DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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January 20, 2010

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) recently reviewed the Savannah River Site fire protection program. The enclosed report documents the findings from this assessment, which included fire protection modifications to Building 241-96H to support the cleanup of Tank 48 and necessary upgrades to support planned K-Area projects. The staff has concerns regarding the management of aging apparatus in the fire department fleet; the oversight of fire protection exemptions, equivalencies, and position papers; and whether known fire protection deficiencies and conditions are managed effectively throughout the site. The staff noted deficiencies and opportunities for near-term improvements, e.g., the Department of Energy Savannah River Operations Office's (DOE-SR) fire protection program plan is five years out-of-date and federal staffing is inadequate.

Of note, among all the sites recently evaluated by the Board, only DOE-SR has exceeded the normal 15-year life expectancy for all its major fire equipment. Of the six units, the three first-line fire engines are 17 years old, another is 20 years old, and the reserve engine is 31 years old. The ladder truck is also 20 years old. The Board requests that it be kept informed of progress in replacing this equipment.

Sincerely,

John E. Mansfield, Ph.D.
Vice Chairman

Enclosure

c: The Honorable Thomas P. D'Agostino
Mr. Jeffrey M. Allison
Mr. Mark B. Whitaker, Jr.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

December 4, 2009

MEMORANDUM FOR: T. J. Dwyer, Technical Director

COPIES: Board Members

FROM: J. Galaska

SUBJECT: Fire Protection Program, Savannah River Site

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of the fire protection program, including fire protection aspects of the Tank 48 project modifications to Building 241-96H and K-Area activities at the Savannah River Site (SRS). Staff members J. Galaska, D. Gutowski, and B. Heshmatpour visited the site during the week of November 2, 2009. The review included meetings with and briefings from representatives of the Department of Energy's Savannah River Operations Office (DOE-SR), the National Nuclear Security Administration's Savannah River Site Office (NNSA-SRSO), Savannah River Nuclear Solutions (SRNS), and Savannah River Remediation (SRR). In addition, the staff toured the Central Alarm Station, the Alternate Alarm Station, three fire stations, vehicle maintenance facilities, Building 241-96H, and K-Area.

Fire Protection Program at SRS. DOE-SR provides day-to-day oversight of the contractor fire protection program. NNSA-SRSO relies on DOE-SR for fire protection engineering expertise and other engineering functions. The DOE-SR fire protection program implements DOE Order 420.1A, *Facility Safety*, which was replaced by DOE Order 420.1B as of December 22, 2005. DOE-SR Implementing Procedure 400, Chapter 440.1, *DOE SR Fire Protection Program Plan*, was last revised April 19, 2004. This procedure has not been updated to reflect requirements contained in DOE 420.1B. DOE-SR directed SRNS to revise the Standard/Requirements Identification Documents (S/RIDS) to comply with DOE 420.1B but has not revised its own program. As a result, the contractor and site office fire protection programs are being implemented under different requirement sets. It would be appropriate for DOE-SR to apply Order 420.1B to the implementation of its own fire protection program.

Fire Protection Staffing—DOE-SR is authorized three full-time equivalent fire protection engineers. The present staffing level is one engineer with responsibilities for both fire protection and aviation safety who focuses on matters related to the fire protection program about 75 percent of the time. This individual will be eligible to retire in 3 years. This staffing shortage limits the effectiveness of the site office fire protection program. Hiring additional fire protection engineering staff would alleviate this situation while also ensuring continuity of subject matter expertise if the current staff member retires.

Fire Protection Evaluations and Position Papers—SRNS currently maintains 47 fire protection exemptions, 169 fire protection equivalencies, and 104 technical position papers that document various methods used to show equivalent levels of compliance with various aspects of codes, standards, and/or DOE directives. Topics covered include all aspects of the fire protection program, including life safety; fire suppression; fire detection; fire barriers; and inspection, testing, and maintenance of fire protection systems, fire alarm sound levels, emergency lighting levels, fire barriers, and fire pumps. The discussion of these topics is at both the generic or site-wide level and the building-specific and application-specific level. In their current forms, these documents make it difficult to identify all equivalencies that apply to any single facility. As a result, monitoring compliance with these conditions is difficult for both oversight and operations purposes. It is unclear which of these documents were processed as a formal equivalency in accordance with DOE Order 420.1B, Paragraph 5d(10), which assigns responsibility for the Authority Having Jurisdiction to the head of field elements. The Board's staff concludes that the following improvements are needed to enable effective management of exemptions, equivalencies, and position papers:

- Fire protection evaluations and position papers need to identify specific buildings, facilities, systems, components, or portions thereof to which they apply.

- Equivalencies need to be approved by the head of the field element(s) to which they apply, and this information needs to be included in the individual documents.

Fire Department Fleet Management. All five engines and the site's only ladder truck have exceeded their normal life expectancy. Three first-line engines are 17 years old, one engine is 20 years old, and the reserve engine is 31 years old. The ladder truck is 20 years old. National Fire Protection Association (NFPA) 1901, *Standard for Automotive Fire Apparatus*, 2009 edition, recommends that apparatus more than 15 years old, that has been properly maintained and is still in serviceable condition, be placed in reserve status and upgraded in accordance with NFPA 1912, *Standard for Fire Apparatus Refurbishing*, to incorporate as many features as possible of the current fire apparatus standard. SRNS has developed a replacement strategy that includes near-term procurement to replace the 30-year-old engine. SRNS also plans to replace another engine in 2010 and the ladder truck in 2011. SRNS has not developed upgrade plans or a gap analysis to identify safety issues related to continued use of the existing apparatus. Within 3 years, the entire fleet of engines, ladder truck, ambulances, and hazardous material and rescue vehicles will have exceeded SRS's 10-year service life expectancy as listed in the SRS Asset Management Information System in Record Unit Catalog No. 725, *Motor Vehicles and Aircraft*. Since October 2006, several vehicles have exceeded 700 total hours (nearly 1-month equivalent time) out of service for maintenance. For example, the ladder truck has been out of service the equivalent of 119 days during this period. This situation should not be allowed to persist. The Board's staff believes that:

- Existing efforts to procure a replacement engine need to be expedited.

- DOE needs to establish long-term funding and a vehicle replacement schedule to improve fleet reliability and firefighter safety.

K-Area. The staff reviewed the configuration of the K-Area fire protection system. The staff also discussed the facility modifications and reconfiguration to support incorporation of the Pit Disassembly and Conversion Facility into the K-Reactor building with SRNS personnel. Significant fire protection upgrades in support of this project will be necessary and will be the subject of future staff reviews as project details are developed. SRNS managers anticipate the need for improvements to fire barriers, water supply, and fire detection and suppression equipment. The staff notes that:

- The fire protection water supply is subject to single point failure since the mains are not looped or gridded.

- A single 500,000-gallon water storage tank provides fire protection water; another potential single point of failure.

- Portions of the existing fire protection water supply have been reclassified as safety-significant in support of a new nondestructive evaluation capability project.

- The design features of the fire protection systems relied upon for safety-significant or safety-class functions will require additional review in support of new projects.

Tank 48 Project. A fluidized bed steam reforming (FBSR) process is to be used to destroy organics in Tank 48 waste. Project plans call for installation of the FBSR equipment in Building 241-96H. A briefing by SRR covered the existing fire protection configuration. Modifications to the sprinkler systems will be required as new equipment is added and compartments are constructed. The building confinement ventilation system will be modified to support the new configuration. Compliance with applicable portions of DOE Standard 1066, *Fire Protection Design Criteria*, will be included in the design details. The building's fire alarm system and means of egress will be reviewed for compliance with current design requirements. The staff will review modifications as project details are developed. The staff notes that:

- The preliminary fire hazards analysis for the Tank 48 project has been completed. It will need to be incorporated into the Building 241-96H fire hazards analysis during Preliminary Design.

- Project plans encompass compliance with DOE Standard 1066, including confinement ventilation.

Conclusion. The Board's staff finds that the contractor-managed fire protection program at SRS is well staffed and implemented. The fire protection oversight functions of DOE-SR and NNSA-SRSO would be enhanced if authorized fire protection engineer positions were fully staffed. Procurement of replacement fire apparatus needs to be expedited. The staff will conduct a follow-up review of the specific issues discussed in this report.