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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Washington, DC 20004-2901

December 22, 2015

The Honorable Ernest J. Moniz
Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585- 0113

Dear Secretary Moniz:

The enclosed information is provided to help the Department of Energy (DOE) strengthen the Savannah River Site emergency management capability. As part of the overall improvement efforts at the Savannah River Site, DOE should reinvigorate actions including implementation of a robust, comprehensive drill program to ensure site personnel are adequately trained and prepared for an actual emergency.

DOE Order 151.1C, *Comprehensive Emergency Management System*, requires that a "comprehensive, coordinated, and documented program of training and drills must be an integral part of the emergency management program." Based on the observations at the Savannah River Site, DOE should consider whether additional requirements or oversight are needed in this area consistent with Recommendation 2014-1, *Emergency Preparedness and Response*.

Sincerely,

Joyce L. Connery
Chairman

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

September 18, 2015

MEMORANDUM FOR: S. A. Stokes, Technical Director

COPIES: Board Members

FROM: T. Chapman

SUBJECT: Emergency Preparedness and Response at the Savannah River Site

Members of the Defense Nuclear Facilities Safety Board's (Board) staff conducted a review of emergency preparedness and response at the Savannah River Site (SRS) during the week of June 1, 2015. As part of this review, the staff team examined efforts by the Department of Energy's Savannah River Operations Office (DOE-SR), the National Nuclear Security Administration's Savannah River Field Office, and contractors Savannah River Nuclear Solutions (SRNS) and Savannah River Remediation (SRR) to improve the ability of the emergency management programs to demonstrate preparedness and response capability.

Background. In 2014, the Board's Site Representatives at SRS identified the following two concerns with the SRS emergency management programs: 1) inadequacy of emergency preparedness and facility drill scenarios in covering accident scenarios identified in Emergency Planning Hazard Assessments and Documented Safety Analyses; and 2) lack of coordination and integration among emergency preparedness, nuclear safety, conduct of operations, and training personnel for facility drill implementation. Based on these concerns and similar issues raised by DOE-SR, SRNS and SRR conducted assessments to evaluate these and other issues with emergency preparedness and response.

Observations. The Board's staff team evaluated the SRS implementation and DOE-SR oversight of emergency preparedness and response requirements from DOE Order 151.1C, *Comprehensive Emergency Management System*, and associated implementation guides. The review also focused on recent SRS emergency management program improvement initiatives; off-site notification and coordination during emergencies; emergency response organization selection, training, and qualification; site-level exercise planning and execution; and facility-level drill programs.

SRS Emergency Management Program—The number of SRNS staff supporting emergency preparedness in the central organization and the facilities (excluding those who directly support the SRS Operations Center) declined 40 percent between fiscal years 2011 and 2014.[1] Furthermore, SRNS experienced a 70 percent turnover in staff during the last five years.[2]

[1] As noted in the Board's SRS Site Representative Weekly Report of October 10, 2014.

SRR also experienced an almost 30 percent reduction in its full time equivalents (FTE) due to work force restructuring.[3] The turnover is especially significant because the emergency management programs lost several experienced staff members, while recent hires usually had two years or less of relevant experience.

The reduction in staff reduced the capability of the site contractors to conduct routine assessments of the emergency management programs and develop new emergency drill and exercise scenarios. Both SRNS and SRR have very few staff qualified to develop new scenarios or make major revisions to them. The shortage of drill scenario writers has created several issues, including: a backlog of drills that need to be written or updated to be consistent with current emergency action levels (EALs); the age of drill scenarios (some have not been revised in 9 years); and the limited variety of emergency preparedness drill scenarios in some facilities. Some facilities only have two or three active drill scenarios. Repeated use of a small number of old drill scenarios can lead to a false sense of preparedness when emergency responders know what initiated each scenario and what "surprises" are coming up later in the drill.

Emergency Management Program Improvement Initiatives—Based in part on feedback from the Board's Site Representatives, in 2014 and 2015 SRS personnel pursued the following initiatives, with ongoing corrective actions and improvements:

- Facility-level drill program assessments and improvements (see detailed discussion below).
- Response to lessons learned from the Waste Isolation Pilot Plant Corrective Action Plan and Accident Investigation Board reports.
- Independent corporate assessments.

These initiatives are positive steps that are identifying appropriate issues and corrective actions to improve the SRS emergency management programs.

SRNS Facility Drill Program Assessment—The SRNS assessment team did a thorough self-critical review, and identified 20 findings and 69 opportunities for improvement. Because responsibility for the drill program was spread over multiple organizations, the SRNS team recommended merging the drill program functions into a consolidated drill organization to bring standardization and commonality to both the emergency preparedness and conduct of operations drills. Eighty-eight of the 130 facility-specific EALs and 25 of the 27 general site-wide EALs did not have an associated drill scenario, even after taking credit for scenarios that cover multiple alert and site area emergencies (e.g., fire, explosion). At the Savannah River National Laboratory, for example, no scenarios existed for 12 EALs, and another 10 drill scenarios needed revision. Neither H-Canyon nor HB-Line had any criticality response drill scenarios. The only H-Canyon fire scenario involved the fourth-level offices and control room, even though the fire hazards analysis identifies several other locations that have consequences significantly higher and where facility worker evacuation is credited. The H-Canyon drill scenarios did not address

[2] Percentage was provided by SRNS to the Board's staff team in local presentation material.
[3] Percentage was provided by SRR to the Board's staff team in local presentation material.

puncture wounds, siphons (like the one that occurred in 2013 involving dissolved spent fuel), tornadoes, or seismic events.

SRNS also does not have a formal process for determining if changes to the hazards analysis, safety basis, or facility design would drive the development or revision of abnormal or emergency operating procedures or drills. Other findings and opportunities for improvement addressed:

- Inconsistent tracking of drill issues.
- Lack of training objectives for coached/training drills.
- Lack of criticism in post-drill critiques.
- Drills not proceeding through recovery.
- Drills not being performed at minimum staffing levels.
- Lack of a process for determining remediation and reevaluation for drill attributes that were graded "unsatisfactory."

SRNS is establishing a project team to implement corrective actions to address the assessment's findings. The team will be issuing a corrective action plan and schedule. Subsequent to the Board staff team's review, SRNS issued a scoping document for the formation of a consolidated drill team that would be part of their central training organization. This team will develop, conduct, and evaluate drills across SRNS in accordance with a 5-year drill schedule to ensure consistent expectations and performance. In the near term, SRNS is planning to hire a manager and a scenario writer for this new team. Assuming funding is found, SRNS plans to hire an additional three scenario writers and eight drill team members.

SRR Facility Drill Program Assessment—The SRR assessment report identifies eight findings and 27 opportunities for improvement. SRR concluded that current staffing is not effective in ensuring drill program requirements are met, including the development, updating, and refreshing of drill scenarios. To address this shortage, SRR is increasing the number of staff dedicated to the drill program from 3.5 to 10 FTEs. The new hires include several ex-shift operations managers and radiological work planners who are very familiar with facility hazards and operations. SRR also conducted a scenario development training workshop to increase the number of staff who can develop and revise drill scenarios. SRR will also evaluate emergency response actions credited in the safety bases to determine which ones need to be drilled and develop a long-range schedule (3 to 5 years) of all the emergency preparedness and conduct of operations drills to be performed.

In mid-July 2015, SRR issued a corrective action plan with more than 40 actions. SRR also identified its staffing resource needs through 2017, revised the template for conduct of operations drills, started work on new drill scenarios, and began work on a spreadsheet to track what drills are performed by each shift over a 5-year period.

SRS Operations Center Staffing—Based on the observations of the Board's staff team during the review and previous exercises, gaps remain in the SRS Operation Center (SRSOC) staffing. The SRSOC is the continuously staffed response cell where 911 calls are received and emergency services are dispatched. Due to staff departures in January 2015, the SRSOC is operating at less than minimum staffing with DOE-SR approval. SRNS hired replacements for these gaps, but these personnel will not complete their qualifications until this fall. While the compensatory measures in place appear sufficient for the time being, the potential for performance degradation due to excessive overtime exists.

Facility-level Drill Programs—Each facility (or area) at SRS has a dedicated emergency management specialist who supports the technical planning, drill, and exercise programs. During the Board staff team's review, representatives from the Tritium Facilities, Defense Waste Processing Facility, Tank Farms, and Savannah River National Laboratory discussed their structured drill programs, including operational-level response, operations drills, facility-specific emergency preparedness drills, and SRS-wide emergency preparedness drills and exercises. SRS contractor teams had the opportunity to share best practices during the review discussions. No single contractor team was performing all of the best practices identified below, but it was clear that certain facility drill programs exhibited greater maturity than others. In particular, the Tritium Facilities are executing a robust and comprehensive drill program with significant management support.

During this review, the Board's staff team noted the following best practices being implemented at certain facilities. Other facilities at SRS would likely benefit from adopting these practices:

- Scheduling drills on the back-shift to minimize production impacts and demonstrate emergency preparedness with minimum staffing.
- Using "add-ons" to drill scenarios to provide complexity and challenge decision-making (e.g., adding injured personnel, cascading events, communication issues, unrelated minor events).
- Using a tracking matrix to plan out drill participation and scenario use.
- Creating multi-year planning tools.
- Providing remedial training opportunities for poor performers with subsequent validation through follow-on drills.
- Testing alternate facilities and control centers.
- Providing controllers with opportunities to practice drill controlling.
- Providing workers with table-top or other guided opportunities to walk-through emergency response activities.

The focus on drills at SRS has recently increased due to the contractors' emergency management program improvement initiatives; however, challenges remain. The need to develop challenging (but not overwhelming) scenarios that address both the full spectrum of possible emergencies and provide the ability to vary parameters within scenarios (i.e., add-ons) is a common problem across all facilities. This comprehensive approach is not yet realized or practiced by any of the SRS facility programs. While the Board's staff team observed that the exercise grading scheme at SRS is one of the more mature models in the DOE complex, SRS controllers and drill participants could be more self-critical based on a vertical review of several drill after-action and corrective action reports. Some elements of the contractors' emergency management program improvement initiatives seek to address this concern.

Conclusion. The SRS emergency management programs have degraded over the last few years in part due to limited resources and lack of staffing. Although DOE-SR and DOE Headquarters personnel conducted oversight of emergency management during this time, these interactions were not sufficient to prevent this degradation. SRNS and SRR recently completed thorough assessments that identified key issues and should provide the framework to improve the site's emergency preparedness and response capability. In particular, corrective actions should improve the content and conduct of facility-specific drill scenarios. DOE-SR management supports these improvement initiatives. Sustaining SRS emergency preparedness and response capability will require continued focus from contractor management and DOE oversight.