NUCLEAR FUEL SERVICES, INC.
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21G-09-0182
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November 18, 2009

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: **30-Day Written Notification of Event (NRC Event No. 45446)**

Reference: Docket No. 70-143: SNM License 124

Gentlemen:

On October 19, 2009, at approximately 1700 hours EST, Nuclear Fuel Services, Inc. (NFS) made a telephone notification to the NRC Operations Center of an event for which 10 CFR 70.74, Appendix A, (b)(1) requires a 24-hour notification. This letter provides the 30-day written notification of that event.

If you or your staff have any questions, require additional information, or wish to discuss this matter further, please contact me or Ms. Jennifer Wheeler, Licensing and Integrated Safety Analysis Manager, at (423) 735-5429. Please reference our unique document identification number (21G-09-0182) in any correspondence concerning this letter.

Sincerely,

NUCLEAR FUEL SERVICES, INC.

B Marie Moore

B. Marie Moore
Director
Safety and Regulatory

JKW/pdj

Attachment

IE72
NMSS

cc: Regional Administrator
U. S. Nuclear Regulatory Commission
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Mr. Manuel G. Crespo
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Mr. Gale Smith
Senior Resident Inspector
U. S. Nuclear Regulatory Commission

Attachment

30-Day Notification of Reportable Event

(4 pages to follow)

30-Day Notification of Reportable Event

1. The date, time, and exact location of the event

The event occurred on October 19, 2009 at approximately 1330 hours (EST). The report of the event was made on October 19, 2009 at approximately 1700 hours (EST). The event occurred in Building 333 at the Nuclear Fuel Services, Inc. (NFS) site, located in the town of Erwin, Unicoi County, Tennessee.

2. Radiological or chemical hazards involved, including isotopes, quantities, and chemical and physical form of any material released

Radiological and chemical hazards associated with the event were limited to NOx generated in process vessels during uranium processing. Some NOx exited the system via a ventilation air gap into the work area within Building 333; however, due to the NOx detector alarm and subsequent worker evacuation, no worker exposure of consequence occurred. The work area is already controlled as a Material Access Area (MAA) and a Radiological Controlled Area (RCA). Specific information concerning the radioactive materials located in the area during the time of the event is as follows:

Isotopes:	^{235}U
Quantities:	Approx 1,000 grams HEU (approx 710 g ^{235}U)
Chemical Form:	U-Al in HNO_3
Physical Form:	Solid and liquid

3. Actual or potential health and safety consequences to the workers, the public, and the environment, including relevant chemical and radiation data for actual personnel exposures to radiation or radioactive materials or hazardous chemicals produced from licensed materials (e.g., level of radiation exposure, concentration of chemicals, and duration of exposure)

There were no actual or potential health and safety consequences to the public or the environment. There were also no actual personnel exposures to radiation, radioactive materials, or hazardous chemicals produced from licensed materials above what is experienced with normal operating conditions. The potential safety consequences for chemical exposure to workers are categorized as High under 10 CFR 70.61(b)(4).

4. The sequence of occurrences leading to the event, including degradation or failure of structures, systems, equipment, components, and activities of personnel relied on to prevent potential accidents or mitigate their consequences

The U-Aluminum Bowl Cleaning Station system in Building 333 is designed to remove uranium from centrifuge bowls by circulating nitric acid through the bowls. The system has historically produced NOx (NO, NO_2, etc.) during the nitric acid dissolution process. Safety controls designated as Items Relied On For Safety (IROFS) include a NOx detection system (IROFS BPF-43) with sensors located at the nitric acid knockout column's siphon break (potential NOx release point if process ventilation fails) and at the employee working level.

On October 13, 2009, NFS began using the Bowl Cleaning Station system to dissolve U-Aluminum fines (very small particles of U-Aluminum) rather than adding them to the normal dissolver column. This decision was made because laboratory testing indicated that dissolving the fines with caustic in the normal dissolver column was not recommended due to potential for a vigorous reaction. The fines were loaded into strainers and placed directly into the bowls to be dissolved with nitric acid. After the dissolution process began, the Operator noticed that the temperature of the system was increasing and that NOx (in the form of a brown cloud) was beginning to form inside the Bowl Cleaning Station containment vessels. The system was shutdown. The NOx detector designated as an IROFS alarmed and the facility was evacuated. Immediate corrective actions included building, and health and safety personnel re-entry in SCBA to validate shutdown conditions and remote monitoring of NOx levels in Building 333. Based on re-entry data and remote NOx detector readings, NOx levels inside the building (outside of containment) were not significant.

Laboratory analysis of similar U-Aluminum fines material was conducted October 14 – October 16, 2009. It behaved in the laboratory in the same manner as what was observed during the operational event. Based on the lab testing, a NOx generation rate specific for the fines material was estimated. Based on engineering calculations, it was determined that the NOx generation for the fines was significantly higher than the previously analyzed NOx generation for the U-Aluminum ingots. The previous NOx evaluation for the Bowl Cleaning Station resulted in an Intermediate consequence for chemical exposure to the worker. Using the generation rate specific for the fines results in a High consequence for chemical exposure to the worker.

On October 19, 2009, based on the revised NOx generation rate, it was determined that insufficient IROFS were in place and that the performance criteria of 10 CFR 70.61 were not met.

5. The probable cause of the event, including all factors that contributed to the event and the manufacturer and model number (if applicable) of any equipment that failed or malfunctioned

The probable cause of the event was the failure to recognize the possibility of increased NOx generation due to the greater surface area and aluminum content of the material to be dissolved. Although the safety basis assumed that NOx would be generated during processing, and an

IROFS was in place (NOx detector) to alert workers to leave the Building in the event of a NOx release into the work area, the consequence calculations did not include a NOx generation rate that specifically addressed the differences between the U-Aluminum fines material and the material previously processed in the Bowl Cleaning Station (cake from dissolved U-Aluminum ingots).

No equipment failed; however, the steam evolved during the chemical reaction forced solution and slurry into ventilation piping which resulted in deformation of the TPVC off-gas piping.

6. Corrective actions taken or planned to prevent occurrence of similar or identical events in the future and the results of any evaluations or assessments

The issue was entered into NFS' Problem Identification, Resolution, and Correction System (PIRCS) as Problem ID# 21448. NFS performed extent of condition reviews for other processing areas to determine if similar conditions existed in other processing areas. The preliminary reviews concluded that the processes have sufficient controls in place to prevent a similar event. A Root Cause Investigation was conducted to document the event timeline and identify corrective actions to prevent re-occurrence. Proposed corrective actions include: 1) Development of a more formal communication process between the Operations Departments and supporting laboratories to minimize confusion of technical information. 2) Development and implementation of a project management program to be executed for all new projects or major process changes to current processes. Include in the program, at a minimum, the major components currently found in NFS-TS-009. 3) Revision of the configuration management implementation documents to provide uniform requirements for technical basis documentation with sufficient detail. 4) Development of guidelines for process changes made on off-shifts. Additional investigations include review of NOx calculations for other processing areas and a team review of the safety basis for selected areas. The Operational Decision Making tool was used to allow re-start of the Building 333 process areas except for the U-Aluminum system.

7. If the event involved an area or equipment with an approved Integrated Safety Analysis, whether the event was identified and evaluated in the Integrated Safety Analysis

The event was associated with an area having an approved Integrated Safety Analysis (ISA). The accident sequence associated with the generation of NOx was identified and evaluated in the ISA.

Although the safety basis assumed that NOx would be generated during processing, and an IROFS was in place (NOx detector) to alert workers to leave the Building in the event of a NOx release into the work area, the consequence calculations did not include a NOx generation rate that specifically addressed the differences between the U-Aluminum fines material and the material previously processed in the Bowl Cleaning Station (cake from dissolved U-Aluminum ingots).

8. The extent of exposure of individuals to radiation or radioactive materials

No individuals were exposed to radiation or radioactive materials as a result of this event above what is experienced with normal operating conditions.