DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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February 14, 2005

Mr. Paul M. Golan
Acting Assistant Secretary for
Environmental Management
U. S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0113

Dear Mr. Golan:

In November 2004, the staff of the Defense Nuclear Facilities Safety Board (Board) reviewed procedures for responding to fires at the Plutonium Finishing Plant (PFP) at the Hanford Site. PFP is in transition from nuclear materials stabilization operations to deactivation and decommissioning (D&D), although packaged plutonium metal and oxide remain stored in its vaults. The Board's staff reviewed PFP procedures for fire response to determine whether they would adequately address a scenario similar to the May 2003 fire in Glovebox 8 in Building 371 at the Rocky Flats Environmental Technology Site (RFETS). The staff's conclusions are summarized in the enclosed report. Based upon the staff's review, the Board concludes that PFP's procedures for fire response do not reflect the lessons learned from the fire at RFETS and are not optimized for the conditions likely to be encountered in a D&D environment.

The Board's staff also found that the Department of Energy (DOE) has promulgated guidance that could help ensure a safe and effective response to a fire during D&D work, but that this guidance does not appear to have been implemented effectively at PFP. The Board notes that DOE's letter of February 3, 2004, which provided an interim response to the Board's letter on the Glovebox 8 fire at RFETS, committed to conducting an independent study of fires involving radioactive materials across the defense nuclear complex. The Board understands that this effort was not successful. The Board believes it would be worthwhile to renew this initiative, with a focus on evaluating prefire planning and fire response procedures/training for facilities that are either transitioning to or undergoing D&D. It would also be advisable for DOE to consider whether improved guidance or a technical standard is needed to better address fire protection in such facilities.

The Board requests, pursuant to 42 U.S.C. § 2286b(d), that DOE brief the Board within 60 days of receipt of this letter on its response to the issues and suggestions raised herein and in the enclosed staff report. This briefing should also address the failings in feedback and improvement which led to the incomplete implementation of lessons learned from the RFETS fire.

Sincerely,

John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.
Mr. Keith A. Klein

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

February 2, 2005

MEMORANDUM FOR: J. Kent Fortenberry, Technical Director

FROM: H. W. Massie

SUBJECT: Fire Response Procedures, Hanford Plutonium Finishing Plant

This report summarizes a review by members of the staff of the Defense Nuclear Facilities Safety Board (Board) of procedures for responding to fires at the Plutonium Finishing Plant (PFP) at the Hanford Site. This review was performed during a visit to the Hanford Site in November 2004. PFP is in transition from nuclear materials stabilization operations to deactivation and decommissioning (D&D), although packaged plutonium metal and oxide remain stored in its vaults. This report also summarizes a review of Department of Energy (DOE) directives and standards relevant to fire response for facilities in transition to or undergoing D&D, performed subsequent to the staff's visit to the Hanford Site

Background. On December 2, 2003, the Board issued a letter to the Secretary of Energy summarizing issues associated with the May 2003 fire in Glovebox 8 in Building 371 at the Rocky Flats Environmental Technology Site (RFETS). In addition to identifying broad deficiencies in the implementation of Integrated Safety Management for D&D work at RFETS, the Board's letter and the enclosed staff reports noted deficiencies regarding preparedness for the fire and the D&D workers' response to the fire. The prefire plan for a glovebox fire focused on such hazards as burning plutonium metal instead of the potential for a significant fire involving combustible wastes from glovebox decontamination work. The D&D workers engaged in a concerted effort to extinguish the fire, in violation of site procedures and training dictating that workers in air-fed anticontamination suits ("bubble suits") must evacuate the scene of a fire. In response to the Board's letter, the DOE pursued extensive corrective actions at RFETS, including improvements in prefire planning and retraining of D&D workers in the proper response to fires.

PFP Procedures for Fire Response. In light of the issues identified at RFETS, the Board's staff reviewed the following PFP procedures to evaluate whether PFP was prepared to respond properly to a fire similar to the Glovebox 8 fire at RFETS:

- ZCR-005, *Fire Alarm/Fire/Explosion*, Revision B, Change 0, dated August 20, 2003
- ZCR-015, *Glovebox Fire*, Revision A, Change 3, dated April 26, 2000
- *Operator Training Material for Use of Bayonet Fire Extinguishers*, Course # 202351, Revision 1

- *Firefighting in Radiologically Posted Areas*, provided in HNF-IP-0939, Hanford Fire Department Internal Policy, dated October 17, 2002, Revision 8

The first three procedures appear to apply primarily to bulk plutonium operations, such as stabilization of plutonium metal and oxide, and have not been revised to account for the hazards associated with D&D activities. While the first two of the above procedures are clear in stating that if personnel see an immediate danger to life or health, they must evacuate the area and notify the Hanford Fire Department and the Building Emergency Director, neither encompasses the case of burning plutonium-contaminated waste materials, such as those involved in the Glovebox 8 fire at RFETS. There are also discussions of response to burning plutonium metal and use of a "bayonet"-type fire extinguisher to penetrate a glove of the glovebox to extinguish a plutonium fire which do not apply to D&D activities. Glovebox procedure ZCR-015 needs to be revised to address fire scenarios for D&D activities within gloveboxes. This would include topics such as emphasizing the need for workers to evacuate the immediate area and call the fire department, before engaging in any other activities, in response to a real or suspected fire. It should also explain under what conditions a worker can use a fire extinguisher.

The PFP procedures for fire response do not specifically address the proper response by D&D workers in air-fed anticontamination suits or other unique personal protective equipment. PFP procedures should explain that these D&D workers must immediately evacuate the area and may only use fire extinguishers to extinguish clothing or personal protective equipment, or to assist in the safe evacuation of the work area.

The fourth procedure above is for the firefighters and addresses a variety of topics related to fighting fires in radiological areas. This procedure, like the others, does not address unique conditions that the fire department may encounter in a D&D environment, due to the changing conditions in the facility. Some of the topics that need to be addressed include details of the incident command structure (who is in charge) and how information such as the potential for criticality is communicated to the incident commander. One of the lessons learned at RFETS was that the use of water by the fire department to extinguish a fire can be expedited by establishing ahead of time whether criticality is a concern for a particular area of the building or glovebox, based upon valid estimates of fissile material loading.

Standards for Fire Response. The staff reviewed DOE directives and standards to assess whether they adequately address fire response for facilities in transition to or undergoing decommissioning. The introduction to DOE Standard 1120-98, *Integration of Environment, Safety, and Health into Facility Disposition Activities*, states that it "provides guidance for integrating and enhancing worker, public, and environmental protection during facility disposition activities." There is no specific discussion of fire protection issues, even though fire remains a significant hazard through all phases of a facility's life cycle.

DOE Order 420.1A, *Facility Safety*, does not directly address D&D facilities. However, DOE Guide G-420.1/B-0, *Implementation Guide for Use with DOE Orders 420.1 and 440.1, Fire Safety Program*, provides useful guidance regarding the need for personnel from the fire

department and the fire protection engineering staff to perform routine inspection of facilities undergoing D&D, and for fire department personnel to tour D&D facilities to remain familiar with existing conditions and revalidate prefire plans. The guide also suggests conducting drills and training exercises at D&D facilities at a frequency commensurate with the fire risks and complexity of the facility. This guidance appears sound. The staff's observations at RFETS and PFP, however, indicate that this guidance is not being implemented effectively. More specific guidance or more prescriptive requirements may be appropriate to ensure that defense nuclear facilities are better prepared for the potential of a fire during D&D.

Conclusions. Based upon this review, the Board's staff concludes that revising fire response procedures and prefire planning at PFP to reflect the lessons learned at RFETS would improve the ability of D&D workers and firefighting personnel to respond safely and effectively to a fire similar to the Glovebox 8 fire at RFETS.

In a letter dated February 3, 2004, responding to the Board's letter on the Glovebox 8 fire at RFETS, DOE discussed interim corrective actions being pursued at RFETS and committed to conducting an independent study of fires involving radioactive materials across the defense nuclear complex. The Board's staff understands that this effort was not successful. Based on its observations at PFP, the staff believes it would be worthwhile to renew this initiative, with a focus on evaluating whether prefire planning, fire response procedures, and training have been updated to reflect facility conditions and hazards associated with D&D work for facilities either transitioning to or undergoing D&D. It would also be advisable for DOE to evaluate the need for improved guidance or a technical standard addressing fire protection in such facilities.