



Department of Energy

Washington, DC 20585

December 21, 2011

The Honorable Peter S. Winokur
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW, Suite 700
Washington, DC 20004

Dear Mr. Chairman:

Thank you for your June 24, 2011, letter requesting a report outlining actions taken or planned by DOE to address the weaknesses you identified in the fire protection program at the Waste Isolation Pilot Plant (WIPP). The enclosure to this letter addresses each concern identified in your staff's report that accompanied your request.

During Mr. Dermont Winters' visit to WIPP in October 2011, the Carlsbad Field Office and Washington TRU Solutions personnel briefed him on the status of addressing these issues.

If you have any further questions, please contact me or Mr. Matthew Moury, Deputy Assistant Secretary for Safety and Security Program, at (202) 586-5151.

Sincerely,

A handwritten signature in cursive script that reads "David Huizenga".

David Huizenga
Acting Assistant Secretary for
Environmental Management

Enclosure

cc: R. Lagdon, S-5
E. Ziemianski, CBFO
M. Campagnone, HS-1.1
T. Mustin, EM-2
K. Picha, EM-21 (Acting)



Response to Defense Nuclear Facilities Safety Board
Waste Isolation Pilot Plant Fire Protection Program

During January 25 through 26, 2011, staff of the Defense Nuclear Facilities Safety Board (Board) reviewed the fire protection program at the Waste Isolation Pilot Plant (WIPP). This review included discussions with the Department of Energy (DOE) staff and Washington TRU Solutions (WTS) contractor personnel. The staff issue report, resulting from the review, was provided to DOE in June 2011. The staff issue report indicated that, despite significant improvements made to the WIPP's fire protection and emergency management programs during the past few years, some weaknesses remain. The following summarizes the actions taken by WIPP in response to the concerns expressed by the Board in its report:

Oversight of Fire Protection Program by Carlsbad Field Office (CBFO). CBFO has not conducted its review of the contractor's fire protection program or a self-assessment of its fire protection program within the past three years as required by DOE Order 420.1B, "Facility Safety."

Response:

The Carlsbad Field Office (CBFO) completed the triennial assessment of the contractor's fire protection program. A self assessment of the CBFO fire protection program has been completed and three opportunities for improvement have been identified: 1) Revise the DOE/CBFO Fire Protection Program Plan (FPP) to include a detailed listing of off-site locations and property within the scope of the program; 2) Revise the FPP and/or develop a process to address retention of important fire protection documents; and 3) Revise the FPP to include the requirements for a qualified Fire Protection Engineer (FPE) to manage the program. The improvements to the CBFO FPP are scheduled to be completed by April 30, 2012.

Contractor's Fire Protection Program. The Board's staff identified a weakness in the contractor's current practice related to short-term fire protection system impairments. The contractor may allow an impairment without making all responsible organizations aware of the situation...

Response:

A requirement to notify the WTS FPE and cognizant engineers of any fire protection equipment impairments has been formalized in contractor procedures. WIPP Procedure (WP) 10-WC3011, *Work Control Process*, was revised in May 2011 to specifically identify the responsibilities of FPEs and their integration into the work control process, and WP 12-FP.01, Revision 10, *WIPP Fire Protection Program*, was revised in April 2011 to require the cognizant engineers and FPE to be notified when a fire protection system is out of service for more than 24 hours.

The WIPP fire protection program documents 12-FP.01, *WIPP Fire Protection Program*, and 12-FP3001, *Fire Protection Impairment*, are in the process of being revised to describe the responsibilities delegated and will contain language to notify the WTS FPE of impairments as required by National Fire Protection Association (NFPA) 1 *Fire Code*. The revisions are scheduled to be completed by February 2012.

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Baseline Needs Assessment – A review by the Board’s staff of the 2008 Baseline Needs Assessment for fire department services at WIPP revealed significant weaknesses:

The Baseline Needs Assessment (BNA) does not address the application of NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.

Response:

DOE/WIPP 11-3471, Revision 0, *Baseline Needs Assessment (BNA) for the WIPP*, was approved by CBFO on August 29, 2011. The report states that WIPP is required to maintain a fire brigade per NFPA 600, *Standard on Industrial Fire Brigades*. The BNA now discusses how WIPP complies with the applicable provisions and requirements of NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*.

It also fails to address the unique needs of a small and remote site such as WIPP. WIPP may need to place greater emphasis on the provision of automatic fire suppression capability and associated system maintenance than on on-site and mutual-aid manual fire suppression forces.

Response:

DOE/WIPP 11-3471, Section 2, *Facility Description*, 6.1 *Automatic Fire Suppression*, and Section 6.5, *Staffing*, now address the remote location and credit that is given for existing suppression capabilities, fuel loading, and response staffing.

All permanent buildings have either automatic suppression or detection in accordance with DOE O 420.1B, DOE-STD 1066-99, and NFPA 101 Life Safety Code. All relocatable structures are provided with automatic sprinkler systems or located to meet the separation distances as provided by DOE-STD-1088-95, *Fire Protection for Relocatable Structures*.

Permanent, normally occupied buildings are protected by fixed, automatic fire suppression systems designed for the individual hazards associated with each area. Noncombustible construction, fireproof masonry construction, and fire resistant materials are used whenever possible in buildings and structures. The area within the property protection area (PPA) security fence is either paved or graveled. A gravel road parallels the PPA perimeter security fence, which serves as a fire break in the event of a wildland fire.

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The document is incomplete and does not clearly identify WIPP's firefighting and emergency medical needs, and whether the current arrangement meets those needs.

Response:

DOE/WIPP 11-3471, Section 6.2, *Manual Fire Suppression*, Section 6.3, *Emergency Medical Services*; and Section 6.5, *Staffing*, now address the applicability of NFPA 1710 to the WIPP fire brigade and medical response requirements.

As provided in DOE Guide 151.1-1A, *Emergency Management Fundamentals and the Operational Emergency Base Program Emergency Management Guide*, the emergency response basis assumption is one emergency incident at a time (such as a fire) with a casualty requiring medical assistance. Note that NFPA 1201, *Standard for Providing Emergency Services to the Public*, section 4.3.2, stipulates that the level of service provided and the degree of risk accepted by the jurisdiction shall be subject to local determination.

As noted below, WTS obtained the services of an outside fire protection expert to assist in a review of the BNA as part of its management assessment of the WIPP fire protection program. The 2011 BNA confirmed that the WIPP fire brigade is capable of providing emergency and nonemergency services in a timely and effective manner. The BNA evaluated the WIPP staffing for fire response coupled with a casualty requiring medical assistance and determined that the brigade is capable of responding adequately to emergencies as required by the emergency response program.

Replacement of Fire Apparatus-WTS maintains two triple-combination pumpers (equipped with pump, water, and hose) for firefighting, the second serving as a brush fire and reserve unit. WTS personnel have determined that the second unit is approaching the end of its useful life. WTS management has recognized this fact, but has not taken action to replace the unit.

Response:

The WIPP fire apparatus are maintained to be capable of providing the necessary fire brigade response support. WTS identified the need to replace the fire truck in the 2009, 2010, and 2011 Emergency Readiness Assurance Plan. A budget change notice was processed to request funds for this replacement fire truck in August 2010 and again in fiscal year (FY) 2011; the funding was not provided in the Congressionally-approved budget for those years. The fire truck is currently identified on the unfunded priority list and will be included as a specific line item entry in the FY 2013 budget request to facilitate funding approval.

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Work Control Improvement Plan. While work control for the fire protection system has improved, the Board's staff remains concerned about the lack of timely closure of findings and recommendations. In August 2009, CBFO performed an assessment of portions of WIPP's fire protection program. An observation from this assessment was that some fire protection issues identified in the Fire Hazard Analysis (FHA) had not been addressed.

Response:

The CBFO FPE reviewed the open issues with WTS, and they have since been satisfactorily addressed. Since the Board's review, the following actions have been taken by WTS to enhance its awareness and responsiveness to fire protection issues:

- An outside fire protection expert assisted in the completion of a management assessment of the WIPP fire protection program. The assessment identified one finding, 13 observations, and three noteworthy practices. Corrective actions were initiated for all concerns. The majority of these corrective actions have been completed, with the remainder scheduled for completion by the end of calendar year 2011. The scope of corrective actions included tracking and trending fire protection system performance, training for inspection, testing and maintenance personnel, evaluating fire protection DOE "model program" aspects for incorporation, and required BNA revisions.
- Revised and implemented the WIPP Fire Hazards Analysis to clarify fire hazards and risk associated with the underground.
- The FHA finding to revise the Inspection Testing and Maintenance frequency and procedures to reflect current NFPA codes requirement is in process and expected to be completed mid 2012.
- Revised and implemented the BNA to clarify emergency response personnel and equipment needed and incorporated aspects of the DOE "Model" FPP.
- Revised and implemented the WIPP FPP to clarify the fire impairment reporting requirements.
- Revised and implemented the Work Control Procedure to identify the responsibility of FPEs and their integration into the work control process.

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Fire Hazard Analysis. A single FHA provides an analysis of the fire hazards and associated protection in both the above-ground and underground portions of the WIPP operation. The Board's staff is concerned that the FHA, while containing a complete analysis of the above-ground operations, does not adequately address the fire hazards and risks associated with the underground operations. Of particular concern to the staff is that the FHA fails to recognize the potential impact of a fire on WIPP's ability to process waste, and ultimately on the ability to reduce inventories of transuranic (TRU) waste at other DOE sites.

Response:

WIPP-023, Revision 4, *WIPP Fire Hazard Analysis*, was approved by CBFO in May 2011. This revision addressed the identified concerns, and includes:

- A more accurate description of the redundant feed underground power distribution system including an analysis of fire affects on the system. Because of the redundant electrical feed to and throughout the underground, there would be minimal impact to the electrical distribution system in the event of a fire in the underground. Due to the redundant electrical feeds, commercial availability of electrical components, staff knowledge of techniques and procedures from continuous modifications supporting operations, and the exposed wiring along the drift walls, repairs of the electrical distribution system will require only hours or days to complete.
- Additional descriptive information on magnesium oxide (MgO) "super sack" design and construction with additional detail on expected consequences from super sack fire effects. The super sack is constructed of extruded polypropylene woven into a flexible cloth and has a relatively slow burning rate. Once outside the influence of the initiating fire (postulated as a pool fire) it is expected to self-extinguish due to the contact heat absorption from the MgO.
- Additional detail on small fires postulated in the underground including fires involving underground office areas. Small fires are more likely in maintenance areas, office areas, or laboratory areas where there is no radiological material in the vicinity. Small fires would likely be detected and extinguished by facility personnel using the extinguishers positioned throughout the occupied portions of the mine. There would be no impact to ventilation equipment or exhaust airflow, and personnel evacuation could proceed without impedance.
- The acknowledgement that the potential impact of a significant fire in the underground is estimated to impact the WIPP's ability to process waste, and ultimately on the ability to reduce inventories of TRU waste at other DOE sites.

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An analysis of the underground fueling station resulted in it being provided with automatic fire suppression; the analysis failed to address other areas within the mine where quantities of transient and construction combustibles exist...

Response:

WIPP is required to meet Mine Safety and Health Administration (MSHA) requirements by Public Law 102-579, also called the *Waste Isolation Pilot Plant Land Withdrawal Act*. The MSHA requirements in title 30, CFR are extensive, specific, and represent an approach that meets Highly Protected Risk and defense-in-depth principles required by DOE O 420.1B.

The automatic fire suppression system at the underground refueling station was not required by the fire analysis, but by MSHA title 30, CFR § 57.4262. Due to the noncombustible construction, separation distances, size-limited areas, and limited quantities of storage material in the underground, the remainder of the WIPP underground does not require suppression systems, and they are not required by MSHA. Underground transformer stations, combustible liquid storage and dispensing areas, pump rooms, compressor rooms, hoist rooms, and transformer stations are required to be provided with fire protection extinguishers of a type, size, and quantity that can extinguish fires of any class in their early stages which could occur as a result of the hazards present.

...without an adequate combustibles control program, restrictions on the use of combustible materials for the construction of office and other work enclosures, and/or in-place automatic fire suppression, fire damage may be greater than anticipated, ultimately impacting mission.

Response:

Combustibles are controlled by WP 12-FP.01, *WIPP Fire Protection Program*, and WP 12-FP3003, *Combustible Loading Controls for the Waste Handling Building and Underground*. The noncombustible construction, separation distances, and the limited areas and quantities of storage material in the underground are reasons the WIPP underground does not require suppression systems. Materials used for office construction is limited in quantity and combustibility.

The revised FHA addresses the fire hazards identified by the Board's staff report. Material common and necessary to the operation of a mine is stored primarily in the northern areas of the underground area. Hazardous materials in the underground are periodically (quarterly) inventoried and controlled in accordance with WP 12-IH.02-4, *WIPP Industrial Hygiene Program – Hazard Communication and Hazardous Materials Management Plan*. Other material quantities required for operation are controlled and minimized through underground housekeeping practices through daily rounds. These materials are stored in a configuration that prevents fire propagation.

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...While site engineers have performed analyses to address the exposure of TRU waste drums to a fuel spill fire, those analyses did not consider the added fuel represented by the large number of the magnesium oxide bags...

Response:

Revision 4 of the WIPP FHA approved by CBFO in May 2011 addressed this concern. The MgO is installed to eliminate the carbon dioxide produced from microbial consumption of the cellulose, plastic, and rubber contained in the waste. Although the major function of MgO is to serve as a pH buffer, which reduces the solubility of transuranic elements into the water in case of a water intrusion accident scenario, MgO acts as a fire extinguishing agent effective against plutonium and uranium fires. It is noncombustible and smothers the fire.

The super sack is constructed of extruded polypropylene woven into a flexible cloth. In its primary form, polypropylene will melt and flow if ignited, permitting propagation of a fire. In its extruded form, however, it has a relatively slow burning rate. The material supplied per the sack specification would take about 20 minutes to burn from one side of the super sack to the other. Once outside the influence of the initiating fire (postulated as a pool fire) it is expected to self-extinguish due to the contact heat absorption from the MgO. In the event that a long lasting smoldering fire should occur, the room can be permanently isolated. In any event, the burning cloth does not present a fire exposure hazard to the material contained in the DOT Type 7A TRU waste containers emplaced in the underground disposal room.