi to meet WIPP's maximum sprinkler demand. Although the electric fire pump is the first to start from a pressure loss demand, the diesel fire pump can operate under all normal and off-normal conditions. Both fire pumps are capable of meeting 100 percent of the design required flow and the pressure demands of the fire protection water supply system. The WIPP FHA, postulates fires and estimates the required fire flow. Per the FHA, the bounding fire, accounting for 250 gpm hose stream flow, and sprinkler demand for a 90 minute time frame has a required fire flow of approximately 105,000 gallons. The nominal capacity of the fire water storage tank is 180,000 gallons. Thus, there is sufficient margin available to supply the bounding fire. It is concluded that the water supply is adequate for the aboveground facilities.

From discussions with the cognizant system engineer, the electric fire pump controller is obsolete and replacement parts are not available. A work order to replace the electric fire pump controller, WO 0903461M was developed (in calendar year 2009) but never completed. Since the controller remains functional, the system is not considered impaired. Thus, there is no programmatic requirement to replace the controller in a timely manner. A review of the detailed recovery schedule for fire protection indicates that the replacement of the fire pump controller is not being tracked.

Both the electric and diesel fire pumps are aging and are require corrective maintenance. At the time of the assessment, the packing on the electric fire pump had been replaced, and replacement of the packing on the diesel fire pump was being planned. Discussions with cognizant personnel indicate that the replacement of both fire pumps is being planned. However, the detailed recovery schedule does not include this activity.

Over the past ten years numerous post indicator valves (PIVs) have failed to operate properly. These conditions have impact both the reliability and operability of the water supply. Historically, timely repair of both PIVs and fire hydrants has not been a priority. As the time of this assessment, fire protection system impairments were being given higher management visibility, by placing active impairments on the plan of the day. However, it was not evident that process improvements have been developed and implemented to ensure that the fire protection water supply is being maintained such that it meets the DOE expectation for a reliable water supply

As part of ensuring a reliable fire protection water supply, the replacement of the fire pump controller both the electric and diesel fire pumps and any developing fire water supply system deficiencies should be treated as a priority and tracked to completion (Observations 3, 4, 5).

5. Status and Reliability of WIPP Fire Suppression Systems

DOE 420.1C, Chapter II, Fire Protection, states as an objective, providing a level of safety protection consistent with the "highly protected risk" class of industrial risks. The WIPP Fire Protection Program document, section 1, "Purpose and Scope", appropriately establishes basic fire protection capabilities, notably that they be sufficient to minimize losses of life and property from fire and related hazards consistent with highly protected risk status in private industry. As a result of applying the highly protected risk requirement and the DOE requirement that automatic fire suppression systems be provided throughout new facilities exceeding 5,000 ft² and where a maximum possible fire loss exceeds \$5million, all of the facilities >5,000 ft² or high value structures aboveground are protected with automatic fire sprinkler systems (27 systems). As delineated in the Fire Protection Program document, fire suppression systems are required as follows:

- Waste handling liquid fueled vehicular equipment over 60 HP have individual automatic fire suppression systems.
- Going forward, all mining liquid fueled vehicular equipment over 60 HP or is filled to more than 25 gallons (fuel) shall have individual automatic fire suppression systems.

TSRs affecting some WIPP fire protection systems are identified in Doe/WIPP-07-3373, Waste Isolation Pilot Plant Technical Safety Requirements. Specific fire suppression systems required to be operable include systems in the Waste Handling Building, Support Building and the Site Fire Water Supply.

Section 15, delineates requirements for when a fire protection system is impaired. Attachment 2, identifies applicable fire protection, inspection testing and maintenance procedures. Attachment 4 delineates detailed inspection, testing and maintenance requirements for the water-based fire protection systems.

At the time of the assessment, the fire year obstruction inspection, required by NFPA 25, and identified in Attachment #4 were not completed for a number of fire sprinkler systems. This deficiency was self-identified by the contractor and is being tracked as a condition adverse to quality (reference: WF 14-269).

Per the FHA, as part of post fire event fire protection enhancements, an automatic dry chemical extinguishing system, designed to the requirements of *Standard for Dry*

Chemical Extinguishing Systems NFPA 17, will be installed to provide fire suppression for the underground lube oil storage area. Additionally, a modified residential fire sprinkler system (NFPA 13D type system) supplied from a dedicated water storage tank providing protection for the underground office area is to be installed. The fire protection engineer on the assessment team endorses these enhancements and considers them to be consistent with the highly protected risk criteria.

As part of updating and improving the Fire Protection Program description, WP 12-FP.01, should be updated to explicitly incorporate the Automatic suppression system protection thresholds and the post fire event fire protection suppression system enhancements (Recommendation 1).

6. Status and Reliability of WIPP Fire Barriers

As appropriately described in the WIPP Fire Protection Program, fire barriers provide for both protection of property and life safety. The program appropriately delineates specific requirements for marking, and controlling penetrations in fire barriers. Attachment 6, identifies a list of fire barriers and doors by building and room location.

As a process improvement, an annual inspection of fire barrier penetrations as delineated in NFPA 80, Standard for Fire Doors and Other Opening Protectives, section 5.2.4 should be incorporated into the WP 12-FP.01, WIPP Fire Protection Program (Recommendation 1).

7. Status and Reliability of WIPP Emergency Notification Systems (Fire Alarms, Fire Reporting, Voice Evacuation Notification)

The Radio Fire Alarm Reporting System is used to transmit fire alarm panel alarm and trouble signals to the Central Monitoring Room (CMR). Per the FHA, the Harlow Radio Fire Alarm Reporting System was installed in the mid-1980s and utilizes MSDOS software. The system hardware and software is no longer supported by the manufacturer and is considered obsolete.

Replacement of the obsolete Harlow Radio Fire Alarm Reporting System should be treated as a priority (Observation 2).

The contractor has proposed the following enhancements for the Underground:

- The Underground fire alarm system will be upgraded to provide smoke and carbon monoxide detection as a supplement to existing heat detection.
- A supplemental strobe/speaker notification system is installed, redundant to reflectors to safely direct employees to the safe direction of travel to exit the Underground.

8. Adequacy of Emergency Egress and Illumination

Consistent with DOE O 420.1C and 10 CFR 851, Worker Health and Safety Program, the WIPP Fire Protection Program cites the building code, NFPA 101, Life Safety Code, and 30 CFR 57 (for Surface and Underground Mines) as the basis for the requirements related to emergency egress and illumination.

For aboveground facilities emergency egress and illumination is required to be provided in accordance with the applicable NFPA 101, Life Safety Code occupancy requirements.

The FHA notes that 33 emergency lights are not functional in the WHB. WIPP Form 13-282 has been issued to track this deficiency. At the time of the assessment, corrective actions were being developed.

The underground is equipped with emergency egress and illumination as stipulated by 30 CFR 57. The underground utilizes three shafts for emergency egress: the Waste Shaft, the Salt Handling Shaft, and the Air Intake Shaft. Exiting requires aboveground mechanical conveyance. This configuration meets and exceeds the minimum criteria cited by 30 CFR 59.11050, that at least two separate, properly maintained escapeways to the surface be available when personnel are in the underground. Per the fire protection program, and consistent with 30 CFR 57.11051, the underground escape routes are required to be inspected at weekly intervals, maintained in a safe, travelable condition, and as a minimum are marked with conspicuous and easily read, reflective direction markers that clearly indicate the ways of escape.

Per the fire protection program, the personnel capacity of the underground is administratively controlled to a typical maximum occupancy of 145 personnel. The control is regulated by the shaft tenders only allowing people with a brass tag, issued by the lamp room, to enter the UG. The number of persons in the UG is limited if a hoist is Out of Service and not available for egress.

Workers entering the UG are required to have minimum safety equipment including self-rescuer and miner's lamp.

Emergency illumination is provided to each individual via battery-powered electric lamps.

The contractor has proposed the following emergency egress and illumination enhancements for the Underground:

- Going forward, permanent or emergency lighting sufficient to provide a minimum of one foot candle lit path along the egress route will be installed within the mine at intersections, assembly areas, control doors, fans and hoisting stations. If this system is powered by battery units, then the one foot candle requirement is applied after one hour of operation.
- Going forward, emergency Life Safety Code lighting shall be provided in underground occupied spaces.
- Going forward, vehicle parking will be allowed on the non-reflector side of the mine only of those drifts that are wide enough for vehicle parking. This assures that exit travel way will be unobstructed and personnel will be able to safely exit.
- Going forward, existing reflectors will be maintained and supplemented by additional reflectors to provide a continuously visible direction of travel. Reflectors will be cleaned at monthly intervals. The reflectors are green when traveling toward the egress station (red for travel toward secondary egress station), and white when traveling deeper into the underground. This is a required marking feature for MSHA compliance and is being upgraded to assure compliance. The periodic cleaning is a defense in depth measure to assure reflectors will be visible if needed.

These enhancements are consistent with the DOE 420.1C, Fire Protection Objective, that a level of safety protection be provided that is consistent with the "highly protected risk" class of industrial risks.

9. Adequacy of Means to Prevent Accidental Release of Significant Quantities of Products of Combustion and Firefighting Water to the Environment

The FHA appropriately states that DOE Order 420.1C and the DOE-STD-1066-12 applicable implementation guide require that a means to prevent the accidental release of significant quantities of contaminated products of combustion and fire water to the environment, such as ventilation control, filter systems, and curbs and dikes, be employed. It also states that these features are only necessary if required by the FHA or DSA in conjunction with other facility or site environmental protection measures.

With respect to water runoff/containment of liquids, the FHA identifies the warehouse building (building 453) as the only concern. The FHA concludes that most of the site's stormwater runoff pond is expected to capture the majority of fire water runoff. The FHA notes that there is some potential for water intrusion into the mine area, but that the potential for firewater intrusion is remote. Also, any water that is introduced into the shafts would be collected in the shaft sump area where it would be collected in the shaft sump area where it would be contained until removed.

The FHA indicates that the WHB and TMF could generate as much as 8,200 gallons of discharge water for a typical fire with activated sprinklers. The WHB has a fire water trench system and retention basins that would allow collection and sampling of any water used for fire suppression. Also, the WIPP site is graded to allow rainwater and other runoff to flow in the direction of the holding ponds.

Based on the evaluation of the topography, no other required mitigation is indicated in the FHA. It is concluded that the measures for preventing an accidental release of significant quantities of firefighting water to the environment are acceptable.

With regard to a fire in the underground, there is potential for these fires to produce significant quantities of products of combustion (POCs) to the environment. The path forward proposed by the contractor includes several significant actions that will limit the POCs released to the environment. These include fuel limits on vehicles in the underground, automatic suppression on fossil-fueled vehicles, smoke detection, and improved combustible loading controls. However, the path forward does not include a quantitative analysis to determine what fire size is permitted and whether POCs for this fire size are expected to be released to the environment.

A quantitative evaluation to determine what fire size is acceptable within the underground relative to a release of Products of Combustion (POCs) to the environment is recommended (Recommendation 2).

10. Means to Address Fire and Related Hazards That are Unique to the WIPP Site and Not Addressed by Industry Codes and Standards

The FHA (Revision 7) has appropriately proposed several enhancements for the underground that reflect improvements beyond compliance with 30 CFR 57 criteria. Most have been previously identified above. Several notable enhancements include:

- Going forward, the underground fire alarm system will be upgraded to provide smoke detection as a supplement to existing heat detection in the mine. The smoke detection addition will consider such state of the art features such as addressable detectors that will help locate any incipient fire detected. In addition the additional detection will consider features such as very early smoke detection (VESDA) and strobe/speaker notification appliances to provide redundant visual alarm and voice communication notification for the underground workers. This will provide a greater potential for detection of fires in the incipient stage and earlier notification of underground occupants.
- Ventilation Control Boards will be provided in the CMR to assure that control doors can be remotely closed to isolate a fire in any underground area so that personnel can safely evacuate.

These proposed improvements are endorsed and will improve the approach to fire hazards inherent to underground operations.

It is noted that quantitative analysis of the fire hazards in the underground to address occupant tenability during credible postulated fires has not been completed.

Quantitative analysis of the fire hazards in the underground is recommended to determine:

- whether tenable conditions exist throughout the underground during postulated fires.
- the time available for safe egress.
- possible blockage of hoistway pathways from POCs.
- possible HEPA filter blockage from POCs.
- possible POCs release to the environment.
- A technical basis for quantifying combustible loading limits.
(Recommendation 3)

11. Adequacy of Fire Protection Systems to Ensure Vital Safety System Functions are Not Adversely Impacted By Fire or By Inadvertent Fire Protection System Operation.

The FHA identifies safety class and safety significant systems. Relative to fire hazards, these include:

Safety Class:

- Underground liquid-fueled waste handling vehicles
- Underground liquid-fuel waste handling vehicle fire suppression system

Safety Significant:

- WHB Fire Suppression System
- Facility Pallet

- RH Bay Design

From review of the FHA, there is no indication that the inadvertent operation of a fire protection system has been analyzed.

Thus, analysis and documentation regarding the impact of the inadvertent operation of a fire protection system on safety class and safety significant systems should be incorporated into the FHA (Observation #6).

12. Status of Issues Related to the Fire "Department" BNA

The current BNA is comprehensive and appropriately addresses recommendations previously identified in the 2012 BNA as well as provides new recommendations for improving first responder response to emergencies. The following recommendations remain open from the 2012 BNA:

- 2012-01: Formally track response times onsite in accordance with NFPA 1710...
- 2012-02: Develop a procedure for Technical Rescue Response to include rope rescue and confined space.
- 2012-03: Develop a deployment procedure for offsite MOU response.
- 2012-04: Perform a task analysis baseline for structural fire, hazardous materials, technical rescue, wildling and EMS response...
- 2012-05: Develop task analysis for emergency responses based on availability of additional site emergency response personnel augmenting the Fire Brigade (FB).
- 2012-06: Develop response protocol for response to an emergency incident with a casualty requiring medical assistance....
- 2012-07: Develop response protocol for response to a second incident...
- 2012-09: Perform an evaluation for a procedure to use hydrants and hoselines for interior firefighting and for a procedure for the use of a portable water monitor for exposure protection or for defensive firefighting operations.
- 2012-10: Define minimum response and response capability in procedure WP 12-ER4911.

Given that nine of eleven BNA issues identified in 2012 remain unresolved after two years, a corrective action plan which includes resolution dates and formally tracked by management is recommended (Observation #1).

It is noted that the 2014 BNA includes 28 new recommendations. From review of the BNA, the overall conclusion is that it is a comprehensive document and provides appropriate conclusions and recommendations.

13. Review of Implementation of Applicable Fire Protection Requirements for Facilities, Activities and Programs.

Based on the unresolved issues with the fire water supply, uncompleted fire sprinkler obstruction tests, emergency light deficiencies, the obsolete RFAR fire reporting equipment, and the unresolved issues from the 2012 BNA, it is concluded that additional attention to maintaining fire protection and life safety systems is recommended.

Correction Action with firm dates to follow-up on all issues is also recommended. (Observations 1-5).

14. Review of Roll-down of Applicable Fire Protection Requirements Into Applicable Contractor Requirement Documents.

With the noted exception of the incorporation of pre-incident planning requirements, notably, from NFPA 1620, requirements from applicable fire protection sources have been satisfactorily incorporated into the WIPP Fire Protection Program.

15. Managing and Tracking Fire Protection and Life Safety Systems

It is evident that the tracking of most fire protection issues is done. However, completion of deficiencies, required corrective maintenance, and disposition of significant issues such as those identified in the BNA, are not completed in a timely manner. (Observation 1)

16. Other Items As Identified By the Surveillance Team

It is noted that the FHA, section 7.6 provides a satisfactory discussion of the life safety requirements for the Underground; the source of the requirements, and the distinction between requirements applicable to the mine environment, (e.g. 30 CFR 57) and those applicable to above ground facilities, (e.g. NFPA 101, Life Safety Code).

This distinction appears to have been lost in the Equivalency determination that was provided to DOE. The purpose of the request is to demonstrate an equivalent level of safety to that provided by compliance with NFPA 101, Life Safety Code. This effort is not possible since the Underground cannot be characterized as an occupancy recognized by NFPA 101. Also, the essential means of egress for the Underground, are hoistways rather than stairs. Hoistways are not a recognized acceptable means of egress by NFPA 101. The closest recognized similar egress component would be elevators as described in NFPA 101, chapter 11, Special Structures and High-Rise Buildings.

Since the Equivalency Determination does not address the proper elements, It is recommended that the DOE Equivalency Determination for the WIPP Underground be withdrawn or rejected (CAR 15-032).

Overall, three conditions adverse to quality, six Observations, and three Recommendations were identified during the surveillance, and are described below.

Conditions Adverse to Quality:

1. Corrective Action Report (CAR) 15-010 was written concerning four emergency medical technician (EMT) licenses (ref: OFF 635) that were identified as expired on the Emergency Services Technician and Fire Protection Technician monthly reports. Additionally, one Emergency Response Team (ERT) member's OPS-08 Qualification Card was identified as expired on the ERT Training monthly report. Current qualifications/licenses are required for persons serving in these positions and must be included in each individual's training file. The surveillance team found no

- evidence of these qualifications/licenses in the training files of the individuals identified.
2. CAR 15-031 was written regarding the requirements of NFPA 1620, Standard for Pre-Incident Planning, which have not been fully incorporated into the WIPP Fire Protection Program and applicable related documents and procedures as required. For example:
 - WP 12-FP.01 does not cite Standard NFPA 1620, nor does it cite the required involvement of the Fire Protection Engineer and Cognizant Engineer;
 - WP 12-FP3004 does not reference the required elements of NFPA 1620;
 - WP 12-ER4911 does not reference the required elements of NFPA 1620;
 - WP 12-ER4911 does not include a "Special Hazards" section as stipulated by NFPA 1620, chapter 8, to identify and document special hazards that present extraordinary life safety challenges, operations challenges, or other challenges to emergency responders. Explicitly noted special hazards include radioactive materials, special atmospheres, flammable and combustible liquids, and hazardous material inventory;
 - WP 12-ER.04 contains no reference to pre-incident plans or to NFPA 1620;
 - WP-12-ER4908 does not reference pre-incident plans or NFPA 1620;
 - WP 12-FP.01 does not incorporate an annual inspection of fire barrier penetrations, as delineated in NFPA 80, Standard for Fire Doors and Other Opening Protectives, section 5.2.4.
 3. CAR 15-032 was written to address the Equivalency Determination provided to the U.S. Department of Energy (DOE) to satisfy life safety requirements in the Fire Hazards Analysis (FHA), section 7.6, and the conclusion that Title 30 Code of Federal Regulations (CFR) 57 is not applicable due to the fact that the WIPP underground cannot be characterized as an occupancy recognized by NFPA 101, Life Safety Code. The essential means of egress for the WIPP underground are hoistways, rather than stairs. Hoistways are not a recognized acceptable means of egress in NFPA 101.

Observations:

1. There are 28 new recommendations and nine "Open" recommendations from the 2012 BNA. Implementation of these recommendations is expected to result in satisfactory standard operating procedures (SOPs) for site firefighting personnel and therefore, completion/disposition need to be assigned priority status. The current BNA is comprehensive and appropriately addresses recommendations previously identified in the 2012 BNA, as well as providing new recommendations for improving first responder emergency response. Nine of 11 BNA issues identified in 2012 remain unresolved after two years. If not addressed in a timely manner, this could result in a condition adverse to quality.
2. The WIPP radio fire alarm reporting system is used to transmit fire alarm and trouble signals to the Central Monitoring Room (CMR). Per the FHA, the Harlow Radio Fire

Alarm Reporting System was installed in the mid-1980s and utilizes MSDOS software. The system hardware and software are no longer supported by the manufacturer and are considered obsolete. The obsolete Harlow system could lead to a condition adverse to quality; therefore its replacement should be assigned priority status.

3. The electric fire pump controller is obsolete and replacement parts are not available. A work order to replace the electric fire pump controller, WO 0903461M, was initiated in calendar year 2009, but was never completed. Since the controller remains functional, the system is not considered impaired; thus, there is no programmatic requirement to replace the controller in a timely manner. A review of the detailed recovery schedule for fire protection indicates that the replacement of the fire pump controller is not being tracked. This issue could lead to a condition adverse to quality.
4. Both the electric and diesel fire pumps are aging and require corrective maintenance. At the time of the assessment, the packing on the electric fire pump had been replaced, and replacement of the packing on the diesel fire pump was being planned. Discussions with cognizant personnel indicate that the replacement of both fire pumps is being planned; however, the detailed recovery schedule does not include this activity. This issue could lead to a condition adverse to quality.
5. Over the past ten years, numerous post indicator valves (PIVs) have failed to operate properly. This condition has impacted both the reliability and operability of the water supply. Historically, timely repair of both PIVs and fire hydrants has not been a priority. At the time of this assessment, fire protection system impairments were given higher management visibility by placing active impairments on the plan of the day. However, it was not evident that process improvements have been developed and implemented to ensure that the fire protection water supply is maintained such that it meets the DOE expectation for a reliable water supply. This issue could lead to a condition adverse to quality.
6. Analysis and documentation regarding the impact of the inadvertent operation of a fire protection system on safety class and safety significant systems should be incorporated into the FHA. Inadvertent operation of a fire protection system on safety class and safety significant systems could result in a condition adverse to quality.

Recommendations:

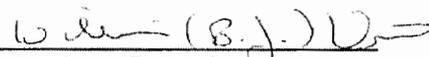
1. WP 12-FP.01, *WIPP Fire Protection Program*, should be updated and improved to explicitly incorporate the automatic suppression system protection thresholds and the post-fire event fire protection suppression system enhancements. Additionally, include annual inspection of fire barrier penetrations as delineated in NFPA 80, Standard for Fire Doors and Other Opening Protectives, section 5.2.4 in WP 12-FP.01, *WIPP Fire Protection Program*.
2. There is the potential for fire in the underground to release significant quantities of products of combustion (POCs) to the environment. The path forward proposed by the contractor includes several significant actions that will limit POC release to the

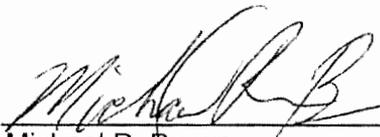
environment. These include fuel limits on vehicles in the underground, automatic suppression on fossil-fueled vehicles, smoke detection, and improved combustible loading controls. However, the path forward does not include a quantitative analysis to determine what fire size is permitted and whether POCs for this fire size are expected to be released to the environment. Performance of a quantitative analysis regarding these issues is recommended.

3. The surveillance team noted that a quantitative analysis of the fire hazards in the underground to address occupant tenability during credible postulated fires has not been completed. Quantitative analysis of the fire hazards in the underground is recommended to determine:
 - Whether tenable conditions exist throughout the underground during postulated fires
 - The time available for safe egress
 - Possible blockage of hoistway pathways from POCs
 - Possible blockage of high efficiency particulate air (HEPA) filters from POCs
 - Possible release of POCs to the environment
 - A technical basis for quantifying combustible loading limits

Conclusion:

Based on the unresolved issues with the fire water supply, uncompleted fire sprinkler obstruction tests, emergency lighting deficiencies, obsolete radio fire alarm reporting equipment, and the unresolved issues from the 2012 BNA, the surveillance team concluded that the attention given to maintaining fire protection and life safety systems is insufficient. Corrective actions for all issues is recommended, including fixed due dates for completion and follow-up. Satisfactory disposition of the items identified by the surveillance team is required.

Surveillance Team Leader Signature:  Date: 4/16/15
William (B.J.) Verret

CBFO QA Director Approval Signature:  Date: 4/16/15
Michael R. Brown