



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

March 16, 2009

Mr. David Kudsin
President
Nuclear Fuel Services, Inc.
P. O. Box 337, MS 123
Erwin, TN 37650

SUBJECT: NRC INSPECTION REPORT NO. 70-143/2009-005

Dear Mr. Kudsin:

This letter refers to the team inspection conducted from January 26 - 30, 2009, at the Nuclear Fuel Services (NFS) facility in Erwin, TN. The purpose of the inspection was to determine whether activities authorized under the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspections, the findings were discussed on January 30, 2009, with those members of your staff identified in the enclosed report.

The inspection consisted of a focused examination of operations, radiation protection, and maintenance and surveillance activities in the BPF. The specific items examined during the inspection are identified in the enclosed report. The inspection was conducted through a selective examination of procedures and representative records, observations of activities in progress, and interviews with personnel. Programmatic aspects of areas reviewed were examined to determine if there were safety significant findings or weaknesses presenting challenges to the NFS safety culture program.

The inspection was conducted as part of NRC's enhanced oversight of NFS's implementation of its Safety Culture Improvement Plan which was submitted to NRC on May 15, 2008. The NRC is currently formulating plans for its own independent evaluation of safety culture at NFS. Information and observations gathered during the onsite inspection described in the attached report will be considered as NRC further develops the scope and timing of its independent review of safety culture.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, and its enclosure will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

D. Kudsin

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Should you have any questions concerning this inspection, please contact us.

Sincerely,

/RA/

D. Charles Payne, Chief
Fuel Facility Inspection Branch 1
Division of Fuel Facility Inspection

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

Enclosure: NRC Inspection Report No. 70-143/2009-005

cc w/encl:
Timothy Lindstrom
Vice President, Operations
Nuclear Fuel Services, Inc.
Electronic Mail Distribution

B. Marie Moore
Director
Safety and Regulatory Management
Nuclear Fuel Services, Inc.
Electronic Mail Distribution

Lawrence E. Nanney
Director
TN Dept. of Environment & Conservation
Electronic Mail Distribution

D. Kudsin

cc w/encl (Cont.):
William D. Lewis
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 39
Unicoi, TN 37692

Distribution w/encl:
PUBLIC

S. Burris, RII
M. Tschlitz, NMSS
N. Baker, NMSS
P. Habighorst, NMSS
C. Payne, RII
M. Crespo, RII
G. Smith, RII
K. Ramsey, NMSS

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ADAMS: Yes ACCESSION NUMBER: ML09760109 SUNSI REVIEW COMPLETE

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 70-143

License No.: SNM-124

Report No.: 70-143/2009-005

Licensee: Nuclear Fuel Services, Inc.

Facility: Erwin Facility

Location: Erwin, TN 37650

Dates: January 26 - 30, 2009

Inspectors: M. Crespo, Senior Fuel Facility Inspector
A. Gooden, Senior Fuel Facility Inspector
P. Startz, Fuel Facility Inspector

Accompanying
Personnel: D. Charles Payne, Chief, Fuel Facility Inspection Branch 1

Approved by: D. Charles Payne, Chief
Fuel Facility Inspection Branch 1
Division of Fuel Facility Inspection

Enclosure

EXECUTIVE SUMMARY

Nuclear Fuel Services, Inc.
NRC Inspection Report 70-143/2009-005

This regional initiative inspection involved observation of work activities, a review of selected records, and interviews with personnel involved in the implementation of the BLEU Preparation Facility (BPF) operations, radiation protection, and maintenance and surveillance. Three inspection procedures (IPs) were used to focus evaluation efforts: Operational Safety (IP 88020), Maintenance and Surveillance of Safety Controls (IP 88025), and Radiation Protection (IP 88030).

Within the areas examined, the following observations were noted below:

Operational Safety

- The licensee's operators in BPF performed their responsibilities according to procedure (Paragraph 2).

Maintenance and Surveillance of Safety Controls

- The licensee's actions with regard to maintenance activities adequately focused on the improvement of safety margins with a focus on process equipment reliability. The licensee's testing records adequately documented the functional tests of safety significant controls (Paragraph 3.a).
- The licensee's actions demonstrated a weakness in the timely submission of reviews. The licensee demonstrated adequate pre-job planning for actions involved in the safety related equipment testing (Paragraph 3.b).
- The licensee has improved participation of employees in the corrective action system and has plans to make further improvements (Paragraph 3.b).

Radiological Protection

- The licensee adequately supported the radiation protection program based on the availability of appropriate equipment for the area. However, the licensee demonstrated a weakness when a radiation technician (RT) requested assistance to locate unique survey locations due to lack of refresher training (Paragraph 4.a).
- The licensee had implemented initiatives with procedures and training to further reduce external exposures in BPF to well below the limits for occupational exposure. A minor violation was identified for the failure to return a lapel air sampler to the appropriate storage location following use (Paragraph 4.b).
- A maintenance worker signed that he had read, acknowledged, and understood a special work permit (SWP) but mistakenly dated it for a date four days after conducting the work. The licensee corrected an inadequate access control/step-off area identified by the inspectors for an area outside the waste water treatment facility (Paragraph 4.c).

- The licensee adequately implemented the contamination control program (Paragraph 4.d).
- The ALARA program was being implemented in accordance with requirements. Some RTs were hesitant in initiating stop orders for potential operational safety issues (Paragraph 4.e).
- Corrective actions for the items that were reviewed from the safety culture assessment were adequate for closure (Paragraph 4.f).

Attachment

Partial List of Persons Contacted

Inspection Procedures Used

List of Items Opened, Closed, and Discussed

REPORT DETAILS

1. Summary of Plant Status

Blended Low Enriched Uranium (BLEU) Preparation Facility (BPF) operations were operating normally.

2. Operations (88020)

(1) Inspection Scope and Observations

The inspectors reviewed actions by operators and supervisors in the BPF to assess the licensee's compliance with procedural requirements. The inspectors had been briefed that most of the licensee's planned safety culture initiatives had not yet been implemented in BPF operations. A significant focus of the inspection was placed on operations in the uranium aluminum area (UAL), which had recently been experiencing operational upset conditions. The dissolvers for the UAL system had been clogging and causing material to back-up into the overflow columns. These operational upsets had occurred several times over the week prior to the inspection. Each overflow situation placed a significant burden on the operations staff because each of the overflow lines are safety related equipment. The overflow lines had to be inspected for clogs following each upset which requires setting up a radiological controlled area for each inspection. The inspectors discussed the actions the operations and engineering team had taken to prevent recurrence and determined that the licensee was taking an active approach in attempting to stay ahead of the issue. For example, the level probes for the product column were replaced due to faulty readings. Despite this initiative, another overflow situation occurred during the week of the inspection. While performing a water rinsing operation, an operator manipulated a spring-loaded water valve allowing water to rinse through the system. Unknown to the operator, the newly replaced level probe had failed and did not annunciate the high level alarm. Shortly thereafter, the high-high level alarm did annunciate, but the operator did not have visual access to the alarm panel to verify if the alarm corresponded to his equipment. Consequently, another overflow situation occurred requiring a halt in operations and another inspection of the safety related overflow lines.

The inspectors reviewed standard operating procedure (SOP) 409, Section 10, Revision 23, "Uranium Aluminum Dissolution" which the operator used to rinse the UAL system. The inspectors noted two potential weaknesses in the procedure regarding the rinsing process. First, the procedure instructed the operator to cease water addition upon hearing the high level alarm (which had failed in this most recent case). The high-high level alarm was not mentioned in the procedure and it did not successfully alert the operator to halt the addition of water. Second, the operation required the operator to physically hold the valve open. The alarm panel was on the other side of the UAL station. Therefore, the operator did not have visual access to the alarm panel. Without visual access to the alarm panel to determine the specifics of an alarm, the operator depended solely on audio cues. Also, the procedure did not specify any requirement or recommendation for having two operators to perform this process to compensate for this equipment arrangement.

The inspectors anticipated that the recent spills in the UAL area would have generated a more conservative or questioning attitude with regard to responding to alarms. Instead, the operator rinsing the UAL station assumed the high-high alarm did not apply to him. This non-conservative assumption was confirmed by the reading from the newly replaced level probe that indicated that the product column was nearly empty. However, the level probe had failed so the operator's basis for action was based on incorrect readings. In response to recent number of overflows in the area, the licensee stated that a causal analysis was planned to be performed to assess the proper course of action to minimize these upsets in the future, but the causal analysis had not been completed before the end of the inspection.

The inspectors recognize that the UAL area has had several modifications and design improvements over the years to improve steady-state operations. However, the inspectors noted that the predominant operator and supervisor attitude recently was to work through operational challenges due to a limited amount of input material remaining to be processed. This attitude to persevere through the problems was necessary because the remaining material was recognized as being the most difficult to process and process shutdowns were expected. However, the inspectors did not identify any specific examples of potential improvements that had been denied. Process engineers were noted to be responsive to minor equipment upgrades identified to improve the operations of the system.

The inspectors attended several shift turnover briefings in the BPF and noted that the supervisors had formalized a meeting for communicating the status of the area to the on-coming supervisors. The inspectors noted that operators were not included in these meetings nor did they conduct their own shift turn-over meeting. When the inspectors communicated this observation to the licensee, the licensee stated it had plans to improve operator turnovers to ensure that plant status elements were adequately communicated to the operations staff.

(2) Conclusions

The licensee's operators in BPF performed their responsibilities according to procedure.

3. **Maintenance and Surveillance (88025)**

a. **Maintenance Implementation**

(1) Inspection Scope and Observations

The inspectors observed ongoing activities and evaluated the findings, violations, and items captured in the licensee's Problem Identification, Resolution, and Correction System (PIRCS) database for the previous six months.

The inspectors reviewed progress by the maintenance department in achieving its commitments as identified in the safety culture crosswalk (which captures the recommendations in the Safety Culture Assessment by the Safety Culture Board of Advisors (SCuBA)). Maintenance department goals included: (1) the identification and planned repairs of operator burdens/work-arounds/degraded conditions; (2) purchase and incorporation of software that would tie together various other related programs and processes to improve work control; and (3) a comprehensive work management

process/system to establish a more formal and reliability-centered operations structure. The maintenance manager estimated that the three main departmental goals were approximately 40 to 50% complete.

The maintenance manager also reported additional progress with the distribution of a new "Human Performance Handbook" to maintenance mechanics. During weekly maintenance meetings, the maintenance manager reviews and discusses at least one subject from the handbook. The program is designed to: (1) reduce the frequency and severity of events and (2) systematically evaluate human performance and/or equipment shortfalls in order to devise and implement relevant improvements in work processes and/or equipment improvements. A new human performance project director is currently developing and will be expanding the program plant wide. The inspectors noted the importance of the human performance initiatives within the NFS safety culture program and senior management's personal promotion of these issues directly with hourly personnel.

The inspectors reviewed fourteen records of previously completed functional tests of safety related equipment and items relied on for safety (IROFS) in the BPF facility. The review targeted process hardware such as valves, condensers, and a variety of instrumentation. The records were evaluated to determine if: test records reflected that required tests were completed; test rigor was relevant and adequate; records were properly completed; and testing had been completed on time. The inspectors determined that this group of functional tests was relevant and that test records were completed in accordance with licensee requirements.

(2) Conclusions

The licensee's actions with regard to maintenance activities adequately focused on the improvement of safety margins with a focus on process equipment reliability. The licensee's testing records adequately documented the functional tests of safety significant controls.

b. Surveillance and Calibration Testing Implementation

(1) Inspection Scope and Observations

Inspectors observed a functional evaluation of safety-related equipment identified as N333XDRAIN1A09 and N333XDRAIN1A10 using the procedure for equipment number N333OVRFLO1F04B number IROFS 333-UALUMN, Revision 2. The activity included the disassembly and visual inspection of two liquid drains for glove box enclosure ENCLOS-1A06. Work control procedures for this functional evaluation were considered adequate. Pre-job planning involving operations personnel, the RT, and the supervisor were observed considered adequate. Radiological preparations included appropriate personal protective equipment for the individuals performing the work, establishment of a controlled area posted with an appropriate radiological work permit, notification of other personnel who were working in areas below the glove box, and direct support from the supervisor. Operations personnel and supervisors appeared knowledgeable and prepared for performing the functional evaluation, and the activities were completed without incident. The operators performed the work activities in a disciplined manner. An example of the degree of preparation included operators' use of bottles to capture

residual liquids drained from pipe connections that otherwise could have leaked and possibly fallen onto personnel stationed on a lower level work area.

The inspector reviewed PIRCS report ID 14404 concerning functional testing of safety-related instrumentation. The corrective actions stemmed from the failure of personnel to immediately forward completed forms to the ISA department for closure. Two days after the tests were completed, a follow up search was able to recover the forms. Licensee personnel properly identified the problem, made the correct notifications to production management, and entered the problem into PIRCS. The apparent cause of personnel not promptly delivering the completed forms to the ISA department was lack of knowledge regarding the procedural requirement. No other significant issue was noted with the licensee's actions.

(2) Conclusions

The licensee appropriately responded to an issue involving the lack of timely submittal of reviews. The licensee demonstrated adequate pre-job planning for actions involved in the safety related equipment testing.

c. **Maintenance Problem Identification and Resolution**

(1) Inspection Scope and Observations

The inspector reviewed PIRCS entry reports and noted that a large portion of recent entries were made by supervisors as opposed to hourly personnel who often directly experience a relevant issue or failure. The licensee was aware of the need to improve employee participation in the corrective action program, especially hourly personnel. To address this issue, the licensee has initiated multiple new programs aimed at improving salary and hourly employee participation. The programs are listed as follows:

- Implementation of a human performance program that includes human performance training, tools, and processes.
- Installed additional computers in lunch rooms and implemented a new anonymous paper-based option to encourage hourly employees to make PIRCS entries.
- Enhanced the PIRCS system to include an optional end-of-action questionnaire. The questionnaire is designed to obtain feedback from participants on how the process worked.
- Initiated a new "good catch" reward program that includes a gift certificate for personnel who submit significant safety concerns in PIRCS. In addition, participants may also be recognized in the company's monthly news letter.

The licensee's efforts to increase hourly employee's participation in the PIRCS program has achieved progress as evidenced in the nearly three-fold increase in PIRCS entries since 2006. Licensee management observed additional progress especially after hourly employees had completed the human performance training courses. The training courses are still ongoing.

(2) Conclusions

The licensee has improved participation of employees in the corrective action system and has plans to make further improvements.

4. **Radiation Protection (88030)**

a. **Radiation Protection Program Equipment**

(1) Inspection Scope and Observations

Fixed and portable equipment used for detecting the presence of radioactive material was examined to determine if the selected equipment was calibrated, adequately maintained, and reliable to perform the intended safety function. The inspectors interviewed and observed the performance of radiation protection personnel conducting radiation surveys, air sample collection, and sample analysis. The appropriate equipment resources were available for measuring the type of material being processed in BPF and the scheduling of equipment maintenance and operability checks were performed in accordance with procedure requirements. The Radiation Technician (RT) performing the dose rate surveys and checking postings was familiar with the equipment operability, calibration requirements, and area posting requirements. The inspectors noted an RT performing the dose rate surveys was unfamiliar with a survey location called for on the survey form. When questioned by the inspectors regarding the lack of familiarity with BPF, the technician indicated that he was recently reassigned from a another location and no opportunity was provided to observe another technician perform the BPF survey, nor was a briefing provided regarding BPF survey points by the RT supervisor.

(2) Conclusions

The licensee adequately supported the radiation protection program based on the availability of appropriate equipment for the area. However, the licensee demonstrated a weakness when an RT requested assistance to locate unique survey locations due to lack of refresher training

b. **Exposure Controls**

(1) Inspection Scope and Observations

The inspectors discussed the BPF personnel monitoring program, performed BPF walk-downs of potentially significant exposure work areas, and discussed with a licensee representative the on-site personnel exposure data to determine if exposures were in compliance with 10 CFR Part 20 limits and maintained As Low As Reasonably Achievable (ALARA). The inspectors determined from documentation and interviews that the material currently being processed in BPF was a major contributor to external dose. In response, the licensee increased the dose rate survey frequency, implemented an electronic dosimeter station to provide real-time dose information to BPF workers, emphasized training on the ALARA concept of time distance and shielding, and posted the dose rate survey results at various locations inside BPF. The inspectors noted that these as positive safety initiatives for external exposure control.

The inspectors reviewed the maximum assigned exposure for personnel assigned to the BPF for calendar year 2008, and based on three quarters of data, found that exposures were significantly less than the occupational limits of 10 CFR 20.1201.

The inspectors conducted frequent tours of the BPF to verify that personnel were wearing the appropriate dosimetry and following the special work permit (SWP) requirements for controlling exposure. The inspectors observed that a maintenance worker was assigned a lapel air sampler for use while performing maintenance activity. Subsequently, the inspectors noted during a later tour that the lapel sampler had been left on a potentially contaminated surface, well after the maintenance activity had been completed. This action by the worker was inconsistent with requirements in Procedure NFS-GH-29, "Proper Use and Handling of Lapel Samplers." The referenced procedure requires the lapel air samplers be placed in the designated storage area (shelf or container) when leaving the work area. This observation was brought to the attention of a RT, who then took the appropriate response and placed the lapel in the designated area for processing. The licensee entered the finding into PIRCS (P17059). The corrective actions involved the notification of the operations and maintenance groups of the designated area to which the lapel air samplers were to be returned. This failure constituted a violation of minor significance and will not be subject to formal enforcement action.

(2) Conclusions

The licensee had implemented initiatives with procedures and training to further reduce external exposures to well below the limits for occupational exposure. A minor violation was identified for the failure to return a lapel air sampler to the appropriate storage location following use.

c. Postings, Labeling, Control

(1) Inspection Scope and Observations

The inspector reviewed the licensee's program for posting as required by 10 CFR 20.19 to determine if area postings were consistent with the radiation survey results, the requirements in 10 CFR Part 20, and the license application. The inspectors reviewed dose rate survey data as posted inside the BPF, and toured selected areas where the measurements were made to conduct an independent survey and verify that the licensee had properly posted the area. No issues were identified. Areas were posted consistent with survey results. Several work locations were also reviewed to assess general work practices, the adequacy of contamination control barriers, and the posting of SWPs as required by 10 CFR 20.1902. SWPs were reviewed to determine the adequacy of the requirements posted for worker protection and the degree to which those requirements were being implemented. The SWPs generally communicated the appropriate safety information and no examples were observed where workers did not follow the SWP requirements.

Three observations resulted from the review and were discussed with the licensee. The inspectors noted during the facility walk-down that a maintenance worker signed and mistakenly dated SWP 09-33-009 as having been read, acknowledged, and understood on January 30, 2009, rather than the date actual work was performed on January 26, 2009. The inspectors observed a contamination control area posting outside the waste

water treatment facility which was properly posted to control contamination but incorrectly established. Storage bins containing clean protective shoe covers were located inside rather than outside the area of potential contamination. In response to the inspectors' observations, the licensee took prompt actions to move the container to outside the posted area. Contamination control at this location was implemented through the use of a solid yellow line painted on the steps leading down to the area of potential contamination. The yellow line served as the demarcation point for the border of the contaminated area. The inspectors noted that the yellow line was weathered, barely visibly and in need of repainting.

(2) Conclusions

A maintenance worker signed that he had read, acknowledged, and understood a SWP but mistakenly dated it for a date four days after conducting the work. The licensee corrected an inadequate access control/step-off area identified by the inspectors for an area outside the waste water treatment facility.

d. Surveys

(1) Inspection Scope and Observations

The contamination control survey program was reviewed to determine if surveys were effective in the identification of contamination and performed in accordance with procedures. The inspectors observed personnel performing contamination surveys in addition to reviewing a limited number of BPF surveys for areas with potential for contamination. Surveys (both routine and special) were performed in accordance with the license application requirements. In the event contamination action limits were exceeded, prompt and effective actions were taken to decontaminate to acceptable levels.

(2) Conclusions

The licensee adequately implemented the contamination control program.

e. As Low As Is Reasonably Achievable (ALARA)

(1) Inspection Scope and Observations

The licensee's ALARA program was reviewed to determine if the program and ALARA goals were being developed and implemented in accordance with the license. The inspectors reviewed documentation and interviewed workers to determine their understanding of ALARA, and management's commitment to ALARA. The inspectors determined that all interviewed workers were familiar with the term ALARA and the concepts of time, distance, and shielding. The inspectors reviewed documentation in support of the licensee's annual ALARA goal setting activities which identified the areas of potential exposure, trends in exposure, and initiatives to reduce exposure. The inspectors questioned randomly selected workers to determine what their understanding was regarding ALARA. In every case the answer was associated with less exposure. During interviews with RTs, the inspectors determined that they fully understood ALARA and their important role in implementing the ALARA program. However, some RTs expressed a lack of empowerment to halt operations that might be unsafe. These RTs

did not believe they had the authority to initiate a stop in operations when conditions warranted. Nor did they feel empowered to correct inappropriate actions by operators or maintenance personnel due to the perceived lack of support and commitment to excellence when prior issues had been raised to management. In response to the observation, the licensee stated that the safety culture training of RTs would be conducted before summer. In addition, the licensee would re-emphasize with the RTs their roles and responsibilities.

(2) Conclusions

The ALARA program was being implemented in accordance with requirements. Some RTs were hesitant in initiating stop orders for potential operational safety issues.

f. **Radiation Protection Problem Identification and Resolution**

(1) Inspection Scope and Observations

The inspector reviewed a limited number of PIRCS commitments and corrective actions taken by the licensee in the radiation protection area in response to the independent safety culture self-assessment to determine if actions were effective for closing the item. Based on interviews and records reviewed, radiation protection items were being assigned, tracked, and followed to completion.

(2) Conclusions

Corrective actions for the items that were reviewed from the safety culture assessment were adequate for closure.

5. **Exit Meeting**

The inspection scope and results were summarized on January 30, 2009, with those persons indicated in the attachment. Although proprietary documents and processes were occasionally reviewed during this inspection, the proprietary nature of these documents or processes have not been included in this report. No dissenting comments were received from the licensee.

ATTACHMENT

1. PERSONS CONTACTED

Partial List of Licensee's Persons Contacted

T. Lindstrom, Vice President, Operations
M. Moore, Director, Safety & Regulatory
R. Droke, Licensing Director
M. Tester, Sr. Manager, Radiation Control
B. Clause, Health Physicist
D. Coulter, Health Physicist
R. Rice, Supervisor, Radiation Technicians
D. Rogers, Building 333 Manager

2. INSPECTION PROCEDURES USED

IP 88020	Operational Safety
IP 88025	Maintenance and Surveillance of Safety Controls
IP 88030	Radiation Protection

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

<u>Item Number</u>	<u>Status</u>	<u>Type/Description</u>
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None