



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

June 25, 2015

EN 50954

Mr. Joel W. Duling
President
Nuclear Fuel Services, Inc.
P. O. Box 337, MS 123
Erwin, TN 37650

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION SPECIAL INSPECTION REPORT
NO. 70-143/2015-006

Dear Mr. Duling:

This report documents the results of the special inspection (SI) at the Nuclear Fuel Services (NFS) facility in Erwin, Tennessee that was performed by the Nuclear Regulatory Commission (NRC) from April 14, 2015, through May 26, 2015. The purpose of the SI was to inspect and assess the facts and circumstances surrounding an unplanned chemical reaction involving licensed material which caused an unplanned contamination event and access to the contaminated area being restricted for greater than 24 hours. This event was reported to the NRC Operations Center on April 5, 2015 (EN50954) in accordance with the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70.50 (b)(1), "Unplanned Contamination Event."

Based on preliminary information provided by the licensee in the Event Notice, the NRC determined the event involved a potentially significant system interaction and the SI was the appropriate level of regulatory response to obtain additional information to fully assess the significance of the event (see Enclosure 2). The SI objectives were to (1) review the facts surrounding the unplanned chemical reaction event, (2) assess the licensee's response, (3) evaluate the licensee's basis for immediate and long term corrective actions to prevent recurrence, and (4) assess the licensee's progress in determining a root cause. The SI consisted of facility walkdowns, selective examinations of relevant procedures and records, and interviews with plant personnel. At the close of the inspection, the licensee's causal evaluation report had not yet been finalized and issued for NRC review. The enclosed report documents the results of the SI. The inspection results were discussed with you and other members of your staff at an exit meeting held on May 26, 2015.

In accordance with 10 CFR 2.390 of NRC's "Agency Rules of Practice and Procedure," a copy of this letter and its enclosures will be made available electronically for public inspection in the NRC Public Document Room, or from the NRC's Agencywide Documents Access and Management System (ADAMS), which is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html>.

If you have any questions, please call me at 404-997-4700.

Sincerely,

/RA/

Mark S. Lesser, Director
Division of Fuel Facility Inspection

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

Enclosures:

1. NRC Inspection Report No. 70-143/2015-006
w/Attachment: Supplementary Information
2. NFS SIT Charter

cc: (See page 3)

In accordance with 10 CFR 2.390 of NRC's "Agency Rules of Practice and Procedure," a copy of this letter and its enclosures will be made available electronically for public inspection in the NRC Public Document Room, or from the NRC's Agencywide Documents Access and Management System (ADAMS), which is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html>.

If you have any questions, please call me at 404-997-4700.

Sincerely,

/RA/

Mark S. Lesser, Director
Division of Fuel Facility Inspection

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

Enclosures:

1. NRC Inspection Report No. 70-143/2015-006
w/Attachment: Supplementary Information
2. NFS SIT Charter

cc: (See page 3)

DISTRIBUTION:

PUBLIC

N. Baker, NMSS

D. Hartland, RII

J. Hickey, RII

R. Johnson, NMSS

K. Ramsey, NMSS

C. Stancil, RII

M. Sykes, RII

NFS Website

☒ PUBLICLY AVAILABLE ☐ NON-PUBLICLY AVAILABLE ☐ SENSITIVE ☒ NON-SENSITIVE
ADAMS: ☒ Yes ACCESSION NUMBER: ML ☒ SUNSI REVIEW COMPLETE ☒ FORM 665 ATTACHED

OFFICE	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI			
SIGNATURE	NEP1	DJH2	MDS1	MSL1			
NAME	NPeterka	DHartland	MSykes	MLesser			
DATE	6/25/2015	6/25/2015	6/25/2015	6/25/2015			
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: G:\DFFI\REPORTS\FINAL REPORTS\NFS\2015\NFS IR 2015-006 SIT.DOCX

cc:

Michael McKinnon
Director, Operations
Nuclear Fuel Services, Inc.
Electronic Mail Distribution

Richard A. Freudenberger
Safety & Safeguards Director
Nuclear Fuel Services, Inc.
Electronic Mail Distribution

Debra G. Shults
Director, TN Dept. of Environment & Conservation
Electronic Mail Distribution

Doris D. Hensley
Mayor, Town of Erwin
211 N. Main Avenue
P.O. Box 59
Erwin, TN 37650

Gregg Lynch
Mayor, Unicoi County
P.O. Box 169
Erwin, TN 37650

Johnny Lynch
Mayor, Town of Unicoi
P.O. Box 169
Unicoi, TN 37692

George Aprahamian
Manager, Program Field Office – NFS
Knolls Atomic Power Laboratory
1205 Banner Hill Rd
Erwin, TN 37650

**U.S. NUCLEAR REGULATORY COMMISSION
REGION II**

Docket No.: 70-143

License No.: SNM-124

Report No.: 70-143/2015-006

Licensee: Nuclear Fuel Services, Inc.

Location: Erwin, Tennessee 37650

Dates: April 14 – May 26, 2015

Inspector: N. Peterka, Fuel Facility Inspector

Approved by: Mark S. Lesser, Director
Division of Fuel Facility Inspection

Enclosure 1

EXECUTIVE SUMMARY

Nuclear Fuel Services, Inc.
NRC Special Inspection Report No. 70-143/2015-006
April 14 – May 26, 2015

Nuclear Fuel Services (NFS), Inc. is authorized to receive, possess, use, store, and ship special nuclear material (SNM) pursuant to 10 CFR Part 70. Part of Nuclear Fuel Services operations includes processes for the recovery and purification of low-enriched and highly-enriched uranium from scrap material generated either onsite or at other facilities.

One source of scrap material is uranium-bearing waste generated from cleaning activities and routine operations; the generated waste items include gloves, cleaning cloths and other cleaning materials. In addition to uranium, the accumulated waste products may also potentially contain nitric acid and organic compounds. To avoid unplanned chemical reactions, the items that were used with nitric acid and organic compounds are required to be rinsed and dried prior to being placed into approved containers to minimize the potential for an unplanned chemical reaction. When full, these containers are sealed in plastic bags and stored within a locked area until they can be assayed for uranium content and either sent to recovery, or disposed of as waste per approved methods.

On Saturday April 4, 2015, a NFS fuels supervisor noticed a strong odor coming from an area near the main process floor. Upon further investigation, the supervisor and an operator discovered a ruptured and smoldering two-liter container on the floor of a storage area and a visible brownish-red haze in the air. The contents of the container had been spilled onto the floor and adjacent areas within the 306 West area. The supervisor, in accordance with facility guidelines, actuated a nearby fire alarm and the NFS site fire brigade responded to and mitigated the smoldering container. The area was subsequently roped off, and additional entry requirements posted during cleanup activities. On April 5, 2015, the licensee notified the Nuclear Regulatory Commission (NRC) of the unplanned chemical reaction through the reporting requirements for an unplanned contamination event (Event No. 50954), pursuant to the requirements in 10 CFR 70.50 Reporting Requirements, (b) Twenty-four Hour Report (1)(i), in part:

An unplanned contamination event that requires access to the contaminated area, by workers or the public, to be restricted for more than 24 hours by imposing additional radiological controls or by prohibiting entry into the area.

The licensee additionally reported under 10 CFR 70.50 (b) (4), in part: *an unplanned fire or explosion damaging any licensed material*. This was conservatively reported by the licensee with the initial report on April 5, and was subsequently retracted on April 10, 2015, and replaced with a courtesy notification per Information Notice 97-23: Evaluation and Reporting of Fires and Unplanned Chemical Reaction Events at Fuel Cycle Facilities. The NRC evaluated the event and initiated a special inspection (SI) to assess the facts and circumstances surrounding the event.

Actual and Potential Safety Significance

There were no actual safety consequences identified as a result of the unplanned chemical reaction. No workers were present when the material was released from the container and there was no evidence that workers had received an intake of uranium or nitrous oxide (NO_x) gases. Plant ventilation systems were also verified to be in service to minimize concentrations and prevent a release to the environment during and following the unplanned chemical reaction; therefore there was no actual safety consequence to the workers, public, or the environment.

The potential health and safety consequence to the worker as a result of this event sequence was identified as an acute intake of uranium and exposure to Nitric acid and NO_x gases. The licensee determined, using the approved Integrated Safety Analysis (ISA) methodology for evaluating accident sequences and consequence analyses, that the potential safety significance of the event was low. The NRC verified the licensee's conclusion by requesting additional information and performing an independent assessment.

Evaluation of the Licensee's Response

Upon identification of the unplanned chemical reaction and the potential for NO_x gas generation, the site fire brigade responded to the area and mitigated the chemical reaction and placed the area into a safe condition. The inspector determined that the licensee's response to the unplanned chemical reaction and their immediate corrective actions were comprehensive and effective.

Evaluation of the Licensee's Existing ISA Accident Sequences

The inspector evaluated whether the chemical and radiological aspects of the unplanned chemical reaction were bounded by similar types of accident sequences contained in the licensee's ISA. Relevant accident scenarios involving nitric acid and the release of uranium into the air were reviewed and had been identified by the licensee as low consequence events that did not require safety controls. The inspector determined that the approach used for accident analysis was consistent with previously reviewed methods.

Evaluation of the Licensee's Causal Analysis and Extent of Condition

The inspector preliminarily reviewed the licensee's causal analysis and extent of condition review for incompatible chemicals to be introduced during cleaning activities in other areas of the plant. An Unresolved Item (URI) 2015-006-01 was identified to further evaluate the adequacy of the licensee's procedures and measures in place for handling potentially contaminated waste.

Attachment:

Supplementary Information

REPORT DETAILS

1. Event Timeline

During normal operations and routine cleanup activities, it is common for waste items such as gloves and cleaning cloths to accumulate within the facility. The process area which generated the cleanup materials that ultimately led to the unplanned chemical reaction routinely deals with nitric acid and organic compounds. To preclude an unplanned chemical reaction occurring between the inorganic and organic compounds, operators are required to rinse and dry the cleaning materials prior to placing them into the containers. A small rinse station is available in the process area for operators to use. The process area in question generates approximately one cleanup container per day during normal operations.

March 31, 2015

- Cleanup container #008398364 is removed from the area. The incident container, #008398448, is introduced to the area.
- Cleanup container #008398448 is in use and over the course of about two days, the container is about 2/3 full and consists of used gloves and cleaning cloth.

April 02, 2015

- First Shift, after performing general cleaning within their process area, an operator notices a small amount of condensation on the inside of the two-liter container they have been using. The operator turns the container upside down to drain the condensation for approximately an hour and a half, and is noticed to be moisture-free at the end.
- 0945, cleanup container #008398448 is sealed and placed into the storage rack in Building 306 West.

April 04, 2015

- 1150, a supervisor and operator notice an odor and begin to investigate.
- 1151, the supervisor and operator discover a ruptured and smoldering two-liter container on the floor of 306 West storage area. Their view into the area was obstructed by a brownish-red haze. The supervisor actuated the fire alarm and both individuals left the area.
- 1155-1205, the site fire brigade enters the area with proper personal protective equipment (PPE) and mitigates the chemical reaction. The area is placed into a safe configuration and access restricted.
- Between about 1215-1230, NFS management notifications are made.

April 05, 2015

- At approximately 0300, the area is posted under a Special Work Permit (SWP) and cleanup of the storage area begins. It is noted that some material from the container was expelled and is on the wall and racks diagonally from the container's original location.
- 0658, NFS completes the required 24-hour NRC notification.

April 07, 2015

- At approximately 1000, cleanup of the storage area is completed and the area is down posted.

June 19, 2015

- NFS approves the Unplanned Chemical Reaction Event Investigation.

2. Analysis of the Actual and Potential Safety Significance

a. Scope and Observations

The licensee analyzed the actual and potential safety significance of the event utilizing data collected following the rupture during cleanup activities for both radiological and chemical exposures. Since the unplanned chemical reaction which occurred in the two-liter container was not explicitly analyzed in their ISA, NFS performed a consequence analysis for radiological and chemical exposure using the methodology in 21T-12-1045, "Chemical Analysis Methodology and Calculations," and NFS-HS-A-68, "ISA Risk Assessment," which is applicable to the consequence-likelihood requirements specified in 10 CFR 70.61 and guidance provided in NUREG 1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility."

The inspector independently evaluated and verified the calculations performed by the licensee to show the actual and potential safety significance for the two-liter container event was low for both chemical and radiological scenarios.

There were no nuclear criticality safety concerns associated with the event. The Nuclear Criticality Safety Evaluation (NCSE) which encompasses the 306 West storage racks analyzes the two-liter containers containing uranium solution at optimum parameters per license conditions. Their analysis shows the storage rack configuration remains subcritical under normal and potential upset conditions and bounded what occurred during the event.

Actual Condition

The inspector reviewed the licensee's calculations for actual consequence to the worker as a result of the unplanned chemical reaction. At the time of the event, no workers were present. The individuals who could have been exposed to either uranium or NO_x gases were the individuals who discovered the release, the first responders, and those who assisted with the cleanup of the area. The licensee performed nasal smears on the individuals who could have been potentially exposed to uranium as a result of the event. All results from the nasal smears were below the licensee's investigation level which would

have required the individuals to submit a urine sample for analysis. By coincidence, the operator who initially discovered the container with the supervisor completed a previously-scheduled bioassay during the days following the event and the results also were negative for uranium uptake. Using appropriate PPE, initial responders and radiation technicians sampled the air at the incident scene and at the 306 West boundary for NO_x gas using draeger tubes. The sample results in the immediate area were above the licensee's action level, 3 parts per million (ppm) NO_x, requiring respiratory protection. The highest value measured was 7 ppm at the storage rack location and less than 3 ppm at the boundary to 306 West before actions were taken to mitigate the event. For evaluation of potential chemical exposure, the workers who discovered the container and first responders were sent to the onsite medical facility, no health concerns were identified. There was no actual safety consequence as a result of the unplanned chemical reaction.

Potential Condition

The inspector reviewed the licensee's calculations for the potential consequence to the worker as a result of the unplanned chemical reaction. The licensee analyzed the radiological consequences to a worker utilizing their approved methodology. The licensee analyzed the hypothetical radiological consequence to the worker by examining both the Total Effective Dose Equivalent (TEDE) and intake of soluble uranium. The licensee modeled the hypothetical consequence under various conditions such as powder and liquid spill, pressurized release, re-suspension of the material, and direct exposure from ionizing radiation. The most limiting model was the pressurized release scenario and most appropriately reflected the actual pressurized release of material from the container due to the chemical reaction. The licensee conservatively modeled the release with double the amount of uranium present at the time of release from Material Control and Accounting (MC&A) records. In addition, the time of exposure was modeled as greater than five minutes, with five minutes being the requirement per their methodology. The results of the calculations showed the greatest exposure due to a pressurized release of uranium would not exceed the intermediate performance requirements of 25 rem and 30 milligrams (mg) of soluble uranium for occupation exposure.

The licensee analyzed the potential chemical exposure to a worker for chemical exposure from the inhalation of NO_x gases. The choice of NO_x gas as the chemical of concern is considered conservative, given the chemicals used in the process area where the container originated, and based on analysis of the liquid generated during cleanup activities. For the licensee's analysis, it was assumed the two-liter container contained 500 milliliters (mL) of nitric acid, which is considered conservative, based on procedural guidance for handling waste containing nitric acid, and the container being empty of free-standing liquids at the time it was placed into storage. Per approved methodology, the release was modeled as an instantaneous release with all of the nitric acid being instantly converted to NO_x gas and of uniform concentration throughout the 306 West room volume. No credit was taken by the licensee for air changes as the result of area ventilation and the exposure period was then modeled for five minutes. The licensee then compared the NO_x exposure in mg against values provided in their ISA following TEEL guidelines. The potential exposure to NO_x was calculated as being approximately 62 percent of the 22.6 mg/m³ TEEL-2 value which is approved as the licensee's intermediate consequence threshold.

It was not readily obvious to the inspector that the licensee's analysis for chemical exposure bounded the actual circumstances of the event. The inspector utilized NRC staff risk analysts to assist in the evaluation. Additional information was requested from the licensee to conduct an independent assessment. Based upon review of available relevant

information and NRC staff independent calculations, the inspector was able to independently conclude that the potential safety significance to a worker was low.

b. Conclusion

No findings of significance were identified.

Response to the Event

a. Scope and Observations

Following the supervisor's and operator's observation of the smoldering two-liter container on the floor of the 306 West storage area and pulling the fire alarm at approximately 1151 on April 4, 2015, the site fire brigade responded to the area. The fire brigade placed the area into a safe condition by spreading the remaining contents of the container on to a metal pan and applying a quick discharge of a dry chemical fire extinguisher to ensure the chemical reaction had terminated. It was later discovered that some of the contents of the container were found on other areas of the floor, storage rack, and wall diagonally from where the container was initially in its storage location. Following response by the fire brigade, the plant shift superintendent began to make management notifications. Following the initial management notifications, the licensee began to clean-up the area and investigate the facts and circumstances surrounding the unplanned chemical reaction.

At 0658 on April 5, 2015, NFS completed the required 24-hour NRC notification, EN 50954, under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70.50 (b) (1), "Unplanned Contamination Event" for access being restricted to an area for greater than 24 hours and 10 CFR 70.50 (b) (4), "Unplanned fire or explosion damaging licensed material". On April 10, 2015, the licensee retracted their notification under 10 CFR 70.50 (b) (4) and replaced it with a courtesy notification per Information Notice 97-23: Evaluation and Reporting of Fires and Unplanned Chemical Reaction Events at Fuel Cycle Facilities.

The event was entered into the licensee's corrective action program (CAP) as PIRCS 47925 on April 4, 2015. Immediate corrective actions performed by the licensee included training which discussed the event and reiterated the need to follow procedures for the handling of waste generated during cleanup activities and the adverse chemical reaction which could occur if two incompatible chemicals are mixed. Additionally, the licensee initiated daily thermography on the containers generated from the process area to look for 'hot spots' which could be indicative of a chemical reaction. To date no issues have been identified with newly generated containers from the process area and the thermography checks will continue until corrective actions are in place.

b. Conclusion

No findings of significance were identified.

3. Evaluation of the Integrated Safety Analysis

a. Scope and Observations

The inspector evaluated whether the chemical and radiological aspects of the unplanned chemical reaction were bounded by a similar type of accident sequence in the licensee's ISA which were of low consequence to the worker. The licensee provided two separate accident

scenarios, one for both the chemical and the radiological consequences to the worker. The scenarios provided by the licensee follow their approved ISA methodology for accident analysis and screen as low consequence events to the worker and do not require safety controls, or Items Relied on for Safety (IROFS) to meet the performance requirements of 10 CFR 70.61.

The chemical accident sequence provided by the licensee examined the release of nitric acid from a column to the Area 200 process floor and the subsequent generation of NO_x gases in 21X-14-0034, "300 Complex Chemical Accident Consequence Analysis (ACE)," Appendix E, Table E-1, NO_x Calculation Occupations Scenario 1, Revision (rev.). 6. The result to the worker was a low chemical consequence event, which equates to a chemical concentration less than the TEEL-2 value of 22.6 mg/m³ for NO_x.

The radiological accident sequence provided by the licensee examined the release of uranium powder in the Building 311 storage area and subsequent re-suspension into the air in STR-RPO-001, "Radiological ACE Storage Areas", Sequence 311.013", Rev. 2. The result to the worker was a low radiological consequence event which equates to an intake of uranium which results in a TEDE to the worker of less than 25 rem.

While the above accident sequences are not exact matches for the unplanned chemical reaction, the inspector determined that the approach used for accident analysis was consistent with previously reviewed methods.

b. Conclusion

No findings of significance were identified.

4. Causal Analysis and Extent of Condition

a. Scope and Observations

The licensee initially performed a critique of the event to immediately gather the facts and circumstances surrounding the event. Following the guidance in their corrective action program, NFS initiated a small team root cause investigation to review the events surrounding the unplanned chemical reaction in the cleanup container. An extent of condition review was also initiated to review other areas onsite where it is possible to mix chemicals which could result in an unwanted chemical reaction.

In their preliminary assessment, the licensee identified the primary cause of the unplanned reaction to be the mixing of non-compatible materials that had not been adequately rinsed and dried prior to adding to the 2-liter container. The licensee attributes this to lack of detailed guidance in the procedure for the handling and cleaning of waste contaminated with non-compatible materials.

At the close of this inspection, the final results of the licensee causal evaluation had not been issued for NRC review. A final assessment of the licensee causal evaluation and planned actions could not be completed. Therefore, an unresolved item was identified to complete the assessment of the adequacy of the causal analysis and extent of condition evaluation. (Unresolved Item (URI) 2015-006-01 Handling and Storage of Contaminated Waste).

b. Conclusion

Unresolved Item 2015-006-01 was identified to further evaluate adequacy of the licensee's procedures and measures in place for handling potentially contaminated waste.

5. Planned Long Term Corrective Actions

a. Scope and Observations

At the close of this inspection, the final corrective actions stemming from the licensee's causal evaluation and extent of condition had not been issued for NRC review. A final assessment of the licensee's corrective actions will coincide with the review of URI-2015-006-01.

b. Conclusion

No findings of significance were identified.

6. Exit Meeting

The inspection scope and results were presented to members of the licensee's staff on May 26, 2015. No dissenting comments were received from the licensee. Proprietary information was discussed but not included in the report.

SUPPLEMENTARY INFORMATION

1. List of Persons Contacted

<u>Name</u>	<u>Title</u>
C. Athon	Principle Scientist
N. Brown	NCS Department Section Manager
J. Duling	President
M. Eakin	Nuclear Criticality Safety Engineer
R. Freudenberger	Safety & Safeguards Director
S. Gizzie	Fire Brigade Chief / Nuclear Criticality Safety Engineer
C. Jarvis	Training Specialist
F. Kerns	Plant Superintendent Manager
D. Mann	Safety Analysis Engineer
R. Markland	Supervisor
B. McAllister	Safety Analysis Engineer
M. Moore	Environmental Protection & Industrial Safety Section Manager
A. Sabisch	Licensing and ISA Manager
R. Shackelford	Nuclear Safety & Licensing Section Manager
A. Street	Supervisor
C. Street	Plant Superintendent

Other licensee employees contacted included engineers, technicians, production staff, and office personnel.

2. List of Items Opened, Closed, and Discussed

Opened	URI 2015-006-01	Handling and Cleaning of Potentially Contaminated Waste (Section 5)
--------	-----------------	---

3. Inspection Procedures Used

IP 88003, Reactive Inspection for Events at Fuel Cycle Facilities Program
IP 88020, Operational Safety
IP 93812, Special Inspection

4. Documents Reviewed

Procedures:

NFS-CAP-009, NFS Corrective Action Program, Rev. 4
NFS-CAP-009-01, Corrective Action Program Screening Process, Rev. 1
NFS-GH-62, Control of Combustibles, Rev. 8
NFS-HS-A-50, Guidelines for Government Agency Notification, Rev. 23
NFS-HS-A-68, ISA Risk Assessment Procedure, Rev. 5
SOG-EP-01, Standard Operational Guidelines for Evaluation of Unusual Incidents, Rev. 3
SOP-401-03-302, Area 300-Building 302, Rev. 045
SOP-401-16, Processing of Materials Generated in the FMF, Rev. 18
SOP-401-17, FMF Cleaning, Rev. 7
SOP-409, Section 1, General Requirements for BLEU Preparation and Associated Facilities, Attachment A, Rev. 40

Records:

2-Liter Bottle Rupture Event Revised Calculations Using Storage Cage Volume, dated May 12, 2015

2-Liter Container Unplanned Chemical Reaction Investigation, dated June 16, 2015

300 Complex Chemical ACE, Appendix E, 21X-14-0034, Table E-1, NOx Calculation Occupational Scenario 1, Rev. 6

Assessment of the Consequences Associated with the Bottle Event, dated April 16, 2015

Building 302-MISC Job Requirements List

Chemical Analysis Methodology and Calculations, 21T-12-1045, Rev. 5

Chemical Occupational Exposure Calculations Associated with PIRCS 47925, 21T-15-1115, dated April 13, 2015

Critique Event #47925: Container Reaction in 306 West (April 4, 2015)

Evaluation of Bottle Rupture / Worker Injury Probability, dated May 15, 2105

Evaluation of Residual Materials from Container Event – PIRCS 47925, dated April 8, 2015

Information Notice No. 97-23: Evaluation and Reporting of Fires and Unplanned Chemical Reaction Events at Fuel Cycle Facilities, dated May 7, 1997

NFS Site ISA Summary, Rev. 12, dated January 2015

NOx Calculations associated with PIRCS 47925, 21T-1108, Dated April 13, 2015

NOx Exposure Thresholds White Paper

Nuclear Criticality Safety Evaluation for Storage Racks in Building 306W, 54X-02-0019, Rev. 0, dated October 2002

OPR-TB-APR15-02, Toolbox Training, Oxidizers and Organics, dated April 15, 2015

PIRC 47925 Radiological Data and Dose Evaluations

Protective Action Criteria (PAC) Rev 25 based on 60-minute AEGLs, ERPGs, or TEELs for Chemicals of Concern, dated August 2009

Radiological ACE Storage Areas, STR-RPG-001, Rev. 2

Radiological Evaluation of Container Breach, 21T-15-1109, dated April 13, 2015

Special Nuclear Materials License Application, SNM-124, Rev. 2, dated September 2014

Corrective Action Program PIRCS:

18057, Gloves smoking in trash tube

29834, Chemical reaction in trash tube

32337, Smoldering trash tube

35945, Signs of pressurization in drum in waste packaging

47925, Unplanned Chemical Reaction in 2-liter container



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

April 13, 2015

MEMORANDUM TO: Nicholas E. Peterka, Fuel Facility Inspector
Nuclear Fuel Services Inc., Special Inspection

FROM: Victor M. McCree, Regional Administrator /RA/

SUBJECT: SPECIAL INSPECTION CHARTER FOR NUCLEAR FUEL
SERVICES, DOCKET NUMBER 70-143 (INSPECTION REPORT
NUMBER 70-143/2015-006)

This memorandum confirms the establishment of a Special Inspection (SI) at Nuclear Fuel Services Inc. (NFS) to inspect and assess the facts and circumstances surrounding the April 4, 2015 unplanned exothermic chemical reaction event in which a two liter container filled with cleanup materials located in a storage rack burst, releasing hazardous chemicals and licensed material into the immediate area. The issue was reported to the Nuclear Regulatory Commission (NRC) Operations Center on April 5, 2015 (Event # 50954), under a 24 hour report 10 CFR 70.50(b)(1), for unplanned contamination event, and 10 CFR 70.50(b)(4), for an unplanned chemical reaction damaging the container containing licensed material. You are the inspection leader and should report your status directly to me.

Regional Office Instruction No. 0704, "Documenting Management Directive 8.3, NRC Incident Investigation Program, Reactive Team Inspection Decisions in the Division of Fuel Facility Inspection," Revision 3, was used to evaluate the level of NRC response for this operational event. Based on deterministic criteria, the staff concluded that the event was a rupture of a plastic two liter container and expulsion of some of its contents involving hazardous chemicals and licensed material, for which an Augmented Inspection Team would be considered. The NRC determined that the appropriate level of response was to conduct a SI based on the licensee's identification of the initial issue, conservative decision making in response to the event, an adequate understanding of the event and the immediate corrective actions taken in response to the conditions identified.

The inspection and report will be performed in accordance with the guidance of Inspection Procedure (IP) 88003 "Reactive Inspection for Events at Fuel Cycle Facilities," and the applicable provisions of IP 88020 "Operational Safety," and will be consistent with Management Directive 8.3 and Manual Chapter 2600. The report will be issued within 30 days of the completion of the inspection.

CONTACTS: James A. Hickey, RII/DFFI
404-997-4628

Mark S. Lesser, RII/DFFI
404-997-4700

Enclosure 2

A copy of the Charter is enclosed for your use. The objectives of the inspection are to gather information and make appropriate findings and conclusions in the areas listed in the Charter. These results will be used as a basis for any necessary follow-up action. As indicated in the Charter, the foremost objectives are to determine the safety implications and adequacy of the licensee's immediate corrective actions for the issues which resulted in the event.

You should notify Region II management of any potential generic issues identified as a result of this event for discussion with the Office of Nuclear Material Safety and Safeguards. Safety or security concerns identified that are not directly related to the event should be reported to the Region II office for appropriate action.

This Charter may be modified should you develop significant new information that warrants review.

Enclosure: SI Charter

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

Inspection Charter

Nuclear Fuel Services Incorporated

Unplanned Chemical Reaction

Event

On April 4, 2015, a floor supervisor smelled an odor. The supervisor notified the Plant Shift Superintendent, and while he was on the phone (cell), he observed a two liter bottle on the floor on its side with the top still secure located inside the storage cage. It appeared the bottle had a golf-ball sized hole in its side. Contents were spilled on the floor and splattered around the storage cage. The material on the floor was emitting some visible vapor. The supervisor then pulled the fire alarm and called the onsite emergency number. Fire brigade members and radiological technicians promptly responded and mitigated the chemical reaction.

The area was roped off, air samples were taken and area surveys were performed. Nasal smears and personnel survey of three individuals were additionally performed.

The containerized material was estimated to be cleaning materials (cheese cloth and gloves), some nitric acid, very little moisture if any, and some uranium. The container had been in storage for approximately two days.

Objectives

The objectives of the inspection are to: 1) review the facts surrounding the unplanned chemical reaction event; 2) assess the licensee's response; 3) evaluate the licensee's basis for immediate and long term corrective actions to prevent recurrence; and 4) assess the licensee's progress in determining a root cause. To accomplish these objectives, the following tasks will be completed.

1. Develop a complete sequence of events related to this event.
2. Determine the actual and potential safety significance.
3. Evaluate the adequacy of the licensee's response to the event, including immediate corrective actions and any compensatory measures.
4. Evaluate if the licensee had evaluated this event in the Integrated Safety Analysis or if this event is bounded by another accident sequence. If this event was evaluated determine if the licensee meets the performance requirements for this and related accident sequences.
5. Include a review of other processes on site which may be vulnerable to a similar process upset.
6. Assess the licensee's progress in conducting a root cause analysis of the event to determine if it is adequate to correctly identify direct, contributing, and root causes; likely precursors; and corrective actions to prevent recurrence.

Documentation

Document the inspection findings and conclusions in an inspection report within 30 days of the completion of the inspection.