November 14, 2013

Mr. Joseph G. Henry, President
Nuclear Fuel Services, Inc.
P. O. Box 337, MS 123
Erwin, TN 37650

SUBJECT: NUCLEAR FUEL SERVICES – U.S. NUCLEAR REGULATORY COMMISSION INSPECTION REPORT NUMBER 70-143/2013-205

Dear Mr. Henry:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine, announced nuclear criticality safety (NCS) inspection at your facility in Erwin, Tennessee, from October 21st-24th, 2013. The purpose of the inspection was to determine whether activities involving special nuclear material were conducted safely and in accordance with your license and regulatory requirements. Throughout the inspection, observations were discussed with your staff. An exit meeting was held on October 24th, during which inspection observations and findings were discussed with your management and staff.

The inspection, which is described in the enclosure, focused on the most hazardous activities and plant conditions, the most important controls relied on for safety and their analytical basis, and the principal management measures for ensuring controls are available and reliable to perform their functions relied on for safety. The inspection consisted of analytical basis review, selective review of related procedures and records, examinations of relevant NCS-related equipment, interviews with NCS engineers and plant personnel, and facility walkdowns to observe plant conditions and activities related to safety basis assumptions and related NCS controls. Based on the inspection, your activities involving nuclear criticality hazards were found to be conducted safely and in accordance with regulatory requirements.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390 of NRC's "Rules of Practice," a copy of this letter and the enclosure will be made publicly available in the public electronic reading room of the NRC's Agencywide Document Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions concerning this report, please contact Mr. Jeremy Munson of my staff at (301) 287-9148, or via e-mail at Jeremy.Munson@nrc.gov.

Sincerely,

***/RA/***

Michael X. Franovich, Chief
Programmatic Oversight
and Regional Support Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

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

Enclosure:
NRC Inspection Report 70-143/2013-205
w/Attachment: Supplementary Information

cc w/enclosure: See page 3

If you have any questions concerning this report, please contact Mr. Jeremy Munson of my staff at (301) 287-9148, or via e-mail at Jeremy.Munson@nrc.gov.

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**OFFICIAL RECORD COPY**

cc w/enclosure:

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**U.S. NUCLEAR REGULATORY COMMISSION**
**OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS**

| | |
|---|---|
| Docket No.: | 70-143 |
| License No.: | SNM-124 |
| Report No.: | 70-143/2013-205 |
| Licensee: | Nuclear Fuel Services, Inc. |
| Location: | Erwin, TN |
| Inspection Dates: | October 21st-24th, 2013, |
| Inspectors: | Jeremy Munson, Criticality Safety Inspector (Trainee)<br>Greg Chapman, Criticality Safety Inspector<br>Timothy Sippel, Criticality Safety Inspector |
| Approved by: | Michael X. Franovich, Chief<br>Programmatic Oversight<br>and Regional Support Branch<br>Division of Fuel Cycle Safety<br>and Safeguards<br>Office of Nuclear Material Safety<br>and Safeguards |

Enclosure

## EXECUTIVE SUMMARY

## NUCLEAR FUEL SERVICES, INC.
## NRC INSPECTION REPORT 70-143/2013-205

### Introduction

Staff of the U.S. Nuclear Regulatory Commission (NRC) performed a routine, announced Nuclear Criticality Safety (NCS) inspection of the Nuclear Fuel Services, Inc., (NFS) facility, License Number SNM-124, in Erwin, Tennessee, from October 21st-24th, 2013. The inspection included an onsite review of the licensee's NCS program, NCS training, NCS evaluations, NCS audits, internal NCS event review and follow-up, plant operations, and open items follow-up. The inspection focused on risk-significant fissile material processing activities and areas including the Blended Low-Enriched Uranium Processing Facility (BPF), commercial development (CD) line, and high-enriched uranium fuel fabrication.

### Results

- Unresolved Item (URI) 70-143/2013-203-01 was closed to a minor violation regarding conformance with the requirement in Title 10 of the *Code of Federal Regulations* (10 CFR) 70.72(f) that the licensee document a written evaluation providing the basis for the determination that changes do not require prior NRC approval.

- No safety concerns were identified regarding implementation of the NCS program.

- No safety concerns were identified regarding the licensee's NCS audits and weekly inspections.

- No safety concerns were identified regarding NCS training.

- No safety concerns were identified regarding the licensee's internal NCS event review and follow-up.

- No safety concerns were identified during walkdowns of plant operations.

## REPORT DETAILS

### 1.0 Summary of Plant Status

NFS produces uranium oxides from low-enriched uranium liquid, performs activities for the U.S. Navy, and conducts routine ammonia recovery processes and liquid waste treatment at its Erwin, Tennessee site. During the inspection, NFS was performing routine fuel fabrication and downblending operations with parts of the BPF and CD line area shutdown.

### 2.0 Nuclear Criticality Safety Program (IP 88015 & 88016)

a. Inspection Scope

The inspectors reviewed the licensee's NCS program and analyses to assure the safety of fissile material operations. The inspectors reviewed selected Nuclear Criticality Safety Evaluations (NCSEs) to determine that criticality safety of risk-significant operations was assured through engineered and administrative controls with adequate safety margin and prepared and reviewed by qualified staff. The inspectors interviewed licensee managers and engineers in the safety and production departments, operations engineers, and selected operators. The inspectors reviewed selected NCS-related items relied on for safety (IROFS) to determine that the performance requirements have been met for selected accident sequences. The inspectors accompanied NCS and other technical staff on walkdowns of NCS controls in selected plant areas. The inspectors reviewed selected portions of the documents listed in Section 2.2 of the Attachment.

b. Observations and Findings

The inspectors observed that the licensee had an NCS program which was independent from production and was implemented through written procedures. The inspectors also observed that the licensee NCS program reviewed process changes affecting criticality safety. The inspectors determined that, for the NCSEs reviewed, the NCSEs were performed and independently reviewed by qualified NCS engineers. Additionally, the inspectors determined that the analyses provided for subcriticality and double contingency of the systems and operations through appropriate limits on controlled parameters. The inspectors reviewed selected IROFS supporting NCS controls and determined that the IROFS corresponded to the approved analytical results, and designated controls and were adequate to meet performance requirements for the selected accident sequences. NCSEs and supporting calculations demonstrated adequate identification and control of NCS hazards to assure operations within subcritical limits.

During the review of 54T-13-0013, "NCSE for 301 RFS Calciner Furnace," the inspectors noted that credit was assigned to repeated failures of a single administrative IROFS in order to demonstrate that a nuclear criticality was highly unlikely. This administrative control, IROFS CRF-20, involves restricting enclosures to less than 12kg U metal.

In particular, an event sequence, which involved multiple U metal containers being placed in an enclosure at a given time, credited multiple failures of this control in order to demonstrate that a criticality event was highly unlikely. More than four metal containers would need to be present within the enclosure at a given time for criticality to be possible. The licensee considers the repeated failures of this IROFS as independent and therefore may be credited multiple times.

This event sequence could also involve IROFS CRF-21, an administrative control limiting the mass of U metal in a container to less than 12 kg. A mass measurement is recorded for each U metal container before the containers are placed in a storage area; however, the operator that adds the container to the enclosure verifies that the initial recorded mass is not in excess of the 12 kg limit and does not perform an independent mass measurement.

NFS did not clearly state in the double contingency argument that accident sequences could entail either multiple failures of these controls or just multiple failures of IROFS CRF-20; therefore, the inspectors identified a weakness in that the double contingency argument lacked clarity as the discussion combined controls applicable to multiple accident sequences and credited the same control multiple times without adequate justification of the independence of each subsequent control's failure. In either case, the independence of subsequent failures of the controls was not clearly justified in either the double contingency argument or risk analysis discussions. Inspectors observed that other double contingency arguments and accident sequences in the NCSE were similarly lacking in clarity and justification.

Inspectors reviewed NFS-HS-A-68, "ISA Risk Assessment Procedure," Rev 5, to determine the independence of subsequent failures of the controls in these sequences. It was determined that redundant container measurements are performed by NFS and the shipper that ensure the independence of subsequent failures of CRF-21. Also, the handling methodologies established for material retrieval and processing assure that only one container at a time would reasonably be added to the enclosures and should ensure independence of subsequent failures of CRF-20. Operators are restricted to hand carrying U metal containers and may only carry one at a time. The use of carts to transport U metal containers is prohibited in this area, and the storage of U metal in storage racks in the area is also prohibited. NFS was thus consistent with NFS-HS-A-68 in crediting these controls multiple times in the sequence.

Inspectors also noted that the justification of independence for subsequent control failures is a recurring issue as IFI 70-143/2008-208-01 was opened specifically to track this issue in 2008. While that IFI was closed in inspection report 70-143/2009-205, the fact that the same issue was identified four years later indicates that this issue, a lack of justification for independence, still exists.

While NFS has yet to utilize Scale 6.1, inspectors reviewed selected portions of the validation report, "Validation of Computer Codes for NCS for Uranium Systems with Enrichments up to 100 wt% 235U: Scale 6.1 with the V7-238 library from ENDF/B-VII, and Scale 4.4a with the 27groupNDF library form ENDF/B-IV." The inspectors did not identify any safety concerns with the validation report.

During review of the NCSEs, the inspectors noted that the licensee used less than optimal assumed values for the bounding bulk uranium metal density; in fact, two such

values were used. The inspector questioned the licensee about the basis for these values to determine if they were actually bounding. The older value was based on the void space remaining in a volume after the volume had been filled with full density metal spheres. The licensee had then applied a somewhat arbitrary factor of conservatism to obtain a 'bounding' density for bulk uranium metal. More recently, "Uranium Metal Bulk Density," (dated September 2, 2012) included a calculation of the typical value observed and included conservative assumptions in the calculation. The NCS engineer applied an additional factor of conservatism in the NCSE to obtain a 'bounding' density. This resulting value exceeded the typical values observed for bulk uranium metal density. It is, however, less than the arbitrary value previously used. The licensee NCS engineers were aware that these 'bounding' values may become non-bounding if the materials and processes were changed. Because the 'bounding' value was based on observations and conservative assumptions of material and process parameters, changes to the material type or process could result in the bounding value used for bulk uranium metal density being non-bounding or even non-conservative. The danger inherent in this practice has been previously discussed in NRC Information Notice 2004-14, "Use Of Less Than Optimal Bounding Assumptions In Criticality Safety Analysis At Fuel Cycle Facilities," (Agencywide Documents Access and Management System [ADAMS] Accession No. ML041760122). The inspectors observed that use of such less than optimal bounding assumptions is a potential weakness in the NCSEs.

c. Conclusions

No safety concerns were identified regarding the NCS program. A recurrent weakness where the justification of independence of subsequent failures of a single control in NCSEs was identified. Another potential weakness was identified in that NFS utilizes a less than optimal bounding assumption of bulk metal density in its evaluations.

## 3.0 Nuclear Criticality Safety Inspections, Audits, and Investigations (IP 88015)

a. Inspection Scope

The inspectors reviewed licensee internal audit procedures and results of the most recent NCS audits to assure that appropriate issues were identified and resolved. The inspectors accompanied licensee NCS engineers on a quarterly audit of storage racks in Building 301. The inspectors reviewed selected portions of the documents listed in Section 2.3 of the Attachment.

b. Observations and Findings

The inspectors observed that the licensee's NCS audits were conducted in accordance with written procedures. The inspectors noted that the audits were performed by NCS engineers who reviewed open NCS issues from previous audits, reviewed the adequacy of control implementation, reviewed plant operations for compliance with license requirements, procedures, and postings, and examined equipment and operations to determine that past evaluations remained adequate. The inspectors confirmed that deficiencies identified during audits were appropriately captured in the licensee's corrective action program and resolved in a timely manner.

Inspectors accompanied a qualified NCS engineer on a quarterly audit in Building 301. The audit requires an NCS engineer to verify various spacing requirements of the Building 301 storage racks by taking physical measurements. The inspectors noted that a measurement from the floor to the bottom shelf was not taken. Initially, the NCS engineer explained that this measurement was not required because the associated NCSE conservatively modeled the contents of the bottom shelf in direct contact with the floor without any spacing. A review of the NCSE, 54T-13-0016, revealed that not all of the Building 301 storage racks were modeled in this way, but rather some were modeled with spacing. Although the storage rack dimensions were field verified upon initial install, this identified a discrepancy in this particular audit flow down. The NCS engineer addressed this issue by generating PIRCS #41541, (dated October 24, 2013) to include this measurement in the audit flow down.

c. Conclusions

No safety concerns were identified regarding the licensee NCS audits.

## 4.0 Nuclear Criticality Safety Training and Qualification (IP 88015)

a. Inspection Scope

An inspector reviewed the content of general employee NCS training. The inspector interviewed licensee management concerning this training and reviewed selected portions of the documents listed in Section 2.4 of the Attachment.

b. Observations and Findings

The inspectors determined that NCS staff was actively involved in development, review, presentation, and oversight of NCS training and that NCS training is updated annually. The inspectors discussed the training of operations personnel with NCS staff, observed the operations in various areas, and discussed NCS controls with operations personnel to assess their understanding of controls for NCS. Only operators that have completed their training requirements handle fissile material or perform safety significant activities.

The annual refresher training is required as part of general employee training. The refresher contains a section on criticality safety that is developed and approved by the licensee's NCS manager. A significant change that is new to the 2013 Annual Refresher Training is the inclusion of an overview of a process criticality accident. In this case, the licensee's NCS manager chose to feature the solution criticality accident at Y-12 in 1958. In most other respects, the NCS portion of the annual refresher training remained unchanged. The training also reviews the major control parameters and hazards associated with criticality. The refresher training focuses on those control parameters that are used by the licensee and can be affected by plant personnel. The training also covers various postings and lessons learned that are applicable to NCS.

c. Conclusions

No safety concerns were identified regarding the licensee's NCS training and qualification program.

## 5.0 Nuclear Criticality Safety Event Review and Follow-up (IP 88015 & 88016)

a. Inspection Scope

The inspector reviewed the licensee response to a selection of recent internally-reported events. The inspector reviewed the progress of investigations and interviewed licensee staff regarding immediate and long-term corrective actions. The inspector reviewed selected portions of the documents listed in Section 2.5 of the Attachment.

b. Observations and Findings

The inspector reviewed selected licensee internally reported events since the last NCS inspection. The inspector determined that the licensee adequately evaluated whether or not these events were reportable to the NRC. The inspector observed that internal events were investigated in accordance with written procedures and appropriate corrective actions were assigned and tracked.

c. Conclusions

No safety concerns were identified during a review of recent licensee investigation of internal events. Corrective actions were adequately tracked by the licensee.

## 6.0 Plant Activities (IP 88015)

a. Inspection Scope

The inspectors performed plant walkdowns to review activities in progress and to determine whether risk-significant fissile material operations were being conducted safely and in accordance with regulatory requirements. The inspectors interviewed operations staff and NCS engineers both before and during walkdowns. The inspectors reviewed selected portions of the documents listed in Section 2.6 of the Attachment prior to performing the walkdowns in the following areas:

- BPF
- Naval Fuel
- CD Line

b. Observations and Findings

The inspectors verified that controls identified in NCS analyses were installed or implemented and were adequate to ensure safety. The inspectors also verified that safety was maintained for observed facility operations. The cognizant NCS engineers were knowledgeable and interacted regularly with operators on the process floors. The inspectors verified the adequacy of management measures for assuring the continued availability, reliability, and capability of safety-significant controls relied upon by the licensee for controlling criticality risks.

During a walkdown, the inspectors questioned the licensee NCS engineers and process engineers about safety related equipment tests for selected NCS controls in BPF.

The inspectors reviewed the SRE tests to verify that the tests would confirm the NCS controls remained available and reliable.

c. Conclusions

No safety concerns were identified during plant walkdowns.

## 7.0 Open Items

**IFI 70-143/2012-204-01**

This item tracks completion of investigations and corrective actions associated with, and examination of, non-destructive assay methods suitable for wet uranium accumulations in process ventilation. An electrostatically cooled High Purity Germanium detector has been approved for purchase. A request for a quote is currently being prepared. This item remains **open** pending the item's purchase and availability for use.

**IFI 70-143/2013-201-01**

This item tracks completion of corrective actions identified as "long-term" in the Problem Identification, Resolution, and Corrective System that involve programmatic non-compliances. The long term corrective actions have been screened to identify those involving programmatic non-compliances. Those identified were then either closed or reassigned a more appropriate due date. This item is **closed**.

**Unresolved Item (URI) 70-143/2013-203-01**

URI 70-143/2013-203-01, "Lack of a detailed justification for why changes do not require a license amendment," was opened and discussed in NRC Inspection Report 70-143/2013-203 (ADAMS Accession No. ML13190A150).

The licensee uses NFS-HS-A-67-A, "Safety & Regulatory Review Routing Forms" to document the 10 CFR 70.72 evaluations. Form NFS-HS-A-67-A requires the relevant personnel (e.g. the NCS engineer) who are performing the 70.72 evaluation to document a YES or NO answer to the questions required by 70.72(c); however, the licensee's form does not require the reviewers to document the basis for the determination that the changes do not require prior Commission approval. Occassionally, reviewers do provide a basis in the comment section, but this isn't required. Licensee management stated that they consider the engineering and safety documentation associated with a proposed change and the knowledge of the personnel performing the 70.72 evaluation to contain the basis for the determination; however, no other written documentation addresses the questions required by 70.72(c). The rest of the change package documentation addresses various safety, engineering, and implementation issues which are significant and important. The inspectors acknowledge that it may be possible to recreate the basis for the determination from the change package documentation, but there would be no way to assure that the recreated basis is the same as the initial reviewer's basis. The reviewers are required to have a basis for their determination and can possibly be questioned about the basis later. Neither of these constitute "a written evaluation that provides the bases for the determination that the changes do not require prior Commission approval [which] must be maintained until termination of the license," as

required by 10 CFR 70.72(f). The licensee's procedures fail to require the reviewers to provide a written basis for their determination that a change doesn't require prior Commission approval. This failure is a minor violation because the NRC has thus far not found any examples of this failure contributing to an incorrect determination of whether a change needs prior approval. Although this issue should be corrected, it constitutes a violation of minor significance that is not subject to enforcement action in accordance with Section IV of the NRC Enforcement Policy. This item is **closed.**

## 8.0 Exit Meeting

The inspector presented the inspection results to members of the licensee's management and staff, including Mr. Randy Shackelford, during an exit meeting on October 24th, 2013. The licensee acknowledged and understood the findings as presented.

## SUPPLEMENTARY INFORMATION

### 1.0 List of Items Opened, Closed, and Discussed

| Item Number | Status | Description |
|---|---|---|
| **IFI 70-143/2012-204-01** | Discussed | This item tracks completion of investigations and corrective actions associated with, and examination of, NDA methods suitable for wet uranium accumulations in process ventilation. |
| **IFI 70-143/2013-201-01** | Closed | This item tracks completion of corrective actions identified as "long-term" in the Problem Identification, Resolution, and Corrective System that involve programmatic non-compliances. |
| **URI 70-143/2013-203-01** | Closed | Lack of a detailed justification for why changes do not require a license amendment. |

### 2.0 Key Documents Reviewed:

Inspectors reviewed selected aspects of the following documents. Documents that apply to multiple sections are listed in the section that is most applicable.

### 2.1 Plant Status

Not Applicable

### 2.2 Nuclear Criticality Safety Program (IP 88015 & 88016)

- NFS-HS-A-63, Rev 5, "Verification and Validation of Nuclear Criticality Safety Analysis Codes," January 16, 2013.
- NFS-HS-A-68, Rev 5, "ISA Risk Assessment Procedure," April 16, 2012.
- "Uranium Metal Bulk Density," dated September 2, 2012.
- "Validation of Computer Codes for NCS for Uranium Systems with Enrichments up to 100 wt% $^{235}U$: Scale 6.1 with the V7-238 library form ENDF/B-VII, and Scale 4.4a with the 27groupNDF4 library from ENDF/B-IV," Rev. 0, December 12, 2012.
- "Nuclear Criticality Safety Evaluation for 301 RFS Calciner Funace," Rev 5, June 2013.
- 54T-13-0011, "Nuclear Criticality Safety Evaluation for the Dissolution of Uranium and High Enriched Uranium Storage Columns," Rev. 19, dated July 2013.
- 54T-13-0019, "Nuclear Criticality Safety Evaluation for the Dissolution of Uranium and High Enriched Uranium Storage Columns," Rev. 20, dated September 2013.
- 54T-13-0013.
- SOP 409-71, Rev 17.

### 2.3 Nuclear Criticality Safety Inspections, Audits, and Investigations (IP 88015)

- PIRCS #41541, dated October 24, 2013.
- 21T-06-1956, dated November 27, 2006.
- 21T-12-0948, dated August 6, 2012.
- 21T-13-1047, dated July 18, 2013.
- 21T-13-1055, dated July 17, 2013.
- 21T-13-1106, dated July 12, 2013.
- 21T-13-1137, dated July 31, 2013.
- 21T-13-1152, dated August 6, 2013.
- 21T-13-1161, dated August 9, 2013.
- 21T-13-1166, dated August 13, 2013.
- 21T-13-1171, dated August 14, 2013.
- 21T-13-1173, dated August 14, 2013.
- 21T-13-1175, dated August 15, 2013.
- 21T-13-1176, dated August 19, 2013.
- 21T-13-1181, dated August 19, 2013.
- 21T-13-1184, dated August 19, 2013.
- 21T-13-1187, dated August 21, 2013.
- 21T-13-1190, dated August 22, 2013.
- 21T-13-1196, dated August 26, 2013.
- 21T-13-1206, dated August 29, 2013.
- 21T-13-1261, dated September 25, 2013.
- 21T-13-1271, dated October 2, 2013.
- 54T-13-0016, dated August 13, 2013.
- 54T-13-0017, dated August 2, 2013.

### 2.4 Nuclear Criticality Safety Training and Qualification (IP 88015)

- 27T-12-0144, “2012 Annual Refresher Training” dated October 2012.
- 27T-13-0135, “2013 Annual Refresher Training” draft dated September 2013.

### 2.5 Nuclear Critically Safety Event Review and Follow-up (IP 88015 & 88016)

- PIRCS #40378, dated July 16, 2013.
- PIRCS #40380, dated July 16, 2013.
- PIRCS #40385, dated July 16, 2013.
- PIRCS #40661, dated August 6, 2013.
- PIRCS #40665, dated August 1, 2013.
- PIRCS #40748, dated August 12, 2013.
- PIRCS #41195, dated September 24, 2013.
- PIRCS #41393, dated October 13, 2013.
- PIRCS #41460, dated October 17, 2013.
- CA #4053, dated June 24, 2013.
- CA #20618, dated as ongoing.
- CA #20619, dated August 16, 2013.
- CA #20624, dated October 16, 2013.
- CA #21004, dated September 12, 2013.

- INV #16516, dated July 24, 2013.
- INV #16613, dated August 19, 2013.
- INV #16765, dated September 26, 2013.

### 2.6 Plant Activities

Documents listed in other sections were reviewed related to facility walkdowns. In addition, the inspectors reviewed:

- SRE Test: N333LVLALARM3F04, dated November 6, 2012.
- SRE Test: N333DISSLVLSYSB, dated April 5, 2013.

### 2.7 Open Items

- NFS-GH-44, "Evaluation and Implementation of Internally Authorized Changes (IACs)," Rev. 14, dated June 20, 2013.
- NFS-GH-901, "Configuration Management Program," Rev. 17, dated July 8, 2012.
- NFS-HS-A-67-A, "Safety & Regulatory Review Routing Forms" Various examples.
- NFS-HS-A-68, "ISA Risk Assessment Procedure," Rev 3, Effective Date March 24, 2004.
  - Attachment A, "Independence Criteria Guidance."
- NFS-HS-A-68, "ISA Risk Assessment Procedure," Rev 4, Effective Date October 26, 2007.
  - Attachment III, "Independence Criteria Guidance."
- NFS-HS-A-68, "ISA Risk Assessment Procedure," Rev 5, Effective Date April 12, 2012.
  - Attachment III, "Independence Criteria Guidance."
- IAC Package 792, "Building 130 Remediation."
- IAC Package 870, "TMT Clinkers and Screenings."

### 2.8 Exit Meeting

Not Applicable

## 3.0 Inspection Procedures Used

| | |
|---|---|
| IP 88015 | Nuclear Criticality Safety Program |
| IP 88016 | Nuclear Criticality Safety Evaluations and Analyses |

## 4.0 Key Points of Contact

**NFS**

| | |
|---|---|
| S. Sanders | Training Manager |
| N. Brown | NCS Manager |
| R. Shackelford | Manager, Nuclear Safety & Licensing |
| J. Nagy | CNSO |
| J. Wheeler | Projects and Construction Section Manager |

**NRC**

| | |
|---|---|
| Jeremy Munson | Criticality Safety Inspector (NSPDP), NRC Headquarters |
| Timothy Sippel | Criticality Safety Inspector, NRC Headquarters |
| Greg Chapman | Criticality Safety Inspector, NRC Headquarters |
| Charlie Stancil | Sr. Resident Inspector, RII |
| Nick Peterka | Resident Inspector, RII |

All attended the exit meeting on October 24, 2013.

## 5.0 List of Acronyms and Abbreviations

| | |
|---|---|
| BLEU | blended low-enriched uranium |
| BPF | BLEU preparation facility |
| CA | corrective action |
| CAP | corrective action program |
| CD | Commercial Development |
| CDL | commercial development line |
| HEU | high-enriched uranium |
| HEPA | high-efficiency particulate air |
| HPGe | High Purity Germanium |
| IFI | inspector follow-up item |
| IP | inspection procedure |
| ISA | integrated safety analysis |
| NCS | Nuclear Criticality Safety |
| NCSE | nuclear criticality safety evaluation |
| NDA | non-destructive assay |
| NFS | Nuclear Fuel Services, Inc. (licensee) |
| NRC | U.S. Nuclear Regulatory Commission |
| PIRCS | Problem Identification, Resolution, and Corrective System |
| QA | Quality Assurance |
| SOP | Standard Operating Procedure |
| SRE | safety related equipment |
| SNM | Special Nuclear Material |
| U | Uranium |
| UNB | Uranyl Nitrate Building |