



Department of Energy

Washington, DC 20585

July 22, 2011

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Garry W. Flowers
President and Chief Executive Officer
Savannah River Nuclear Solutions, LLC
6160 Executive Woodside Court
Aiken, South Carolina 29803

NEA-2011-02

Dear Mr. Flowers:

This letter refers to the Office of Health, Safety and Security's Office of Enforcement and Oversight investigation into the facts and circumstances associated with the June 14, 2010, employee puncture wound injury, which occurred in the F-TRU Remediation Enclosure within the F-Canyon Facility, at the U.S. Department of Energy's (DOE) Savannah River Site. This occurrence was reported in Noncompliance Tracking System (NTS) report NTS-SRSO--SRNS-CPWM-2010-0002, *Contaminated Puncture Wound During TRU Drum Remediation*. The results of the investigation were provided to Savannah River Nuclear Solutions, LLC (SRNS) in an Investigation Report dated March 17, 2011. An enforcement conference was held on April 19, 2011, with you and members of your staff, to discuss the report's findings and the SRNS corrective action plan. A summary of the conference and list of attendees are enclosed.

DOE considers the employee puncture wound injury and the associated violations to be of high safety significance. The hazard analysis performed and the procedures used to support transuranic (TRU) waste remediation activities were not adequate to identify the hazards associated with the use of survey flags as hole-indicating devices inserted into the inner cans of the TRU drums. As a result of the inadequate hazard analysis, the training and procedures established by management were not detailed enough to address the hazards and were not effective in protecting operations personnel while performing these activities. SRNS's failure to effectively identify and control hazards associated with TRU waste remediation contributed significantly to a waste remediation technician receiving a puncture wound injury to his hand from a sharp object contaminated with plutonium-238, which resulted in significant internal contamination.



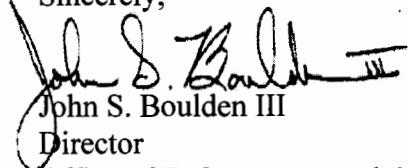
Based on an evaluation of the evidence in this matter, including information presented at the enforcement conference, DOE has concluded that violations of 10 C.F.R. Part 835, *Occupational Radiation Protection*, and 10 C.F.R. Part 830, *Nuclear Safety Management*, subpart A, *Quality Assurance Requirements*, have occurred. Accordingly, DOE is issuing the enclosed Preliminary Notice of Violation (PNOV) to SRNS with four Severity Level II violations and a total proposed base civil penalty of \$300,000.

Because the violations were identified as a result of an operational event, they are considered self-disclosing and no mitigation credit for timely self-identification is deemed appropriate. Although SRNS's causal analysis and subsequent corrective actions identified many specific deficiencies associated with the event, review of the DOE Type B accident investigation revealed that the corrective actions were incomplete and failed to identify several additional areas of deficiency that may have contributed to the event. DOE has chosen to award partial mitigation of 25 percent for corrective actions associated with three of the Severity Level II violations. The fourth violation was associated with quality improvement; historically, DOE has not granted mitigation for corrective actions taken for such violations. As a result, the total proposed civil penalty is reduced to \$243,750.

Pursuant to 10 C.F.R. § 820.24, *Preliminary Notice of Violation*, you are required to file a reply within 30 calendar days of the filing of the enclosed PNOV and to follow the instructions specified in the PNOV when preparing your response.

After reviewing your response to the PNOV, including any additional corrective actions entered into NTS, the Office of Enforcement and Oversight will determine whether further enforcement activity is necessary to ensure compliance with DOE nuclear safety requirements. DOE will continue to monitor the completion of corrective actions until these matters are fully resolved.

Sincerely,



John S. Boulden III

Director

Office of Enforcement and Oversight
Office of Health, Safety and Security

Enclosures: Preliminary Notice of Violation, NEA-2011-02
Enforcement Conference Summary

cc: Douglas Landis, SRNS
David Moody, DOE-SR
Richard Azzaro, DNFSB

Preliminary Notice of Violation

Savannah River Nuclear Solutions, LLC
Savannah River Site

NEA-2011-02

A U.S. Department of Energy (DOE) investigation into the facts and circumstances associated with the June 14, 2010, employee puncture wound injury at the Savannah River Site F-TRU Remediation Enclosure within the F-Canyon Facility, located at the DOE Savannah River Site, identified multiple violations of DOE nuclear safety requirements. Violations committed by Savannah River Nuclear Solutions, LLC (SRNS) include the failure to limit occupational exposure to less than 5 rem total effective dose, inadequacies in work control procedures, inadequate training, failure to identify and correct problems adverse to quality, failure to follow established procedures, and failure to sufficiently identify and control workplace hazards.

DOE has categorized the violations as four Severity Level II violations and, in consideration of the mitigating factors, imposes a total proposed civil penalty of \$243,750. As explained in 10 C.F.R. Part 820, Appendix A, *General Statement of Enforcement Policy*, section VI(b), "Severity Level II violations represent a significant lack of attention or carelessness toward responsibilities of DOE contractors for the protection of public or worker safety which could, if uncorrected, potentially lead to an adverse impact on public or worker safety at DOE facilities."

As required by 10 C.F.R. § 820.24(a) and consistent with Part 820, appendix A, the violations are listed below.

VIOLATIONS

A. Occupational Dose Limits

Title 10 C.F.R. § 835.202(a), requires, that "occupational dose received by general employees shall be controlled such that the following limits are not exceeded in a year:

- (1) A total effective dose of 5 rems (0.05 Sv);
- (2) The sum of the equivalent dose to the whole body for external exposure and the committed equivalent dose to any organ or tissue other than the skin or the lens of the eye [e.g., bone] of 50 rems. (0.5 Sv)"

Contrary to this requirement, SRNS failed to control the occupational dose received by a waste remediation technician (WRT).

As a result of the June 14, 2010, hand puncture, the WRT received between 15 and 45 rem committed effect dose to the whole body and between 497 and 1491 rem committed equivalent dose to the bone surface. Although this dose assessment is not final, even the low range of this assessment represents a violation of the cited sections of the rule.

This noncompliance constitutes a Severity Level II violation.

Base Civil Penalty – \$75,000

Proposed Civil Penalty (as adjusted) – \$56,250

B. Written Procedures and Work Processes

Title 10 C.F.R. § 835.104 requires that “[w]ritten procedures shall be developed and implemented as necessary to ensure compliance with this part, commensurate with the radiological hazard created by the activity and consistent with the education, training, and skills of the individuals exposed to those hazards.”

Title 10 C.F.R. § 830.122(e)(1) requires that work be performed “consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means.”

Contrary to these requirements, SRNS failed to develop written procedures commensurate with the radiological hazards associated with the processing of transuranic (TRU) waste. Specifically, SRNS did not adequately document or include in the operating procedures specific details regarding the hazards associated with plutonium-238 (Pu-238) or the use of a “sharp” as a hole-indicating device, as evidenced in the following paragraphs.

SRNS Manual 5Q, *Radiological Control Manual*, chapter 3, revision 17, states that “[w]ritten procedures shall be developed as necessary to ensure compliance with the provisions of the Manual that are derived from 10 CFR 835^[835.104]. These procedures shall be commensurate with the radiological hazards created by the activity and the education, training, and skills of the individuals who are exposed to these hazards^[835.104].” SRNS used an Assisted Hazard Analysis (AHA) to identify the specific hazards associated with processing TRU waste. From this hazards analysis, mitigative controls were identified and translated into operating procedures. However, the AHA approved for this work (FCA-4160 revision 4), was inadequate in that it failed to address specific hazards associated with the work, such as the use of survey flags as hole-indicating devices and the associated hazards.

Procedure 221-F-55006, *TRU Drum Repackaging*, revision 33, was the primary operating procedure the WRTs used to process TRU waste. However, the procedure was not written commensurate with the radiological hazards (i.e., Pu-238) or the education, training, and experience of the WRTs performing the work. Specifically, the procedure did not identify the use of survey flags as hole-indicating devices and did not explicitly describe how such devices were to be inserted into the opened can. WRTs used at least five different techniques to insert the flags, none of which were analyzed against the approved hazard analysis to ensure that no additional hazards were introduced. Finally, the survey flags were cut from their original length of 20.75 inches to 16.625 inches, introducing an unanalyzed hazard in

that the bevel at the end of the cut flag was significantly sharper than the end of the uncut flag.

Collectively, these noncompliances constitute a Severity Level II violation.

Base Civil Penalty – \$75,000

Proposed Civil Penalty (as adjusted) – \$56,250

C. Training and Qualification

Title 10 C.F.R. § 830.122(b)(1) requires that the contractor “train and qualify personnel to be capable of performing their assigned work.”

Contrary to these requirements, the training provided by SRNS to personnel involved in processing TRU waste was not sufficient to ensure that they were knowledgeable of the hazards or the work to be performed, or that they were ultimately capable of performing their assigned work.

SRNS Manual 8Q, *Employee Safety Manual*, procedure 122, section 10.E, revision 4, states that “Worker/Support training is required for personnel using the results of a hazards analysis to perform the work.” SRNS Manual 4B, *Training and Qualification Program*, procedure 1.0, revision 3, states that management is responsible for “[e]nsuring personnel, including subcontractors, vendors, and visitors are properly trained and/or qualified to perform assigned tasks.” However, before operations began at the SRS F-TRU remediation enclosure, the WRTs received only informal training on flag insertion techniques. This training was not formally documented, and the specific flag insertion technique was not analyzed as part of the AHA or captured in operating procedures.

SRNS Manual 4B, *Training and Qualification Program*, procedure 1.0, revision 3, states that management is responsible for “[e]nsuring personnel, including subcontractors, vendors, and visitors are properly trained and/or qualified to performed assigned tasks.” Manual 4B, *Glossary*, defines a technician as “principally involved in calibration, inspection, troubleshooting, testing, maintenance, and radiation protection activities.” Manual 4B, procedure 4.0, section 3, notes that “Technician and Maintenance personnel are qualified by specific tasks with an emphasis on successful performance in the field and are not subject to the two-year qualification cycle.” SRNS designated the workers who performed TRU waste processing activities as technicians (i.e., WRTs). However, the activities performed by these WRTs were not consistent with the definition of a technician in the Manual 4B Glossary. Because they were incorrectly designated as technicians, the WRTs did not receive the level of training provided to operators, which would have been a more appropriate designation.

SRNS Manual 4B, *Training and Qualification Program*, revision 3 defines “briefing” as a “formal, documented presentation to employees for the purpose of receiving information related to the conduct of job duties or tasks considered a viable option for certain low hazard tasks and/or functions.” Manual 4B, procedure 1.0, section 1B, revision 5, states that the training organization shall “[m]onitor training results to ensure all employees complete required training.” SRNS provided a briefing to TRU drum waste remediation workers on

the hazards associated with Pu-238. However, not all workers assigned to this activity attended the briefing, and attendance was not documented.

SRNS Manual 4B, procedure 4.0, section 4.C, revision 5, states that the supervisory skills training program “shall, as appropriate, include leadership, interpersonal communication, responsibilities and authority, motivation of personnel, problem analysis and decision making, fitness for duty procedures, and administrative policies and procedures.” However, SRNS supervisors responsible for direct supervision of TRU waste remediation activities only received the leadership portion of the training and were not provided the additional supervisory skills training required by procedure.

Collectively, these noncompliances constitute a Severity Level II violation.

Base Civil Penalty – \$75,000

Proposed Civil Penalty (as adjusted) – \$56,250

D. Quality Improvement

Title 10 C.F.R. § 830.122 (c), requires that a contractor “establish and implement processes to detect and prevent quality problems.”

Contrary to this requirement, SRNS did not implement effective processes to prevent quality problems.

The SRNS *Quality Assurance Management Plan*, SRNS-RP-2008-00020, revision 0, requires processes to be established and implemented to detect and prevent quality problems. Items, services, and processes that do not meet established requirements are identified, controlled, and corrected according to the importance of the problem and the affected work. Remedial measures include identifying the causes of problems and taking action to prevent recurrence based on the significance of the problem. However, SRNS failed to adequately identify, analyze, and correct known problems adverse to quality. These continuing problems directly impacted the TRU waste remediation activities, as discussed in the following paragraphs.

SRNS missed several opportunities to identify and correct the various deviations from expected work practices during TRU waste remediation activities. SRNS designated first line managers and mentors to have primary oversight responsibilities for TRU waste remediation activities. During the initial stages of the TRU waste remediation campaign, first line managers would enter the waste processing area and perform technician duties; they continued this practice until the WRTs were judged to be familiar with these duties. Thereafter, consistent with as-low-as-reasonably-achievable considerations, those responsible for oversight of the work did not enter the waste processing area, but instead observed the work remotely through a single camera with video display in a nearby control room. SRNS also used other groups within the organization (e.g., industrial hygiene, safety personnel, self-assessment teams, other management) to provide periodic oversight of TRU waste remediation activities. However, SRNS oversight failed to identify and/or correct several deviations from expected work practices, including variances in survey flag insertion, failure to wear outer gloves, and failure to use grasping tools to handle waste. Additionally, workers

did not bring their concerns regarding flag insertion to SRNS management's attention during pre- or post-job reviews as required.

Previous reviews by SRNS documented issues with procedure 221-F-55006. Although the procedure was defined as a "use every time" procedure, it was found to contain vague and conflicting steps. As a result of those findings, the procedure was revised numerous times to incorporate comments. However, revision 33 of the procedure (in place on the day of the event) remained vague in several areas associated with can opening and flag insertion. No hazard analysis was performed for these activities, and the procedure was not modified to provide sufficient detail to aid the workers, indicating that the corrective actions from earlier reviews were not effective in addressing previously-identified quality problems.

In a February 2008 causal analysis of recent contamination events at the site, SRNS noted that a common cause for most of the events was a less-than-adequate appreciation of the hazards. The causal analysis report goes on to state that "personnel seemed to lack a full understanding of the behavior and characteristics of Pu-238." Corrective actions taken to address this known problem with workers' understanding of the hazards associated with Pu-238 were not effective, and the problem persisted with workers involved with the TRU waste remediation activities.

The readiness and routine startup assessment program is part of the SRNS assessment program described in Procedure Manual 12Q, *Assessment Manual*. The assessment program periodically performs performance-based assessments of facilities/projects, support departments and programs to ensure adherence to applicable DOE directives and regulatory requirements. SRNS performed several reviews during the final stages of the readiness determination for TRU waste remediation activities. These reviews identified several quality assurance issues associated with adherence to procedure, training package completeness, and evaluation of procedure, equipment, and design changes against safety basis documents. The weaknesses identified during these readiness activities were not corrected before TRU waste remediation activities commenced. As a result, SRNS failed to correct documented weaknesses in procedures, training, and hazard analysis and to identify hazards associated with specific work areas and activities, including the use of hole-indicating devices.

Collectively, these noncompliances constitute a Severity Level II violation.

Base Civil Penalty – \$75,000

Proposed Civil Penalty (as adjusted) – \$75,000

REPLY

Pursuant to 10 C.F.R. § 820.24(b), SRNS is hereby obligated, within 30 calendar days after the date of filing of this Preliminary Notice of Violation (PNOV), to submit a written reply. The reply should be clearly marked as a "Reply to the Preliminary Notice of Violation" and must be signed by the person filing it.

If, in its reply, SRNS agrees to comply with the proposed penalty and waives any right to contest this PNOV or the proposed penalty, then, pursuant to 10 C.F.R. § 820.24(d), this PNOV will constitute a Final Order upon the filing of the reply. In such cases and in accordance with 10 C.F.R. § 820.32(c), the total proposed civil penalty of \$243,750 must be remitted within 30 calendar days after the Final Order is filed. Payment of the civil penalty must be made by check, draft, or money order payable to the Treasurer of the United States (Account 891099) and mailed to the address provided below.

If SRNS disagrees with any aspect of this PNOV or the proposed remedy, then, as applicable and in accordance with 10 C.F.R. § 820.24(c), the reply shall include: (1) any facts, explanations, and arguments supporting a denial that a violation has occurred as alleged; (2) any extenuating circumstances or other reason why the proposed remedy should not be imposed or should be mitigated; and (3) a discussion of the relevant authorities supporting the position asserted, including rulings, regulations, interpretations, and previous decisions issued by DOE. In addition, 10 C.F.R. § 820.24(c) requires that the reply include copies of all relevant documents.

Please send the appropriate reply by overnight carrier to the following address:

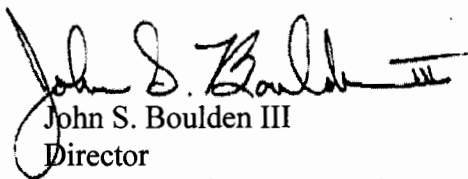
Director, Office of Enforcement and Oversight
Attention: Office of the Docketing Clerk
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

A copy of the reply should also be sent to the Manager of the Savannah River Operations Office.

Pursuant to 10 C.F.R. § 820.33(a), if SRNS does not submit a written reply within 30 calendar days after the date of filing of this PNOV, the Director of the Office of Enforcement and Oversight will request that a Default Order be issued against SRNS.

CORRECTIVE ACTION UPDATES

Corrective actions that have been or will be taken to avoid further violations should be delineated, with target and completion dates, in DOE's Noncompliance Tracking System.



John S. Boulden III
Director
Office of Enforcement and Oversight
Office of Health, Safety and Security

Washington DC
This 22nd day of July 2011