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**DEFENSE NUCLEAR FACILITIES
SAFETY BOARD**

Washington, DC 20004-2901




June 24, 2011

The Honorable Inés R. Triay
Assistant Secretary for Environmental Management
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0113

Dear Dr. Triay:

The staff of the Defense Nuclear Facilities Safety Board (Board) reviewed the fire protection program at the Waste Isolation Pilot Plant (WIPP) during January 25–26, 2011. The review included discussions with Department of Energy (DOE) staff and contractor personnel at WIPP, as well as subsequent document reviews. The staff found that, despite significant improvements made to WIPP's fire protection and emergency management programs during the past few years, some weaknesses remain. One weakness is that the Fire Hazards Analysis (FHA), while containing a complete analysis of the above-ground operations, does not adequately address the fire hazards and risks associated with underground operations. For example, the FHA does not fully analyze transient and construction combustibles in the mine. Of particular concern is the failure of the FHA 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.

The Board notes that DOE and contractor management are aware of these issues and have begun to take corrective actions in some, but not all, cases. Based on the staff's observations and pursuant to 42 U.S.C § 2286b(d), the Board requests a report within 180 days of receipt of this letter outlining actions taken or planned by DOE to address the weaknesses in the fire protection program for WIPP, inadequacies in the FHA, and other issues discussed in the enclosed report.

Sincerely,

Peter S. Winokur, Ph.D.
Chairman

Enclosure

c: Mr. Ed Ziemianski
Mrs. Mari-Jo Campagnone

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

May 2, 2011

MEMORANDUM FOR: T. J. Dwyer, Technical Director

COPIES: Board Members

FROM: W. Futrell, C. March, D. Winters, B. Caleca

SUBJECT: Fire Protection Program, Waste Isolation Pilot Plant

This report documents observations resulting from a review of the fire protection program at the Waste Isolation Pilot Plant (WIPP), including both above-ground and underground operations, and WIPP's emergency response organization. This review was conducted by members of the staff of the Defense Nuclear Facilities Safety Board (Board) W. Futrell, C. March, D. Winters, and B. Caleca during January 25–26, 2011. Participants included representatives from the Department of Energy (DOE) Carlsbad Field Office (CBFO) and Washington TRU Solutions LLC (WTS). This report also documents the results of a review of supporting documentation, as well as subsequent discussions with site personnel.

Oversight of Fire Protection Program by Carlsbad Field Office. The fire protection program for WIPP has been revised during the past few years; however, weaknesses remain. For example, 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*. However, the CBFO fire protection engineer has conducted surveillances of specific aspects of the contractor's fire protection program, and a complete triennial review of the contractor's fire protection program is planned by the end of calendar year 2011.

Contractor's Fire Protection Program. The contractor had modified its fire protection program extensively in preparation for the beginning of operations involving remote-handled transuranic waste. WTS management subsequently identified weaknesses in the program and has continued to make progress in addressing the weaknesses. Steps taken include replacing buried ductile iron fire water piping and associated valves that had severely deteriorated as a result of corrosion. Replacement of large portions of the piping has been completed, and work is now in progress to replace the remaining valves and piping that require attention.

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. WTS management is taking steps to ensure that persons assigned responsibility for fire protection system inspection, testing, and maintenance are trained for the duties they are expected to perform.

WIPP Fire Brigade. The WIPP site does not have a full-time fire department, which is atypical as compared to most DOE sites. Given the site's small size and limited number of buildings, a fire brigade has been established in accordance with National Fire Protection Association (NFPA) 600, *Standard on Industrial Fire Brigades*. The brigade consists of full-time emergency service technicians, the shift manager in the role of fire chief, and auxiliary support personnel. All members are trained as required by NFPA 600. The recent opening of an emergency services training facility in Carlsbad has enhanced training opportunities for brigade members, including live fire fighting training. The contractor and CBFO have taken steps to increase the size of the fire brigade to ensure that it does not fall below the minimum of five responders and to provide for a more immediate initial response.

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

WTS management recognizes the shortcomings in the Baseline Needs Assessment and is in the process of having the document revised.

Mutual Aid and Outside Assistance—The WTS fire brigade provides mutual aid and outside assistance to surrounding areas; however, the actual number of cases in which it provides such assistance is very low. When it is providing such assistance, waste-handling operations are suspended until emergency response staffing on site is restored to the required level.

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.

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.

CBFO's Emergency Management Program. CBFO recently hired a new full-time emergency manager to focus resources on facility response and provide technical assistance to the site. The previous holder of this position was part-time. CBFO's emergency management manager is considering changes to the emergency management program.

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.

- 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 (i.e., the mine office area, the weld shop office area, tunnel areas with large diameter combustible air ducts, and the experimental area). For example, at least one office unit in the experimental area has a combustible interior finish, and another unit contains a large quantity of batteries with plastic cases. On the day the staff visited the mine, a large number of wooden spools, some with plastic insulated cable, and wooden packing crates were located along one wall of the mine tunnel leading to the experimental area. During a subsequent visit (March 2–3, 2011), Board members and staff noted that although some of these combustible materials near the experimental area had been removed, much remained.
- In the event of fire, emergency procedures call for evacuation of the mine. Under such an arrangement, fires will burn until all available fuel has been consumed. Where combustibles are not adequately separated, the spread of fire to other areas can be expected. In those portions of the mine with high air flow, fires of greater intensity can be expected. The danger of such a scenario is that, 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.

- After emplacing TRU waste, WIPP operators place large bags of magnesium oxide on the top tier of waste to absorb any moisture. The magnesium oxide is bagged in a combustible container consisting of an inner plastic bag, a cardboard insert that wraps around the sides of the inner bag to provide side support, and a final outer plastic bag. 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. Given fire dynamics, a fire originating at the loading face could involve most if not all of the magnesium oxide's combustible bagging material. The failure to consider the magnesium oxide bagging calls into question the results of the analysis performed for the impact of a fire on the drum array.

Planned Follow-up. While WTS's fire protection program manager reported overall progress in updating the fire protection program for WIPP, the Board's staff plans to validate this progress during a future visit. The focus of this follow-up will be on the quality of the FHA for underground operations; underground fire safety to avoid unacceptable mission impact; fire protection systems inspection; testing, and maintenance activities; revision of the Baseline Needs Assessment; resolution of fire protection deficiencies; and CBFO's and WTS's emergency management programs.