May 11, 2009

Ms. B. Marie Moore, Vice President
Safety and Regulatory
Nuclear Fuel Services, Inc.
P.O. Box 337, MS 123
Erwin, TN 37650

SUBJECT: AMENDMENT 88 TO LICENSE SNM-124: AUTHORIZATION TO PROCESS URANIUM FLUORIDE COMPOUNDS IN THE CD LINE (TAC L32653)

Dear Ms. Moore:

In accordance with your application dated August 31, 2007, as supplemented by your letters dated June 19, October 20, November 7, November 10, December 5, 2008; and January 22, February 6, and April 15, 2009; and e-mail summaries of conference calls on July 17, July 29, August 6, August 12, December 3, 2008, and January 15, 2009, and pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 70, Materials License SNM-124 is hereby amended to authorize the processing of uranium fluoride compounds in the new commercial development (CD) line. Accordingly, Safety Condition S-1 has been revised to include the dates of the application and the supplemental information. In addition, the following condition has been added:

S-54 Introduction of uranium hexafluoride into the CD Line shall not occur until the Commission completes an operational readiness review to verify that (1) commitments in the amendment request have been fulfilled, (2) management measures for items relied on for safety have been implemented, (3) the CD Line has been constructed in accordance with design requirements, and (4) other actions necessary for safe operations are complete.

All other conditions of this license shall remain the same.

By approval of this amendment request, TAC L32653 will be closed.

If you have any questions concerning this letter, please contact Kevin Ramsey of my staff by phone at (301) 492-3123, or via e-mail to kevin.ramsey@nrc.gov.

Documents transmitted herewith contain OFFICIAL USE ONLY information. When separated from the sensitive conditions in Enclosure 1, this document is DECONTROLLED

In accordance with 10 CFR 2.390 of the U.S. Nuclear Regulatory Commission's (NRC) "Rules of Practice," a copy of this letter, the safety evaluation report and the non-sensitive portion of the license will be available electronically for public inspection in the NRC Public Document Room and the Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible through the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room). The sensitive conditions to the license will be withheld from the public.

Sincerely,

/RA/

Michael D. Tschiltz, Deputy Director
Fuel Facility Licensing Directorate
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

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

Enclosures: As stated

In accordance with 10 CFR 2.390 of the U.S. Nuclear Regulatory Commission's (NRC) "Rules of Practice," a copy of this letter, the safety evaluation report and the non-sensitive portion of the license will be available electronically for public inspection in the NRC Public Document Room and the Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible through the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room). The sensitive conditions to the license will be withheld from the public.

Sincerely,

/RA/

Michael D. Tschiltz, Deputy Director
Fuel Facility Licensing Directorate
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

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

Enclosures: As stated

CLOSE TAC L32653

DISTRIBUTION:

FMB r/f	M.Crespo, RII	G.D.Smith, RII
S.Burris, RII	M.Baker	B.Purnell, TSB
K.Kline. DWMEP	M.Bartlett, AFCB	A.Luebbering, MODB
J.Downs, ECB	R. Hannah, RII	D.McIntyre, OPA

ML090490664

OFC	FMB	FMB	FMB	FFLD
NAME	K.Ramsey	V.Williams	P.Habighorst	M.Tschiltz
DATE	04/27/09	4/28/09	4/29/09	5/11/09

OFFICIAL RECORD COPY

DOCKET: 70-143

LICENSEE: Nuclear Fuel Services, Inc.
Erwin, Tennessee

SUBJECT: SAFETY EVALUATION REPORT: AUTHORIZATION TO PROCESS URANIUM FLUORIDE COMPOUNDS IN THE NEW COMMERCIAL DEVELOPMENT (CD) LINE (TAC L32653)

1.0 BACKGROUND

By letter dated August 31, 2007, as supplemented by letters dated June 19, October 20, November 7, November 10, December 5, 2008; and January 22, February 6, and April 15, 2009; and summaries of conference calls on July 17, July 29, August 6, August 12, December 3, 2008, and January 15, 2009; and e-mails dated February 11, 2009, Nuclear Fuel Services, Inc. (NFS) requested authorization to process uranium fluoride compounds in a new commercial development (CD) Line at its facility. The staff evaluated this amendment request in accordance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 70.

2.0 DISCUSSION

2.1 General Information

Facility and Process Description

The new CD Line will be assembled in Building 301, an existing building in the 300 Complex at the NFS facility in Erwin, Tennessee. The process equipment is small scale and will be housed inside glove boxes. The process operations will convert highly-enriched uranium (HEU) in the form of uranium fluoride compounds to either uranium oxide or uranyl nitrate. The HEU is on-site already and stored in 5A or smaller containers. The higher enriched material ($\geq$ 94 weight percent uranium-235) will be sublimated and converted to UO_2F_2 solution, precipitated to ammonium diuranate cake, calcined to uranium oxide, packaged and shipped to the U.S. Department of Energy (DOE) Y-12 facility in Oak Ridge.

The lower enriched material (< 94 weight percent uranium-235) will be leached in nitric acid, filtered and pumped to an adjacent facility for down-blending to $\leq$ 5 weight percent uranium-235. Operation of the down-blending facility is already authorized under the NFS license.

The staff has reviewed the general facility description for CD Line. The applicant has adequately described (1) the facility and processes so that the staff has an overall understanding of the relationships of the facility features and (2) the function of each feature. The applicant has cross-referenced its general description with the more detailed descriptions elsewhere in the application. The staff concludes that the applicant has complied with the general requirements of 10 CFR 70.22, “Contents of Applications,” 10 CFR 70.60, “Applicability,” and 10 CFR 70.65(b)(1), (2), and (3), “Additional Content of Applications,” as applicable to this section.

Institutional Information

Institutional information is unchanged by this amendment. The applicant has previously provided all information necessary to understand the ownership, financial qualifications, location, planned activities, and nuclear material to be handled. The staff finds this information acceptable.

Site Description

The site description is unchanged by this amendment. The applicant has previously provided information pertaining to the site geography, population, meteorology, hydrology, geology, and design basis events. The staff finds that the information used as a basis for the Integrated Safety Analysis (ISA) Summary is consistent with the site description.

2.2 Organization and Administration

The organization and administration of NFS is unchanged by this amendment. The staff has approved previously the organization, the administrative policies, and the resources to operate the facility. The staff finds the organization and administration to be acceptable.

2.3 ISA

Safety Program and ISA Commitments

The staff finds that the applicant's existing safety program, already established and maintained pursuant to 10 CFR 70.62, is adequate to provide reasonable assurance that items relied on for safety (IROFS) will be available and reliable, to perform their intended functions when needed and in the context of the performance requirements in 10 CFR 70.61. The program compiles and maintains process safety information including procedures for changing the facility and updating the ISA in accordance with 10 CFR 70.72.

The staff finds that the applicant has committed to conduct an ISA of appropriate complexity for the new process, to maintain the ISA with a suitable configuration management system, to train personnel in the ISA methods, to evaluate facility changes with ISA methods, to establish and maintain IROFS, and to maintain written procedures.

The staff finds that the applicant has committed to establish management measures to ensure the reliability and availability of each IROFS.

ISA Summary

The applicant submitted an ISA Summary for the CD Line. In addition, a revised Site ISA Summary was submitted which included references to the new processing line.

The staff's evaluation of the ISA Summary content requirements in 10 CFR 70.65(b) is as follows:

- The general site description refers to Section 1 of the Site ISA Summary. This information has been reviewed and approved previously. This action involves a new processing line in an existing building and no changes to the general site description were made. The staff continues to find the general site description acceptable.

- A facility description is provided in Section 2 of the ISA Summary for the CD Line. The section focuses on the new processing line and references other ISA summaries for descriptions of existing facilities and support systems. The staff finds that the facility description is acceptable.

- Process descriptions were provided in Section 3 of the ISA Summary for the CD Line. The staff finds the descriptions of each process sufficient to understand the theory of operation and the hazards and accident sequences identified.

- Information demonstrating compliance with the performance requirements in 10 CFR 70.61 was provided in Section 4 with references to other information, as appropriate. The demonstration requires hazard analyses, consequence assessments and risk assessments. The methodology used by the applicant has been reviewed and approved previously by the U S. Nuclear Regulatory Commission (NRC). The methodology is defined in Section 5 of the Site ISA Summary. The staff continues to find the methodology acceptable.

  NRC staff performed a detailed review of the hazard evaluations, consequence assessments and risk assessments. This included a vertical slice review on March 10, 2008. The accident sequences evaluated during the vertical slice review included: (1) too much uranium in an enclosure, i.e., too many containers, (2) fire in the cylinder storage area, (3) venting of pressurized powders, (4) a process off-gas ventilation line damper failing open, and (5) fire in the main processing area. Based upon its review, the staff finds that the applicant applied its methodology appropriately. In addition, the staff finds there is reasonable assurance that the applicant has identified all accidents for which the consequences could exceed the performance requirements of 10 CFR 70.61, and has identified how the IROFS listed in the ISA Summary protect against each type of accident.

  The application of management measures for IROFS refers to Section 4.4 of the Site ISA Summary. This information has been reviewed and approved previously by NRC. Section 6 of the ISA Summary for the CD Line specifies the level of management measures applied to each IROFS identified in the summary. The staff finds the description of management measures acceptable.

  The applicant has an existing program for criticality monitors and alarms pursuant to 10 CFR 70.24. This program has been reviewed and approved previously by the NRC, and the staff continues to find this program acceptable.

  The baseline design criteria required under 10 CFR 70.64 is addressed in Section 6.2 of the ISA Summary for the CD Line. Much of the criteria references existing programs at the site which have been reviewed and approved previously by the NRC. The existing programs include quality control, configuration management,

fire protection, chemical protection, emergency preparedness, utility services, maintenance, criticality control, and defense-in-depth practices. In addition to this information, the staff reviewed the Fire Hazards Analysis and the Nuclear Criticality Safety Analysis for the new CD Line. Based on the existing programs and the additional information provided by the applicant, the staff finds the baseline design criteria to be acceptable.

- The description of the team, qualifications, and methods used to perform the ISA refers to Section 5 of the Site ISA Summary. This description has been reviewed and approved previously by the NRC, and the staff continues to find it acceptable.

- A list of each IROFS identified for the new CD Line is provided in Section 6 of the ISA Summary for the CD Line. The staff finds that the list describes each IROFS in sufficient detail to understand its function in relation to the performance requirements in 10 CFR 70.61.

- The description of the chemical consequence standards references Section 7 of the Site ISA Summary. These inhalation standards have been reviewed and approved previously by the NRC. The CD Line produces a liquid chemical solution that poses a hazard if it contacts the skin or eyes of a worker (dermal exposure hazard). No consequence standard for dermal exposure exists, but the licensee submitted a consequence standard based on available information. A more detailed discussion is provided in the Chemical Process Safety Section below. The staff finds these standards acceptable.

- There were no sole IROFS identified for any of the accident scenarios in the ISA Summary for the CD Line.

- The description of the definitions of "unlikely," "highly unlikely," and "credible" refers to Section 9 of the Site ISA Summary. These definitions have been reviewed and approved previously by the NRC. The staff continues to find them acceptable.

2.4 Radiation Protection

The amendment involves moving enriched uranium from sample containers into storage containers or the process line. The gaseous transfer of uranium hexafluoride (UF_6) will be conducted in glove boxes with filtered ventilation to provide process containment. Piping used to transfer uranium in solution will also have a trough containment system to prevent contamination. In addition, the licensee will apply the NFS Radiation Protection Program approved for other NFS operations to the CD Line. The radiological risks for the new facility are comparable to previously approved operations. Therefore the NRC staff concludes that the applicant's radiation protection program is adequate and meets the requirements of 10 CFR 19, 20, and 70. Conformance to the application will ensure safe operations.

The ISA Summary states the primary radiological hazard in the CD Line is the loss of containment due to rupture of a cylinder. The UF_6 is solid during storage and sublimes from a solid to a gas during processing. As a result, the bulk of material released during loss of containment would not become airborne or contribute to internal dose. Based on these features, the NRC concurs with the licensee's determination that there are no credible, non-criticality, radiological accident sequences with intermediate or high

consequences. Thus the radiological portion of the licensee's ISA Summary meets the performance requirements specified in 10 CFR 70.61

2.5 Nuclear Criticality Safety (NCS)

The staff reviewed the criticality accident sequences described in the ISA Summary included with the amendment request and portions of the associated NCS evaluations (NCSE 54T-07-0021 and NCSE 54T-07-0022). The staff also reviewed existing NFS commitments.

Criticality License Commitments

10 CFR 70.64(a)(9) requires that the design of new processes must provide for criticality control including adherence to the double contingency principle. The double contingency principle requires process designs to incorporate sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible. NFS commits to the double contingency principle in its existing NRC-approved license. The staff finds this commitment to be adequate to meet the requirements of 10 CFR 70.64(a)(9).

Chapter 4 of the existing NFS license application specifies that a system is considered to be subcritical if the calculated k_{eff}, including any bias and uncertainty, is less than 0.90 for normal conditions and less than 0.95 for credible abnormal conditions. In order to meet these limits, the licensee controls one or more of the parameters listed in the license application. This is the primary means used by NFS to demonstrate that the CD Line will be adequately subcritical. This method has previously been approved by the NRC and meets the regulatory requirements of 10 CFR 70.61(d).

The staff performed some calculations to verify that the proposed process was adequately subcritical. These calculations were compared with those described in the NCS evaluations for the CD Line. Where such comparisons were made, the staff found that NFS used the most reactive credible conditions, as required by its license, to demonstrate that the process will be adequately subcritical.

Criticality Sequences in the ISA Summary

The primary criticality safety hazards involve the collection of HEU solution into an unfavorable geometry vessel, and the accumulation of too much HEU in one area due to the loss of spacing or mass controls.

The solution processing system is designated as configuration controlled equipment (CCE)—a generic, site-wide designation for passive engineered IROFS—and is designed to prevent significant leakage of HEU solutions. Solution processing lines, columns, and equipment where solution might accumulate in the event of a leak are safe geometry. Backflow of solution into the unfavorable components of the argon, nitrogen, air, and water supply systems is prevented by at least two engineered IROFS for each accident scenario.

In the application submitted on August 31, 2007, a number of accident sequences in the ISA Summary listed “modeling conservatisms” as an enabling event. The staff noted that this does not describe a physical event that could lead to a criticality. NFS committed to remove the use of “modeling conservatisms” from its risk assessment. In its place, NFS will reduce some conservatism in the modeled reflection and consider an increase in reflection as a possible event in its risk assessment. In the letter dated December 5, 2008, NFS stated that it will add an administrative IROFS which controls reflection by restricting access to the underside of some enclosures. NFS agreed to inform NRC if any other changes were made to its NCS evaluations prior to startup. The staff finds that this is an acceptable resolution of the issue.

The staff noted that a number of accident sequences list the same IROFS multiple times as preventing the accident. The staff determined that when the licensee applies this practice to engineered controls there will be multiple identical IROFS, with the same IROFS label, capable of preventing the accident. For administrative controls, the staff determined this practice was not acceptable when repeat failures could be made by a single operator or a credible common mode failure existed (e.g., error in a posting). In its November 10, 2008, letter, NFS agreed that this technique does not provide a desirable level of independence for administrative IROFS. Thus, the staff has reasonable assurance that future changes to the CD Line will not include the use of this method. NFS’s response to address this issue for specific CD Line accident sequences is discussed below.

IROFS CDG-17 is an administrative control restricting the use of open and unattended containers. NFS committed to revise the sequences in the ISA containing CDG-17 so that it is credited only once. Each sequence where CDG-17 was credited multiple times is also protected by other IROFS, thus the staff finds that this is an acceptable response.

Accident sequences 4.1.20 and 4.1.21 consider the possibility of criticality accidents involving hand carried items prevented by IROFS CDG-3. NFS noted that CDG-3 can be separated into two distinct administrative controls: (1) only one item may be hand carried at a time, and (2) hand carried items shall be spaced at least 12 inches from other fissile material. Thus, the accident sequence would require a single operator to fail both of these controls or at least two operators to fail the second control. NFS committed to clarify this in the ISA. The staff finds that this is an acceptable response.

The vertical slice review examined accident sequences 4.1.15a, 4.1.15b, and 4.1.16, which each involve the placement of too much fissile material inside an enclosure. The proposed IROFS to prevent this was an administrative limit on the number of containers which may be placed inside an enclosure. The limits ranged from one to four containers depending upon the specific enclosure. The NCS evaluation indicated that under optimal conditions the subcritical limit could be exceeded if a small number of excess containers are placed together in an enclosure. The ISA Summary indicated that the addition of one container over the limit is a failure of the IROFS, and considered the addition of a second container over the limit to be an independent failure of the same IROFS. NFS also considered these actions to be independent process upsets for the purpose of double contingency. NRC staff did not find this assessment acceptable for the following reasons: (1) it is credible for a single operator to add several containers over the enclosure limit; (2) the same action performed by a single operator cannot be independent; (3) the analysis did not account for common mode failures; and (4) the margin of safety was small. In its December 5, 2008 letter, NFS committed to add

additional IROFS to prevent these sequences from occurring, including a requirement for a second operator to verify that the addition of a container to an enclosure will not exceed the limit. NFS also will revise the limits to range from one to two containers in an enclosure, increasing the margin of safety. The staff finds this response acceptable because it adequately addresses the four concerns listed above.

The staff noted a few areas where the ISA summary was incomplete or contained errors (RAIs 5, 7, 8, 10, 11, and 12). In its response of June 19, 2008, NFS committed to make the appropriate revisions to the ISA Summary before the start of CDL operations. The staff finds that this is an acceptable resolution of these issues.

Based on this review, the staff has reasonable assurance that the licensee has identified all credible criticality accidents and will provide sufficient IROFS to meet the performance requirements of 10 CFR 70.61. The staff finds that NFS's conduct of operations will ensure that fissile material will be possessed, stored, and used safely according to the requirements in 10 CFR Part 70. The staff concludes that the licensee's NCS program meets the requirements of 10 CFR Part 70 and provides reasonable assurance for the protection of public health and safety, including workers and the environment.

2.6 Chemical Process Safety

The licensee identifies several chemicals involved in the process which have the potential to cause harmful effects to workers or the environment. These chemicals are argon, nitrogen, carbon dioxide, hydrofluoric acid, and uranium compounds.

Per Section 7 of the Site ISA Summary, chemical toxicity from the intake of soluble uranium is evaluated along with the radiological consequences. A fire in the cylinder storage area is the only identified high or intermediate consequence scenario involving soluble uranium. This accident sequence and associated IROFS are discussed in the Fire Safety section below.

Argon and nitrogen are inert gases used in the process. Argon is used as a carrier gas and nitrogen is used for pressure testing. Cylinders of compressed carbon dioxide are present for emergency cooling purposes. If an accident releases hot UF_6 gas, the compressed carbon dioxide can be used to cool and solidify the UF_6 quickly. The primary hazard from these chemicals is asphyxiation due to oxygen displacement. The licensee evaluated leak scenarios based on the total amount of gas present in cylinders (carbon dioxide) or the flow rate the material is supplied to the building (argon and nitrogen) and determined that a maximum concentration resulting from a leak would be well below Temporary Emergency Exposure Limit -2 values and therefore are classified as low consequence events.

Hydrofluoric acid (HF) is a toxic and corrosive chemical that is produced as a byproduct of the reaction of UF_6 with water. It is generated in the process as the UF_6 gas removed from cylinders is mixed into an aqueous solution where it combines with water to form UO_2F_2 and HF. HF would also be expected to form via reaction with atmospheric moisture in case of any UF_6 release. A fire in the cylinder area was identified as a high consequence chemical event based on the potential release of a full cylinder of UF_6 and subsequent conversion to HF. This accident sequence and associated IROFS are discussed in the Fire Safety section below. Other leak scenarios from the process were

postulated by the licensee and determined to be low consequence events. The licensee evaluated these scenarios based on worker exposure to airborne concentrations according to the methodology previously described and approved in their Site ISA Summary. NRC staff conducted a detailed review of the licensee's consequence analysis of the bounding gas and liquid releases from the process lines. The staff confirmed that the licensee has appropriately applied its ISA methodology, and agree with the licensee's assessment that these are low consequence events.

Liquid HF can also cause serious injury or death as a result of skin or eye contact. The proposed process involves transportation of solution containing up to 10% HF via overhead piping. The licensee identified and evaluated leak scenarios which have the potential to result in skin or eye contact with the HF solution. While 10 CFR 70.65(b)(7) requires that ISA Summaries contain a description of the proposed quantitative standards used to assess the consequences to an individual from acute chemical exposure to licensed material or chemicals produced from licensed materials, there are no independent, generally accepted standards for liquid chemical exposures as there are for acceptable airborne concentrations. In order to meet this requirement, the licensee proposed consequence standards for this process based upon currently available information on the health consequences of contact with HF solutions. The licensee describes a high consequence liquid HF exposure to be worker contact with dilute (<50%) solution over greater than 805 cm^2 of their body, or any contact with the eye, for greater than 30 minutes. NRC staff has independently reviewed information available in literature and from the manufacturer and concurs that this is an acceptable definition of high consequence skin or eye exposure. Available information suggests that contact with skin of at least 5% body surface area for dilute solutions could cause serious and potentially fatal health effects. The standard proposed by the licensee is consistent with this information. Available history of past exposures also shows that while exposure to high concentration solution generally has immediate effects, exposure to dilute solutions results in health effects that are typically delayed from one hour up to as much as 24 hours after exposure. Thus, for dilute solutions, limiting the definition of high consequence exposures to those greater than 30 minutes is consistent with currently available information. The licensee further defines HF of less than 2% in solution to be "trace" amounts which do not require controls to protect worker health. Again, while there are no definitive standards for acceptable concentrations for acute exposure, this value is consistent with information currently available in literature as a lower bound for concentrations which may cause symptoms. The licensee does not propose an intermediate consequence standard for worker exposure to liquid HF solutions. Staff notes that while 10 CFR 70.61 categorizes an acute chemical exposure to an individual that could endanger the life of the worker (high consequence) separately from one that could lead to irreversible or other serious long-lasting health effects (intermediate consequences), the information available in literature on the health effects of HF exposure does not distinguish between "serious" and "potentially fatal" health effects when discussing exposures. The definition that the licensee proposes conservatively includes exposures that could lead to serious health effects within its definition of high consequence. A separate definition of intermediate consequence exposures would therefore be redundant and is not necessary to comply with 70.65. The licensee identified loss of containment events which have the potential to result in high consequence exposures, and assigned IROFS to decrease the likelihood of the event to highly unlikely as defined in their ISA methodology. Staff concurs that the licensee has appropriately evaluated and applied to controls to these event sequences.

The licensee would conduct this process in accordance with its existing chemical safety programs and procedures, which the NRC has previously reviewed and continues to find acceptable.

2.7 Fire Safety

The purpose of this review is to determine, with reasonable assurance, that NFS has (1) designed adequate protection against fires and explosions that could affect the safety of licensed materials and thus present an increased radiological risk; (2) considered the radiological consequences of fires; and (3) instituted suitable safety controls to protect workers, the public, and the environment.

Building Construction and Facility Design

Building 301 is approximately 50 years old and was designed and constructed to industrial standards that were in effect at that time. The licensee commits to meeting the prevailing fire and building codes whenever facilities are expanded or modified. Routine inspections and review of licensing actions enforce this commitment. For the design, construction, and operation of the CD Line, the licensee commits to comply with the intent of various fire protection standards including, but not limited to, National Fire Protection Association Standard 10 (NFPA 10), “Standard for Portable Fire Extinguishers,” NFPA 30, “Flammable and Combustible Liquid Code,” NFPA 70, “National Electrical Code,” NFPA 72, “National Fire Alarm Code,” NFPA 86, “Standard for Ovens and Furnaces,” NFPA 101, “Life Safety Code,” and NFPA 801, “Standard for Facilities Handling Radioactive Material.”

Building 301 is of non-combustible, Type II construction, in accordance with NFPA 220, “Standard on Types of Building Construction.” There are no coverings of the concrete floor, and all interior finish is Class A, in accordance with NFPA 255, “Standard Method of Test of Surface Burning Characteristics of Building Materials,” as required by NFPA 801. The facility enables rapid personnel egress in accordance with the guidance provided in NFPA 101. The electrical installation and wiring is in accordance with NFPA 70.

Inside Building 301, the Main Processing Room is separated from all surrounding areas by a 2 hour rated fire barrier wall with 1.5 hour rated opening protection, this separation is considered an item IROFS. During a fire, this IROFS is designed to maintain separation of quantities of source term to ensure the performance requirements of 10 CFR 70.61 are met.

The building code required an automatic sprinkler system to be installed throughout this building, however, due to potential criticality safety concerns, an exemption was issued by the State of Tennessee and the system was omitted. Given the fire modeling results without a sprinkler system for bounding fire scenarios indicated no structural damage potential to building components, the other safety systems present (smoke detection, fire alarm, combustible controls, hot work permits, low flammability of interior finishes, etc.) provide an adequate level of protection.

Process Fire Safety

Flammable and combustible liquids are stored as required by NFPA 30. The design and use of ovens and furnaces comply with NFPA 86.

Glove box windows and tops are Lexan with a UL 94 V-2 flame resistance rating. The design of the glove box design is commensurate with the hazard present. Most glove boxes have a pre-filter (UL 900 Class I fire retardant), a high-efficiency particulate air filter (Class I filter per UL 586), and 4-inch vent line (Class I flame spread CPVC) which meets the design criteria for NFPA 91, "Exhaust Systems."

Fire Protection and Emergency Response

The facility maintains a site-wide Fire Brigade (FB), made up of employees trained in fire fighting techniques, first aid procedures, and emergency response. The team is organized, operated, trained, and equipped for incipient fire fighting capability in accordance with NFPA 600, "Standard on Industrial FB." The team handles minor fires and provides a first-response effort, designed to supplement the local fire department, for a major fire at the plant. A sufficient number of fully qualified FB members are available on each shift. The facility maintains pre-fire plans with the Erwin Public Fire Department, which is located approximately 10 minutes (driving time) from the facility. An annual joint training drill is conducted at the plant.

Fire alarm pull stations along with audible and visual fire alarms are installed throughout the facility. An automatic fire detection system is also installed throughout Building 301. Both the smoke detection and fire alarm systems are designed in accordance with NFPA 72. Portable fire extinguishers are installed throughout the facility in accordance with NFPA 10. Multipurpose fire extinguishers are provided for Class A/B/C fires. Specialized extinguishers are located in areas requiring protection from particular hazards, including water-exclusion areas.

The NFS site has a full loop fire protection water supply system that is fed by two independent municipal water supplies. The fire water loop is a 6 inch main with a typical static pressure of 105 psi. There are 4 fire hydrants within 200 feet of Building 301, which meets the requirements of the Southern Building Code.

Items Relied on for Safety

The updated ISA will include 5 fire safety related IROFS applicable to the CD Line process, insuring the performance criteria of 10 CFR 70.61 are met. To minimize fire potential, the FIRE-2 IROFS provides monthly surveillances to ensure compliance with the combustible controls program. These monthly surveillances are referenced by the applicable management measures. To limit the potential for fire propagation, the FIRE-29 IROFS separates the Main Processing Room from all surrounding areas by a 2 hour rated fire barrier wall with 1.5 hour rated opening protection. To meet 10 CFR 70.61, the CDG-12 IROFS minimizes the amount of source material such that the performance requirements can not be exceeded during an accident. To further insure accuracy of quantifying the amount of source material present, the CDG-14 IROFS verifies that 5A and 2S cylinders are empty except for solid "heel" material prior to removal from the Sublimation Stations. To quickly mitigate a fire that occurs during the cylinder valve check, the CDS3-24 IROFS implements a full-time fire watch for the Main Processing

Room before removing a non-processed 5A cylinder from Sublimation Station-3. A full-time fire watch in this situation, which includes manual fire suppression being at the ready, insures a fire is extinguished prior to the cylinder under repair becoming involved.

Fire Safety Management

The licensee commits to an adequate fire safety program, including satisfactory management measures including but not limited to: (1) a maintenance program to install, test, and maintain IROFS to ensure that they are available and reliable; (2) fire safety awareness training for employees and contractors; (3) an approved hot work permitting and fire watch program, as well as housekeeping practices as an integral part of their procedures; and (4) an individual with knowledge and experience in fire safety responsible for daily coordination of the fire safety program, reporting to the vice president of the safety function within the organization.

Periodic risk assessments audit the systems and program to current NFPA standards and identify any deficiencies in the current installation and maintenance that present a danger to safety. Recommendations are provided for resolving these deficiencies. Annual tests of fire protection systems are carried out by the insurance carrier and /or fire equipment service contractor.

Fire Hazards Analysis

Fire Hazard Analysis specific to the CD Line process was performed and is part of the ISA process. They are maintained currently by the Configuration Management program.

Pre-fire plans have been developed using current information regarding building construction, operations, points of attack, and personnel. The plans discuss available fire protection features and utilities for each process area. Information is available on combustible loadings and fire fighting strategy. Emergency team members are trained in the use of the pre-fire plans, which are available at the emergency team building and maintained with the Erwin Public Fire Department.

The staff determined that the licensee's proposed equipment, facilities, and procedures provide reasonable assurance that adequate fire protection will be provided and maintained for those IROFS to meet the safety performance requirements of 10 CFR Part 70.61. The staff also determined that the licensee's aforementioned commitment to industry codes and accepted guidelines provide for adequate protection against fires and explosions to meet the baseline design criteria of 10 CFR Part 70.64.

2.8 Emergency Management (EM)

The applicant has existing license commitments to maintain an EM program in accordance with its Emergency Plan (EP). NRC has reviewed and approved the EP previously. The plan already addresses the types of accidents that could occur in the proposed process line. In letters dated June 19 and November 7, 2008, the licensee committed to making a revision to its EP to clarify the maximum amount of uranium in a 5A cylinder. The revision will not change how the licensee responds to an emergency. The staff continues to find the EM program to be acceptable.

2.9 Environmental Protection

The applicant has existing license commitments to maintain an environmental protection program including (1) environmental and effluent monitoring and (2) effluent controls to maintain public doses as low as reasonably achievable. The environmental protection program has been reviewed and approved by NRC previously. The staff finds that the new process line will not cause a significant increase in the plant effluents and the existing environmental protection program provides reasonable assurance that the public health and safety, and the environment, will be protected.

2.10 Decommissioning

The estimated cost to decommission the equipment, supplies and materials to be used in the new CD Line is $7,225,637.00. The licensee provided information clarifying: 1) the cost of transporting waste material, 2) that it factored in sufficient funds for a third party contractor to perform the work and 3) that it included a full 25% contingency factor. The facility that will house this new CD Line (Building 301) was previously used for Naval Reactor (NR) activities, and the DOE Office of Naval Reactors has acknowledged its continued obligation to decommissioning the structure to the extent that it was contaminated before any non-NR activities. DOE has requested a baseline survey of Building 301 before startup of the new CD Line. NFS will be responsible for any contamination greater than the levels determined by the baseline survey. NFS is required to account for any increase in contamination to its site, including to Building 301, in its next decommissioning cost estimate update and must fully cover all radiological decommissioning costs with an acceptable financial assurance method as defined in 10 CFR 70.25(f). The licensee has: 1) provided a Letter of Credit in the amount of $7,225,637.00, 2) has established a Standby Trust Fund to receive any proceeds drawn from this Letter of Credit and 3) has a contract obligating DOE to cover the current cost of decommissioning the Building 301 structure.

The NRC staff has evaluated the licensee's plans and financial assurance for decommissioning in accordance with the "Consolidated Nuclear Materials Safety and Safeguards Decommissioning Guidance," NUREG-1757, Volume 3. On the basis of this evaluation, the NRC staff has determined that the licensee's plans and financial assurance for decommissioning are adequate.

2.11 Management Measures

The applicant has existing commitments for a management measures program in Section 2.12 of its license commitments. This program has been reviewed and approved by the NRC previously. The staff continues to find the management measures program to be adequate.

2.12 Material Control and Accounting

The material control and accounting program is unchanged by the amendment. The applicant has a fundamental nuclear material control plan for high-enriched uranium in accordance with 10 CFR Part 74. The plan has been reviewed and approved by the NRC previously. The staff continues to find the material control and accountability program to be adequate.

2.13 Physical Protection

The physical protection program is unchanged by the amendment. The applicant has several plans for physical protection of high-enriched uranium in accordance with 10 CFR Part 73. The plans have been reviewed and approved by the NRC previously. The staff continues to find the physical protection program to be adequate.

3.0 ENVIRONMENTAL REVIEW

The staff prepared an environmental assessment for this action in accordance with 10 CFR Part 51. Based on the assessment, the staff concluded that the environmental impacts associated with the proposed action are not significant. A finding of no significant impact was published in the *Federal Register* on September 2, 2008 (73 FR 51319).

In response to this notice, members of the public raised concerns about earthquake risk, flood risk, and changes in local demographics. With regard to demographics, the NRC staff recognizes that local land use, population size and other factors have changed in recent years. However, these demographic changes are not drastic and do not alter the finding that the proposed processing line will have no significant impact on the environment.

With regard to flood risk, the NRC staff recognizes that the floor of Building 301 is close to the 100-year flood plain and it is possible that water could get into the building during a severe flood. However, there would be flood warnings, evacuation orders, and other notices associated with a severe flood that would allow the licensee to secure the processing line, seal containers and prepare for the flood. We find that such actions would prevent a release having a significant impact on the environment.

With regard to earthquake risk, members of the public noted that the U.S. Geological Survey (USGS) published an update in 2008 to the National Seismic Hazard Maps (USGS Open-File Report 2008-1128). The NRC staff consulted with seismic experts at the USGS and the Southwest Research Institute. For the northeast corner of Tennessee, both sources concluded that the earthquake hazard predicted in the 2008 map is lower when compared to the last update in 2002. In addition, the licensee confirmed that it considered the cumulative impacts from an earthquake and upgraded the building structure to withstand a design basis earthquake. The NRC staff concludes that information and analyses provided by the licensee provide reasonable assurance that an earthquake will not cause a release having a significant impact on the environment.

4.0 CONCLUSION

The staff concludes there is reasonable assurance that the activities authorized by the proposed amendment will not pose an undue risk to the health and safety of the public, workers, or the environment. Approval of the license amendment with the following condition is recommended:

S-54 Introduction of UF_6 into the CD Line shall not occur until the Commission completes an operational readiness review to verify that (1) commitments in the amendment request have been fulfilled, (2) management measures for items relied on for safety have been implemented, (3) the CD Line has been constructed in accordance with design requirements, and (4) other actions necessary for safe operations are complete.

NRC inspection staff has no objection to the proposed action.

PRINCIPAL CONTRIBUTORS
Kevin M. Ramsey
Matthew Bartlett
Amy Luebbering
James Downs
Blake Purnell
Kenneth Kline