UNITED STATES
NUCLEAR REGULATORY COMMISSION

Frequently Asked Questions about

Nuclear Fuel Services, Inc.

Docket 07000143

Materials License SNM-124

Revision 0

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Scope

This document provides answers to questions frequently asked by members of the public regarding activities licensed by the U.S. Nuclear Regulatory Commission (NRC) at Nuclear Fuel Services (NFS), Inc. It includes a variety of questions posed to the NRC in various public meetings, private conversations with NRC staff members, and written communications. These "Frequently Asked Questions" (FAQs) are organized into categories to consolidate and make the information easier to find and use. The FAQs are answered based on the best available information at the time of the latest revision. Information presented in parenthesis as “(ADAMS ML########)” corresponds to the accession number of the referenced document in NRC’s Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. The NRC staff intends to update these questions periodically and if necessary to support mission-related activities.

Contents

Revision History

Revision	Date	ADAMS Accession Number
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Abbreviations

ADAMS	Agencywide Documents Access and Management System
ADR	Alternate Dispute Resolution
ADU	ammonium diuranate
AEC	Atomic Energy Commission
AIT	Augmented Inspection Team
ALARA	as low as reasonably achievable
ANI	Area Needing Improvement or American Nuclear Insurers
ASLB	Atomic Safety Licensing Board
ASME	American Society of Mechanical Engineers
BLEU	Blended Low Enriched Uranium
CAAS	Criticality Accident Alarm System
CAL	Confirmatory Action Letter
CD	Commercial Development
CFR	Code of Federal Regulations
DOD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
EA	Environmental Assessment
ECV	effluent concentration values
ECAN	Erwin Citizens Awareness Network
EEOICPA	Energy Employees Occupational Illness Compensation Program Act
EIS	Environmental Impact Statement
EN	Event Notice
EPA	Environmental Protection Agency
FAQ	frequently asked question
FONSI	Finding of No Significant Impact
FRN	Federal Register Notice
HEPA	High Efficiency Particulate Air
HEU	highly enriched uranium
HF	hydrofluoric acid
IFI	inspector follow-up item
IMC	Inspector Manual Chapter
IPAWS	Integrated Protective Warning and Alert System

IROFS	item relied on for safety
ISA	Integrated Safety Analysis
LCF	latent cancer fatality
LLRW	low-level radioactive waste
LPR	Licensee Performance Review
MC&A	Material Control and Accountability
mCi	millicuries
NAS	National Academy of Sciences
NCRP	National Council on Radiation Protection and Measurements
NEPA	National Environmental Policy Act
NFS	Nuclear Fuel Services
NIOSH	National Institute for Occupational Safety and Health
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
OUO	Official Use Only
pCi	picocuries
QA	quality assurance
RCRA	Resource Conservation Recovery Act
RIS	Regulatory Issue Summary
RRAT	Restart Readiness Assessment Team
SEFOR	Southwest Experimental Fast Oxide Reactor
SER	Safety Evaluation Report
SNM	special nuclear material
SUNSI	sensitive unclassified non-safeguards information
Tc-99	Technicium-99
TCE	Trichloroethylene
TEDEC	Tennessee Department of Environment and Conservation
TEMA	Tennessee Emergency Management Agency
UF_6	uranium hexafluoride
URI	unresolved item
VHEU	very highly enriched uranium
WWTF	Waste Water Treatment Facility

General NRC Topics

1) How does the NRC ensure safety at NFS?

The NRC's regulatory process has five main components: (1) developing regulations and guidance for our applicants and licensees, (2) licensing or certifying applicants to use nuclear materials or operate nuclear facilities or decommissioning that permits license termination, (3) overseeing licensee operations and facilities to ensure that licensees comply with safety requirements, (4) evaluating operational experience at licensed facilities or involving licensed activities, and (5) conducting research, holding hearings to address the concerns of parties affected by agency decisions, and obtaining independent reviews to support our regulatory decisions. The NRC also strives to improve its processes in these five areas through risk-informed and performance-based regulation.

Licensing, inspections, and performance assessment are major activities within the NRC's regulatory process to ensure safety at NFS.

Licensing – License applications are reviewed to determine if they meet the requirements for approval. There are many requirements, but they fall into three general categories: (1) workers are qualified by training and experience to use the licensed material in accordance with NRC regulations, (2) proposed equipment and facilities are adequate to protect health and minimize danger to life and property, and (3) proposed procedures are adequate to protect health and minimize danger to life and property. If the requirements are met, a license will be issued authorizing the use of licensed material in accordance with the statements, representations, and conditions in the application.

Inspections – The NRC inspection program assesses NFS's performance by evaluating those programs and activities important to maintaining safe plant operations. Inspection efforts focus on compliance with regulations and on ensuring that activities are conducted safely and equipment is properly maintained to ensure safe operations. Inspection findings are communicated to licensee management for resolution. Follow-up inspections are conducted to ensure that the licensee has taken appropriate corrective action for violations of NRC regulations.

Inspections conducted at NFS are performed by resident, headquarters, and region-based inspectors. Resident inspectors provide first-hand, independent assessment of facility conditions and performance. Resident inspectors live in the local area and maintain offices at the plant. Resident inspectors perform inspection activities during regular business hours during the day and periodic inspections during weekends and evenings. Resident inspectors significantly increase the agency's on-site monitoring of the facility and reduce the time to respond to events at the facility.

Resident inspector activities are supplemented by technical specialists from the regional and headquarters offices. These individuals perform inspections in a wide variety of engineering and scientific disciplines. Inspection specialists review facility security, emergency planning, radiation protection, nuclear criticality safety, operational safety, material control and accountability, environmental monitoring, periodic testing of facility equipment and systems, fire protection, construction activities, and other program areas. During the course of a year, NRC specialists may conduct 10 to 15 routine inspections at NFS in addition to the routine inspections conducted by the resident inspectors.

Performance Assessment – NRC staff and management periodically assess inspection results from all the various inspection efforts noted above. This comprehensive assessment of overall inspection activities serves to identify program areas in need of improvement, even if no escalated enforcement action was required during the inspection period. These reviews help to ensure that necessary inspection resources are assigned to those program areas requiring additional inspection oversight.

2) Are there any specific qualifications for NRC personnel for the job they are in? If so, who determines those qualifications?

Yes, NRC licensing and inspection staff is required to complete a comprehensive training and qualification program. Completion of the training and qualification program typically takes 12 to 24 months, depending on the individual's previous experience and the program for which the candidate will be qualified. The NRC training program requirements for inspection staff are specified in Inspection Manual Chapter (IMC) 1246, “Formal Qualification Programs in the Nuclear Material Safety and Safeguards Program Area,” and IMC 1247, Qualification Program for Fuel Facility Inspectors in the Nuclear Material Safety and Safeguards Program Area.

Training and qualification programs are periodically updated and approved by NRC management.

3) What is an NRC order?

An NRC order is a written NRC directive to modify, suspend, or revoke a license. Title 10 of the *Code of Federal Regulations (CFR)*, Part 2 (10 CFR 2.202) contains the provisions for issuing orders. Orders may be issued in lieu of, or in addition to, civil penalties, as appropriate for Severity Level I, II, and III violations.

4) What is a Confirmatory Action Letter?

A Confirmatory Action Letter (CAL) is a letter issued by the NRC to confirm a licensee's agreement and commitment to take action to address significant NRC concerns about licensee activities affecting health, safety, security, or the environment.

5) What is an exemption and how often is it granted?

An exemption grants relief from a regulatory requirement. The NRC may grant exemptions from requirements in its regulations if it determines the exemptions are authorized by law, will not endanger life or property or the common defense and security, and are otherwise in the public interest.

Exemptions are infrequent. Typically, a licensee will request relief from a requirement when circumstances beyond its control prevent it from complying with the requirement. Occasionally, a licensee will request relief when it identifies a method of protecting health and safety that is less burdensome than the method specified in the regulations. An exemption is granted only when the NRC is satisfied that public health and safety, and the environment, will be protected.

6) What gives the NRC the authority to shut down an NRC licensed facility?

The NRC has the authority to modify, suspend, or revoke an NRC license as stated in the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, as amended. The Atomic Energy Act of 1954, as amended, Section 186(a) states that a license may be revoked for the failure to operate a facility in accordance with the terms of the license or for a violation of this Act or any regulation of the NRC.

In order to modify, suspend, or revoke an NRC license, 10 CFR 2.202 states that the NRC must issue an order that alleges the violations the licensee is charged with, the stated hazardous condition, or other facts deemed to be sufficient grounds for the proposed actions. The licensee must respond to the order and has the opportunity to file for a hearing. If the NRC revokes an NRC license, the facility will no longer be authorized to continue operations.

7) What is Alternative Dispute Resolution?

Alternative Dispute Resolution (ADR) is a term that refers to a number of voluntary processes, such as mediation and facilitated dialogues, used to assist parties in resolving disputes and potential conflicts. These techniques involve the use of a neutral third party, either from within the agency or from outside the agency, and are typically voluntary processes in terms of the decision to participate, the type of process used, and the content of the final agreement. The NRC uses different types of ADR as it engages different stakeholders who may include an employee who has been discriminated against by a company or it may include a discussion on a violation of NRC requirements. Federal agency experience with ADR has demonstrated that the use of these techniques can result in the efficient resolution of issues, more effective outcomes, and improved relationships between the agency and other parties.

8) What would happen at NFS in event of a federal government shutdown?

In the event of a federal government shutdown, the NRC resident inspectors are generally characterized as “essential personnel” and continue to inspect full-time. Selected individuals from Region II and NRC Headquarters, including the emergency response organization, are also characterized as “essential personnel” and continue to work full-time. The rest of the staff in Region II and NRC Headquarters would be placed in a furlough status. The status of the inspections conducted out of Region II and Headquarters would depend on how long the federal government is shut down. The status of the resident inspector program would largely be unaffected.

9) What are severity levels and how does the NRC use them to characterize violations?

The NRC characterizes the significance of violations at fuel cycle facilities by assigning a severity level in accordance with the NRC’s Enforcement Policy. There are four severity levels from I through IV, with Severity Level I violations being the most serious and Severity Level IV violations being the least significant.. Severity Level I is the most significant and Severity Level IV is the least significant. Violations of Severity Level I, II, or III significance are subject to “escalated enforcement,” a process used by the NRC to disposition violations of higher safety or safeguards significance. Section 6.0 of the NRC Enforcement Policy offers multiple examples of violations for each severity level. Each severity level is summarized below.

- Severity Level I – violations that resulted in or could have resulted in serious safety or security consequences (e.g., under 10 CFR Part 70, Subpart H, a high-consequence event occurs).
- Severity Level II – violations that resulted in or could have resulted in significant safety or security consequences (e.g., under 10 CFR Part 70, Subpart H, an intermediate-consequence event occurs;).
- Severity Level III – violations that resulted in or could have resulted in moderate safety or security consequences (e.g., under 10 CFR 70.24, a criticality accident alarm system fails to provide either detection or annunciation coverage for a substantial time period during which operations involving handling or using fissile material occurred).
- Severity Level IV – violations that are less serious, but are of more than minor concern, that resulted in no or relatively inappreciable potential safety or security consequences (e.g., a failure of safety systems or controls occurs such that an acceptable safety margin has not been maintained, and the failure does not result in a Severity Level I, II, or III violation).

10) Ninety percent of the NRC's funding is recovered from the plants that it regulates. Do NRC fees to the licensee create a conflict of interest in regard to fair regulation?

No. The NRC operates with funds approved by the U.S. Congress that come directly from the U.S. Treasury. The fees collected have no effect on the approved NRC budget. The fees paid by licensees go directly to the U.S. Treasury; NRC inspectors and managers have no role in this process.

The fees for NRC's services as covered by the Atomic Energy Act of 1954, as amended, are specified in 10 CFR 170 and 10 CFR 171. Staff hours associated with inspection and licensing activities are billed directly to the licensee. The payment of these fees does not affect the scope or results of the licensing actions or inspections that are performed.

NRC staff salaries are pre-established and are unaffected by the fees collected from the licensee. Enforcement or the lack of enforcement has no bearing on NRC salaries. The number of annual inspection hours consists of a combination of routine core inspection activities and any additional inspections that are predicated on the performance of a given licensee. Consequently, the fees paid by licensees for NRC services increase as the number of inspection hours increase.

11) What needs to happen for the NRC to identify an Area Needing Improvement (ANI) at NFS?

As defined in NRC's IMC-2604, "Licensee Performance Review," an ANI is a performance area for which the NRC has determined that substantive corrective actions or actions to prevent recurrence are required based on the number and the significance of violations identified within a specific time period. Generally, the NRC assesses licensee performance in 24-month periods.

For example, the NRC may identify an ANI if a single Severity Level I, II, or III violation occurred during the assessment period and the violation represents performance issues that need further corrective actions and additional NRC oversight to ensure safe operation

of the facility. On the other hand, an ANI may also be identified if multiple Severity Level IV cited violations with the same root cause occurred within the assessment period, reflecting a performance issue that requires further corrective actions and additional NRC oversight.

12) Why are some Licensee Performance Review (LPR) meetings conducted in an open house/poster session format?

Open house/poster session meetings have become a routine NRC practice for facilities that have no significant performance issues during the assessment period and do not warrant additional regulatory oversight. Conducting the LPR meeting in this format allows NRC staff to interact one-on-one with people attending, especially those who are not comfortable asking questions during larger group discussions. However, the open house meeting format does not preclude people from making comments or asking questions to the NRC staff individually or in small groups. The open house format also provides for more efficient use of meeting time since multiple topics can be addressed simultaneously by the NRC staff. It is also important to remember that the open house is only one method of providing information or answering questions and the NRC staff is always available at other times by phone or e-mail.

13) Does the NRC withhold information from the public related to operations of the NFS facility?

Yes. The NRC's policy for withholding information from the public has changed over the years as we have worked to balance security concerns with the public's right to know how we regulate. Our current guidance was published in Regulatory Issue Summary 2005-31, Revision 1 (ADAMS ML16196A237). Screening criteria is provided in Enclosure 2 and criteria specific to fuel facilities begins on Page 9 of the enclosure.

After the September 11 attacks, there was a period between 2004 and 2007 where all exchanges of information between NFS and the NRC were designated as Official Use Only (OUO) and were not available to the public. The NRC estimated that approximately 1,700 documents were designated as OUO when the policy was in effect. The staff redacted and released a subset of those documents to provide the public with a record of NRC's regulatory actions consistent with the revised policy for withholding information from the public. The subset of documents included inspection reports, licensee performance reviews, enforcement actions, event reports, and other documents which the staff determined to be relevant.

Environmental Protection and Public Dose

Public Dose and Regulatory Jurisdiction

1) What is the dose limit to members of the public?

NRC regulations require that each licensee shall conduct operations so that the total dose equivalent to individual members of the public from the licensed operation does not exceed 100 millirem in a year and 2 millirem in any one hour, with some exclusions related to individuals who have been administered radioactive material for medical purposes. These limits apply to all potential exposure pathways attributable to facility operations

including both liquid and gaseous effluent releases as well a direct radiation measurable at the site boundary.

Additional NRC resources on radiation protection are available at https://www.nrc.gov/about-nrc/radiation.html.

2) Do incremental radiation doses from NFS's releases of uranium to the environment pose a threat to the public's health?

No, there is no threat to the public's health or safety due to any incremental radiation exposures received from liquid or airborne effluents released by NFS, provided the releases remain within NRC regulatory limits.

Radiation exposure limits for members of the public are set by the NRC to ensure adequate protection of public health and safety. The radiation exposure limits are recommended by national and international advisory committees based on the best technical information available. The NRC reviews these recommendations and then amends its regulations, as needed, in a process that includes public participation. One of the fundamental premises of radiation protection is the assumption that any exposure to ionizing radiation, no matter how small, entails some health risk. With this in mind, exposure limits are selected to minimize this health risk through the use of limits on the dose to individuals. The annual exposure limit for the public takes into consideration the potential that an individual receives radiation exposure at the exposure limits for extended periods of time. In addition to meeting the limits, the NRC regulations require that all releases of radioactive material, and exposure to radiation, must be kept as low as is reasonably achievable (ALARA). This means that actual releases are generally a small fraction of the limits, which further ensures adequate protection.

3) Which regulatory agency has jurisdiction over radiological effluents from NFS and which regulations apply to the control and release of radiological effluents?

The NRC has jurisdiction over radiological effluent releases resulting from activities authorized in the NRC license such as enriched uranium activities. The primary NRC regulatory requirements for radiological effluent releases from fuel facilities are those specified in 10 CFR 20 and includes all radionuclide effluents, regardless of licensee.

Section 20.1301 (10 CFR 20.1301), "Dose limits for individual members of the public," and 10 CFR 20.1302, "Compliance with dose limits for individual members of the public," apply to NFS's radiological effluents. Section 20.1301 requires that the dose to the public not exceed 100 millirem in a year.

Section 20.1302 describes two methods for complying with this limit. The first method of compliance is for the licensee to calculate the dose of a public member who would receive the highest dose. The second method is for the licensee to maintain effluent releases below the effluent concentrations specified in 10 CFR Part 20, Appendix B, Table 2. The second method is more conservative since the release limits are based on the assumption that an individual is continuously present at the site boundary. Both methods include airborne and liquid effluents and are crafted to ensure that the highest calculated dose from licensed activities does not exceed 100 millirem in a year to the maximally exposed member of the public.

Section 20.2003 (10 CFR 20.2003), "Disposal by release into sanitary sewerage," limits radiological material discharged to the sanitary sewer. Limits are specified for various radionuclides and are based on an average monthly concentration. Monthly discharges to sanitary sewerage must be based on the volume of water released into the sewer to ensure that concentrations do not exceed applicable limits. The monthly average concentration limits applicable to NFS are listed in 10 CFR 20, Appendix B, Table 3.

The Tennessee Department of Environment and Conservation (TDEC) has jurisdiction over any radiological effluents from the activities authorized by the TDEC license such as natural uranium activities. The TDEC also has regulatory jurisdiction over hazardous chemical releases and the chemical constituents in the effluents. The state regulates chemical releases via permits and inspections to verify compliance.

4) Who regulates the environment at NFS?

Since NFS is an NRC licensee, NFS operations pertaining to the handling and processing of enriched uranium falls within the NRC's jurisdiction. This includes the radiological effluent and environmental monitoring programs. The TDEC regulates the handling and processing of other radioactive materials specified in the TDEC license. Chemical and all other non-radiological hazardous wastes are controlled in accordance with Environmental Protection Agency (EPA) regulations. The EPA delegates many of its environmental regulatory responsibilities to the TDEC. For example, major environmental programs overseen by the EPA but implemented by TDEC include the Clean Air Act, Clean Water Act, and Resource Conservation Recovery Act (RCRA).

5) What is an Environmental Assessment?

An Environmental Assessment (EA) is a report written by the NRC, in consultation with other regulatory agencies that takes a look at the environmental impacts of proposed actions and alternatives being considered by the NRC. The report provides input to NRC decision-makers before final action is taken on license applications. An EA is one of the tools specified in 10 CFR Part 51 for implementing the National Environmental Policy Act (NEPA) of 1969 Section 102(2), as amended.

6) Is NFS violating the National Pollutant Discharge Elimination System permit issued by the State of Tennessee by discharging highly enriched uranium (HEU) as part of its liquid effluents?

No. With respect to uranium discharges via liquid effluent path, the National Pollutant Discharge Elimination System (NPDES) permit issued by the State of Tennessee (TN0002038, dated February 4, 2021) is limited to the regulation of natural uranium, not HEU. The regulation of HEU discharges through the plant’s liquid effluent path is under the NRC’s jurisdiction in accordance with the provisions of 10 CFR 20.

7) Does TDEC independently verify that NFS has not exceeded the limits set in 10 CFR Part 20 for radionuclides discharged to off-site water by NFS?

The verification of compliance with NRC regulations, such as the discharge limits set in 10 CFR Part 20, is the jurisdiction of NRC and is periodically reviewed under the fuel facility inspection program described in NRC Inspector Manual Chapter 2600.

As of April 2023, TDEC maintains an Environmental Monitoring Program of the NFS environment which serves as an independent benchmark. TDEC independently collects and analyzes the following each month: two Nolichucky River samples, two off-site air samples, and quarterly collects and analyzes vegetation samples. TDEC splits several samples with NFS personnel: multiple on-site groundwater monitoring well samples, a collection of sanitary sewer discharge samples, a collection of the Waste Water Treatment Facility (WWTF) discharge samples and a sludge sample from the Erwin, TN municipal wastewater treatment plant. On a quarterly basis, TDEC samples a groundwater well that is up gradient from the site in order to measure a background reading and an on-site groundwater monitoring well.

8) Does the NRC inspection program require the NRC to perform independent measurements of contamination or effluent levels?

NRC's inspection program does not require the NRC to perform independent measurements of environmental contamination or effluent concentrations; however, confirmatory measurements can be performed when needed. The NRC uses a system of licensing and inspection of the licensee programs to verify compliance.

9) Why there has never been an Environmental Impact Statement (EIS) developed for NFS?

The role of an EIS in NRC's regulatory activities is to inform licensing decisions before they are made by the agency. If NFS were to apply for a new facility license today, NRC would be required to conduct an EIS. However, operations at NFS were first licensed in 1957. The NEPA was not signed into law until 1970, and regulations in Part 51 were not issued until 1984. There is no legal requirement for agencies to perform EISs retroactively and doing so is not our practice.

However, when NRC received an application to allow NFS to continue operating, NRC was required to perform a NEPA review. Since the regulatory action in question was the authorization of an existing facility to continue operations (a less significant environmental impact), under 10 CFR 51, an EA was performed to identify whether there were significant impacts warranting an EIS. To date, no significant impacts from continued operations have been identified requiring an EIS.

10) Why did the NRC end a National Academy of Sciences (NAS) pilot study on cancer risks in populations near U.S. nuclear facilities, including NFS?

On September 8, 2015, the NRC announced (ADAMS ML15251A111) that continuing work for the NAS study was impractical, given the significant amount of time and resources needed and the agency's current budget constraints. The NRC continued to find U.S. nuclear power plants comply with strict requirements that limit radiation releases from routine operations. The NRC and state agencies regularly analyze environmental samples from near the plants. These analyses show the releases, when they occur, are too small to cause observable increases in cancer risk near the facilities. The NRC staff planned to monitor relevant health studies published by national and international experts and, if warranted, revisit the need for an update to the Cancer Study. The NRC documented the basis for its decision in SECY-15-0104 (ADAMS ML15141A404). Background information on the study can be found on the NRC's public webpage at: https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bg-analys-cancer-risk-study.html.

Liquid Effluents and Surface Waters

1) How many outfalls (liquid release points) does NFS have and are they authorized?

Nuclear Fuel Services has three outfalls. Each outfall is authorized by Tennessee NPDES permits.

The NFS site has one main outfall into the Nolichucky River. This is a discharge line which carries the treated water from the NFS on-site WWTF. The water is required to be sampled and must be below NRC regulatory release limits for radionuclides before being discharged into the river. The NPDES permit TN002038 was issued by the TDEC and provides hazardous chemical discharge limits for liquid effluents. The NRC receives notification in the event that NFS exceeds limits specified by its state permit.

The NFS site has two other outfalls that feed into Martin Creek. These outfalls serve to collect stormwater runoff and are not utilized to process effluents from plant operations. The outfalls are authorized by NPDES permit TNR050873. The first stormwater outfall carries the majority of stormwater from the site. The second outfall carries stormwater from the parking lots and a small portion of the east side of the plant property. It also includes the Banner Springs Branch, a natural groundwater spring that was re-routed around the NFS North Site. Nuclear Fuel Services monitors the stormwater discharge for radiological constituents at a point downstream of both outfalls as required by its NRC license.

2) Does NFS release radioactive material into the Nolichucky River?

Yes, NFS does release trace amounts of radioactive material into the Nolichucky River. The discharges are made directly to the Nolichucky, using a pipe, after the water has been processed in the WWTF where the majority of contaminates are removed. NRC regulations in 10 CFR Part 20 require that NFS's discharges be less than the amount that could potentially expose a member of the public to more than 0.1 Rem (100 millirem) in a year.

3) Does NFS release HEU into the Nolichucky River?

Yes, NFS discharges trace amounts of uranium (U) into the Nolichucky River which includes HEU. NRC regulations specify release limits for various radionuclides including uranium isotopes, U^{235} and U^{238}, which are two major components in HEU.

Natural uranium, the type of material found in rocks and soil, is composed of approximately 99.3% U^{238} and 0.7% U^{235}. Highly enriched uranium, the type of material used at NFS, is enriched in the U^{235} isotope to greater than 20%. Since NFS is licensed to handle and process HEU, trace amounts of HEU may be present in liquid wastes. Liquid waste is processed, sampled, and analyzed prior to be discharged off-site. The effluent monitoring program ensures that liquid discharges comply with the regulatory release limits.

The parameter for safety associated with liquid effluent discharges from NFS is the activity concentration and not the enrichment. The NRC regulatory limits are based on activity concentration, and the discharges must comply with these release limits, regardless of their enrichment. The allowable release limit for both U^{235} and U^{238} is 3.0×10^{-7} µCi/ml. This release limit was calculated as a safe limit even with the conservative assumption

that a member of the public consumes water directly from the liquid discharge point at this concentration for an entire year.

NFS effluent reports are available on ADAMS via this link.

4) Does NFS discharge HEU into Martin's Creek?

No. NFS does not discharge process wastewater to Martin's Creek and therefore does not discharge HEU into Martin's Creek.

5) Since NFS discharges HEU into the Nolichucky River, are the HEU discharges authorized by the NPDES permit issued by the State of Tennessee (TDEC) or the special nuclear material (SNM) license issued by the NRC?

Effluents containing HEU are authorized by the SNM license issued by the NRC. All NRC licensees are authorized to discharge water containing trace amounts of radioactive material within the limits specified in 10 CFR Part 20.

6) Does NFS release tritium into the Nolichucky River?

No. NFS neither produces tritium (H-3) nor discharges tritium into the Nolichucky River.

7) Since NFS is discharging radioactive materials into the Nolichucky River, is the river safe for recreational activities?

Yes. The NRC licenses and inspects NFS's activities related to sampling and monitoring of effluents resulting from NFS operations. NRC's regulations require facilities like NFS to demonstrate that discharges to the river do not exceed the public dose limit of 0.1 Rem (100 millirem) per year. Therefore, the concentration of radiological materials in the Nolichucky River is safe for recreational activities.

8) The fish near the Indian Creek River used to be plentiful, however, from 2006 - 2011, the fish population decreased. In addition, there are five different species of river animals disappearing. What information does the NRC have regarding this?

The NRC does not have information concerning changes in animal populations.

9) Does the amount of HEU that NFS is allowed to discharge pose a security concern?

No. The amount of HEU allowed to be discharged from NFS is too small to be considered a security risk.

10) Is the water coming from NFS's effluent outfall at the Nolichucky River required to meet EPA drinking water limits?

No. Drinking water limits apply to drinking water sources such as wells and municipal water systems. The effluent outfall at the Nolichucky is an NRC-regulated effluent discharge point and it is not classified as a source of drinking water. Therefore, EPA drinking water standards would not apply.

11) According to NFS's “Biannual Effluent Monitoring Reports,” the same volume of effluent discharge is used for each radionuclide effluent stream. Does that mean that each radionuclide is being discharged as a fraction of the total volume of liquid effluents?

For the WWTF, the total volume reported is the total of all batch releases to the environment for the applicable 6 month period. This number is used in the calculation needed to obtain the total Curie content released as well as the total gram quantity released. The activity concentration is determined by capturing a composite sample for each liquid effluent discharge. A weighted average of the activity concentration can then be calculated over the course of 6 months. In this way, the total discharge volume is used in the calculation for each radionuclide.

12) Why did the “Biannual Effluent Monitoring Report” for the period of July 1, 2005 to December 31, 2005 show different discharge volumes for the WWTF?

The “Biannual Effluent Monitoring Report” for the period of July 1, 2005, to December 31, 2005 (ADAMS ML060590265) shows two different volumes for the radionuclides discharged from the WWTF. The different volume results were due to a change in plant operations during the reported time frame. Specifically, as a result of operation of the Blended Low Enriched Uranium (BLEU) project, several new radionuclides were identified in the latter half of 2005 that could have exceeded ten percent of the discharge limits. NFS was required to analyze for these new radionuclides. For this reason, some effluent calculations were based on the wastewater discharge volume corresponding to the newly-identified radionuclides (i.e., 2.3 million liters) while the radionuclides measured for the entire period used the corresponding wastewater discharge volume (i.e., 5.1 million liters).

13) How does the NRC verify that the effluent monitoring reports accurately account for the actual volume and activity concentration of each radionuclide discharged by NFS?

Inspection activities conducted by both the resident and region-based inspectors routinely assess NFS’s effluent monitoring program. During the environmental protection inspections, NRC inspectors assess the licensee’s compliance with license requirements program procedures for the collection and analysis of effluent samples. One of the inspection objectives is to obtain reasonable assurance that data contained in effluent monitoring reports accurately reflects the amount of radioactive material released to the environment.

14) Why are negative effluent quantities and percentages listed in the effluent monitoring reports submitted by NFS?

Nuclear Fuel Services is required to monitor and analyze radioactivity concentrations in liquid and gaseous effluent pathways. For each measurement, the background activity is subtracted from the measured activity of the sample to determine the actual amount of activity in the effluent sample. This ensures that the activities and concentrations used in the calculation of public dose are based upon the actual amount of radioactivity present in the effluent due to plant operations.

According to the National Council on Radiation Protection and Measurements (NCRP), NCRP Report 58, "A Handbook of Radioactivity Measurements Procedures," 2nd Edition, a "negative" value is a valid measurement and simply indicates that no measurable amount of radioactivity was statistically detected in the sample above background levels.

The NCRP report notes that radioactive decay is a statistical process and consequently repetitive measurements of the same sample will result in a range of concentrations. Effluent analyses require a high level of confidence that the "true" amount of radioactivity has been determined. Since the concentrations of some radionuclides in effluent releases are indistinguishable from background radiation levels, there is a statistical probability that a given measurement may be "less than" background levels. The NCRP report states that under these circumstances a negative value may be reported. In Inspection Report 70-143/2010-004 (ADAMS ML110280474), NRC inspectors addressed the use of negative numbers in the effluent monitoring reports submitted by NFS.

Airborne Effluents

1) How are the workers and the public assured that they are not breathing contaminated air from the NFS site?

Workers: The processes at NFS are performed in enclosed components supported by ventilation systems to limit the workers' exposure to airborne radiation. The air sampling program, a system of detectors designed to measure airborne radioactivity, is also routinely implemented in work areas and during specific jobs. The NFS's radiation protection program is responsible for evaluating planned job activities to determine if the workers should wear respiratory protection. The dose limits in 10 CFR 20 include any contribution to a worker's occupational exposure from airborne radioactivity. The NRC inspectors review air sampling results and the radiation protection program during inspections to verify compliance with applicable requirements..

Public: The airflow from plant processes and work areas is routed through High Efficiency Particulate Air (HEPA) filters and/or scrubbers to significantly reduce the amount of radiation (i.e., contamination) released to the environment. The filters and scrubbers are designed to remove particles (including uranium) and chemicals from the air. In addition, NFS has a sampling program to monitor the amount of contaminants that enter the environment through the plant's stacks to ensure compliance with NRC's effluent limits in 10 CFR 20. NFS also has air sampling equipment posted in outdoor areas on the site and in the community. The NRC inspectors review both the measured effluents and air sampling results during inspections to verify compliance with applicable requirements.

The chemical contaminants present in work areas or released to the environment are within the jurisdiction of the TDEC.

2) Some fractions (such as for uranium-234) of the effluent concentration values (ECV) associated with NFS's stack exhausts are greater than one in NFS's Biannual Effluent Monitoring Reports. Are NFS effluents above the regulatory limit for certain isotopes?

No. The NRC is not aware of any recent effluents from NFS's stack exhausts exceeding the regulatory limit for any of the reported isotopes, including uranium-234. NRC regulations allow licensees to demonstrate compliance with the public dose requirements utilizing two different methods.

In the first method, the licensee demonstrates that the average annual concentrations of radioactive material in effluent releases *at the boundary of the unrestricted area* do not exceed the regulatory release limits given in 10 CFR 20, Appendix B, Table 2. This is the most conservative method since the release limits assume that an individual is

continuously present at the site boundary. If the concentration of radioactive material in the releases is below the limit in 10 CFR 20, Appendix B, no further calculations are required to demonstrate compliance with the public dose requirements. If the concentration of radioactive material is above the boundary limit in 10 CFR 20, Appendix B, the ECV calculation will have a result greater than 1. Under these circumstances, the licensee implements the second method as allowed by NRC regulations.

In the second method, NFS performs additional calculations to estimate the exposure to an individual located at the NFS site boundary and confirm that exposure limits are not exceeded. The licensee demonstrates compliance by using measurements to calculate the dose to an individual likely to receive the highest dose. This method must demonstrate that the annual dose limit to a member of the public is not exceeded. NFS assumes the worst case scenario when assessing doses to members of the public. For example, NFS's calculations assume that an individual is present at the top of the stack breathing the exhaust for 24 hours a day for an entire year. This is a conservative practice since concentrations would be lower at the boundary of the restricted area than the values measured at the stack exhaust.

NFS's effluent reports are available on ADAMS via this link.

3) NRC Inspection Report 70-143/2005-007 closed inspector follow-up item (IFI) 2005-003-04 associated with an elevated stack sample above the licensee's action limits. How did the inspectors determine whether or not the elevated stack sample represented a release above regulatory limits?

The release associated with the elevated stack sample was below the regulatory limits. The IFI was originally opened by the NRC when NFS identified an elevated stack sample during routine stack sampling. The elevated stack sample was caused by a buildup of liquid waste in the hydrogen dilution ventilation system. The licensee submitted the air sample filter to an off-site laboratory for isotopic analysis. The IFI was opened to ensure that the NRC reviewed the results of the analysis when they became available. The IFI was later closed by another NRC inspector after reviewing the results. In 2005, the inspector determined that the stack release did not contribute to a significant dose to the public, but did not elaborate in the report on how that conclusion was reached.

During the 2009 environmental inspection, NRC inspectors followed up on the closed IFI to gather more information. The inspectors reviewed the NFS calculations for the public dose contribution from the elevated airborne release and also reviewed documents which detailed methods to prevent recurrence of the airborne release. The inspectors reviewed the analytical methods and determined that the licensee utilized an off-site laboratory with the proper accreditation and approved analysis methods. The inspection determined that the public dose calculations completed for that time period were below the NRC's limits defined in 10 CFR 20.1301 (100 millirem in a year and 2 millirem in any one hour). The inspectors also determined that the corrective actions to prevent recurrence were adequate and had been implemented.

4) How does NFS meet the chemical concentration limits for discharges from the process stacks?

At NFS, process off-gases are filtered through a chemical scrubber that removes various chemicals from the airborne effluents. The chemical discharges to the environment are the

regulatory jurisdiction of TDEC. For more information on the chemical component of the airborne effluents and NFS compliance with applicable regulatory requirements, please see https://www.tn.gov/environment.html for contact information.

5) If the chemicals in airborne effluents are not caught by the scrubbers, then are they stopping at the fence?

No. If chemicals contained in the airborne effluent are not captured by the chemical scrubber and filtration systems, then they are released to the atmosphere. The chemicals would be subject to dispersion and diffusion in the atmosphere; two scientific principles which affect how small particles and gases are transported in the air. The chemical discharges to the environment are the regulatory jurisdiction of TDEC. For more information on the chemical component of the airborne effluents and NFS compliance with applicable regulatory requirements, please see https://www.tn.gov/environment.html for contact information.

6) When was NFS's main stack (No. 416) constructed?

The main airborne effluent stack was constructed in approximately 1983.

Groundwater

1) What groundwater contamination has occurred at NFS?

The groundwater contamination at NFS, both chemical and radiological, is the product of localized spills of contaminants or negative effects from past authorized operations such as former lagoons and former burial sites. Trichloroethylene (TCE), Technicium-99 (Tc-99), and uranium are the contaminants involved in the groundwater contamination at the NFS site.

Trichloroethylene and Technicium-99 are two contaminants that were introduced to the soil, and then groundwater, from localized spills which occurred in various areas of the plant. Trichloroethylene is a chemical (not radiological) contaminant that was used at NFS as an industrial solvent and is outside of NRC's jurisdiction. Technicium-99 (radiological) is a radioactive metal resulting from past uranium recovery operations. The licensee has been implementing groundwater remediation activities to reduce the concentration of TCE and Tc-99 to safe levels.

Uranium contamination was introduced to the groundwater through soil contamination from the former lagoons and burial sites. After the former lagoons and burial sites were removed, the soil around these areas was also removed and the land heavily remediated. The uranium in the groundwater has been positively affected by the process that NFS used to treat the TCE and has been able to decrease the amount of uranium in the groundwater.

2) What is the status of radioactive Tc-99 contamination in the groundwater?

Technetium-99 is present in the groundwater on-site at NFS. The licensee detected elevated levels of Tc-99 in on-site groundwater monitoring wells between 1998 and 2004. The highest level was recorded at 25,770 picocuries per liter (pCi/L) in July 1999. To reduce Tc-99 on-site groundwater concentrations, a well pumping process was initiated.

The treatment process has lowered Tc-99 on-site groundwater concentrations since 2004 to near or below 1 percent of the NRC effluent release limit. The effluent release limit for Tc-99 specified in 10 CFR 20, Appendix B for off-site water effluent releases is 60,000 pCi/L. Since no additional sources of Tc-99 groundwater contamination are available the treatment process was terminated. However, sampling and analysis of groundwater monitoring wells is still included in NFS's environmental monitoring program. If future concentrations of Tc-99 in on-site groundwater indicate an adverse trend, NFS could initiate the treatment processes as needed.

3) How did Tc-99 get into the groundwater?

In the late 1990s, NFS was contracted to recover uranium that had been trapped in various process filters. The material originated from a Department of Energy (DOE) site and contained Tc-99 in addition to uranium. Processing of the material at NFS resulted in the introduction of Tc-99 into the plant's effluent stream. Nuclear Fuel Services installed filters to maintain airborne and liquid effluents within regulatory release limits. The filters were periodically cleaned, and the debris collected in a storage tank. The storage tank subsequently leaked through a concrete pad with Tc-99 contaminated water reaching the groundwater. The leak was subsequently repaired, stopping any additional Tc-99 from entering the groundwater. Upon completion of the DOE project, the material was removed, and process buildings dismantled. No additional Tc-99 contaminated material has been processed at the NFS facility since that time.

4) Has Tc-99 entered the Nolichucky River?

The NRC is not aware of any evidence indicating that Tc-99 contaminated groundwater reached the river. Concentrations of radioactive material in river water samples are analyzed for total activity. Water samples are not required to be analyzed for specific radionuclides provided that gross radioactivity concentrations are below established values. The gross radioactivity limit is predicated on the fact that as long as gross radioactivity concentrations are below this value then individual radionuclides, if present, would be present in concentrations not exceeding 10 percent of regulatory release limits. In addition, samples routinely obtained from monitoring wells positioned between the site and the river has not detected Tc-99 concentrations above 0.5 percent of the NRC effluent release limit of 60,000 pCi/L.

5) Where is the water from the lagoons (former wastewater settling ponds) pumped?

Nuclear Fuel Services no longer have settling ponds (or “lagoons”) to process wastewater. The NFS ponds were used in the 1950s through the 1970s until the WWTF became operational in the late 1970s. The land around and beneath the ponds has been remediated by removing the contaminated soil and backfilling the excavated areas. The contaminated soil was shipped to an authorized off-site disposal facility. Liquid wastes resulting from fuel process operations are solely processed through the WWTF.

During the remediation process and prior to backfilling, excavated areas resulted in large pits which filled with groundwater and rainwater to form "on-site ponds." The licensee implemented a sampling program of the surface water in these on-site ponds. The licensee also used to pump the water from the on-site ponds to the groundwater treatment facility for processing. The facility treated the water to ensure compliance with the requirements of the State of Tennessee discharge permit as well as applicable NRC

regulatory limits. The groundwater treatment facility treated the water for volatile chemicals and also removed uranium and other heavy metals which may have been in the groundwater. The process stream was sampled and analyzed prior to release to the sanitary sewer system.

6) Why does NFS filter its groundwater samples before analyzing for radionuclides?

Nuclear Fuel Services filters the groundwater samples before analyzing for radionuclides to remove sediment. It is common practice to use a 45-micron filter to remove sediment from the bottom of wells in groundwater samples. A licensee's evaluation of analytical results for filtered and unfiltered sample data from their wells demonstrated that there was little difference between the two sets of data.

7) Is the NRC aware of the subsurface plutonium plume emanating from NFS? What is the NRC going to do about it?

The NRC is not aware of a plutonium groundwater plume. As discussed in Section 4.5.2 of the NFS License Renewal EA, there are two groundwater plumes emanating from NFS – a uranium plume and an organic solvent plume. Cleanup efforts for these plumes have been conducted under the oversight of the EPA and TDEC. TDEC has determined that treatment programs have greatly reduced the size of the groundwater plumes.

Soil Contamination

1) The 1986 Markey hearing files indicate that the ground around the NFS 310 Warehouse is contaminated. When was the 310 Warehouse built? Also, is there contamination, paint thinner, motors, and other waste buried 45 feet underneath this building?

The 310 Warehouse was constructed in 1969 and has been used to store various types of radiological materials.

The NRC staff requested that NFS investigate whether significant contamination (radiological or chemical) was present approximately 45 feet below the 310 Warehouse. The NFS investigation into the NRC's request indicated no evidence of significant contamination below the 310 Warehouse. As part of the investigation, NFS interviewed the project engineer who managed the construction of the 310 Warehouse in 1969. He stated that there was no known burial in the land beneath it. To verify this conclusion, the NRC reviewed summaries of the history of the 310 Warehouse. In addition, the NRC reviewed NFS's well monitoring records for the NFS property. The NRC's review indicated that bedrock is present at a depth of approximately 20 feet. Therefore, burial of items at a depth of 45 feet was unlikely. NRC staff also reviewed sampling results covering a five years period for monitoring wells near and downhill from the 310 Warehouse (Wells 104A, 105A, and 106A). The NRC determined that all three wells were at or below the instrumentation's detection limits for gross alpha, gross beta, and Tc-99. Based on this information and the review of recent sampling results, no evidence exists that indicates the presence of significant amounts of radiological or chemical materials under the 310 Warehouse.

The NFS's response to the NRC's request noted the fact that the southwest burial trenches (located approximately 30 feet west of the 310 Warehouse on NFS property) indeed once had equipment, tanks, and other large debris buried in them. The southwest burial

trenches were approximately 15 feet deep. However, the trenches were emptied, and the contaminated soils removed prior to May 2000. The NRC determined that no significant environmental issues relating to this area currently exist.

2) Nuclear Fuel Services purchased the property at 275 Stalling Lane in Erwin. Does this mean that the property was contaminated?

No. Based on the information provided to the NRC by NFS officials, NFS never believed the property was contaminated. The land was purchased due to its value and proximity to the plant. To confirm there was no contamination, NFS performed a radiological survey of the property, which was witnessed by the NRC. The survey found that the property was not contaminated.

The NRC confirmed that the house is located uphill from the NFS facility. Therefore, groundwater flows from the house to the plant. This fact eliminates groundwater as a potential pathway for contamination originating from the plant, leaving air as the only possible source of potential contamination to the house. The licensee reviewed off-site sampling results for air, stream, soil, and vegetation near the property; and no contamination was found.

Additionally, NRC routine environmental protection inspections included a review of the licensee's air monitoring records and processes for the site. The inspectors did not identify any issues of safety significance or indications of airborne effluent releases that could contribute to measurable contamination of off-site property.

The Former Plutonium Building

1) What is the status of the Building 234 (i.e. Plutonium Building) decommissioning?

In 2003, Nuclear Fuel Services removed the physical structure of Building 234 as part of cleanup activities. The materials removed were sent to off-site disposal sites during the time frame of 1999 to 2003 in various phases of facility decommissioning. In 2003, the licensee erected a large tent over the building footprint. As of May 2023, the licensee had completed excavation and backfilling of the contaminated soil beneath the building footprint and planned to continue with further decommissioning activities. Cleanup activities with regard to Building 234 do not require a formal decommissioning plan as agreed to by the NRC in a letter dated March 30, 2010 (ML100880456). This contains the basis for why the cleanup activity is considered a source reduction activity that is authorized by the license.

2) When was the plutonium facility shutdown?

Building 234, the Plutonium Building, stopped operation in 1973.

3) Is NFS a fuel reprocessing facility and therefore subject to the requirements of 10 CFR Part 50?

No. The NFS site fabricates new fuel and other uranium products under 10 CFR 70. Facilities licensed under 10 CFR 70 are not required to comply with the requirements of 10

CFR Part 50, except for “plutonium processing and fuel fabrication plants” as defined in 10 CFR 70.4. This type of facility is required to comply with the quality assurance (QA) requirements in 10 CFR 50, Appendix B. The NFS site does not reprocess spent reactor fuel or process plutonium for fuel fabrication. Additionally, the regulations in 10 CFR Part 50 apply only to “production facilities” and “utilization facilities” as defined in 10 CFR 50.2 and the NFS site does not meet these definitions.

The fuel production activities performed at NFS, as authorized by NRC Materials License SNM-124, do not meet the definitions for “plutonium processing and fuel fabrication plant,” “production facility,” or “utilization facility.” Therefore, the regulations in 10 CFR 50 do not apply to NFS.

4) Does NFS discharge plutonium to the river?

Yes, trace amounts of plutonium are discharged in NFS’s liquid effluents and subject to the concentration limits in 10 CFR 20.1301. Specific concentrations of plutonium in the discharge waters can be retrieved from the semi-annual effluent reports submitted to the NRC, available on ADAMS via this link.

5) Are NFS workers trained on the hazards of plutonium and how often?

Radiation workers at NFS are trained routinely on the general radiological hazards they will encounter. The licensee has determined that most of the radiation workers will not encounter plutonium, thus general radiation worker training does not distinguish plutonium hazards from other radiological hazards. If workers are going to work in an area where plutonium hazards are possible, pre-job briefings and Radiation Work Permits will provide instructions and discuss the hazards and the proper precautions to take.

6) What is the status of the Building 110 Plutonium Lab?

The Building 110 Plutonium Lab was decommissioned in the early 1990's and has been repurposed for other laboratory work. The original 110 Plutonium Lab was operated to support Building 234 operations during the 1970's time frame.

7) Has NFS ever operated a nuclear reactor called the Southwest Experimental Fast Oxide Reactor (SEFOR)?

No. Nuclear Fuel Services has never operated, nor has it been licensed to operate any type of nuclear reactor facility, including the SEFOR.

During the 1960s and 1970s, NFS manufactured fuel for SEFOR in Building 234. The associated processing equipment was removed, and the building was torn down in 2003.

8) Is waste from the West Valley, NY former commercial spent fuel reprocessing facility located at NFS? Also, is waste from NFS located at Bumpass Cove, TN?

No, waste from the West Valley, NY former commercial spent fuel reprocessing facility is not located at NFS. In addition, NFS does not have waste located at Bumpass Cove, TN. The NRC was aware that the mixed oxide fuel work that NFS performed to reprocess spent nuclear fuel for West Valley in the 1970s resulted in contamination of the land beneath Building 234 (Plutonium Building) on the NFS site. However, this waste resulted from

operations at NFS, not the disposal of West Valley waste at NFS.

In addition, waste from the NFS Erwin facility was not buried at Bumpass Cove. The NRC staff conferred with the federal EPA and state officials who stated that the Bumpass Cove landfill was cleaned up. The site was archived as an Environmental Protection Agency (EPA) Superfund site in 2003, meaning no further environmental action will be taken. For further details contact the EPA or the Tennessee Department of Environment and Conservation.

9) In March 2019, the National Institute for Occupational Safety and Health released a white paper on intake and exposure of plutonium at W.R. Grace, a former operator of the NFS site. What are the implications of this document?

The NRC has no specific comments on the paper. The document was prepared by the National Institute for Occupational Safety and Health (NIOSH), which is part of the Department of Health and Human Services. The information in the NIOSH white paper is used to determine whether workers qualify for benefits from the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). The EEOICPA provides compensation for current or former employees of the DOE, its predecessor agencies, and contractors who were diagnosed with certain health conditions. The EEOICPA program is administered by the Department of Labor, Department of Energy, Department of Justice, and the Department of Health and Human Services. Nuclear worker compensation is not within NRC's statutory jurisdiction.

In the period from late 1950s through early 1970s, and prior to being an NRC-regulated facility, W.R. Grace processed plutonium at the NFS site in support of DOE programs. Plutonium activities at NFS were suspended in 1973 and on-site remediation activities have been in effect for the last decades. The plant processes and worker conditions within the scope of the Act are not representative of current plant operation and radiation protection measures.

Additional information on EEOICPA is available on the U.S. Department of Labor website (www.dol.gov).

Bowl Cleaning Station Event at NFS on October 13, 2009 (Event Notice 45446)

1) What enforcement actions did the NRC take with respect to the issues identified during the inspection of the bowl cleaning station event from October 13, 2009, Event Notice (EN) 45446?

On September 2, 2010, the NRC issued a Severity Level III Notice of Violation and a civil penalty of $140,000 (ADAMS ML102450223) for the issues identified during the inspection of the October 13, 2009, event. The results of the NRC inspection into the event can be found in Inspection Report 2009-011 (ADAMS ML100780127).

On January 7, 2010, the NRC issued a CAL (ADAMS ML100070118) resulting in an extended shutdown of the facility based, in part, on inspection results pertaining to this event.

2) Why was the civil penalty not more than $140K?

The civil penalty amount stemmed from the following: (1) the lack of identification credit due to the self-revealing nature of the event, (2) the lack of corrective action credit due to the need for the NRC to issue a CAL to NFS to ensure that corrective actions were implemented prior to restart of operations, (3) and the application of discretion to escalate the civil penalty amount due to the poor performance of the licensee and the apparent ineffectiveness of NFS's actions to address the issues that resulted in the February 21, 2007 Confirmatory Order (ADAMS ML070520607).

In accordance with the NRC's Enforcement Policy at the time, a base civil penalty in the amount of $35,000 was considered for a Severity Level III violation. Since NFS was the subject of escalated enforcement within the past two years of the enforcement panel, the NRC considered whether credit was warranted for *Identification and Corrective Action* in accordance with the civil penalty assessment process in Section VI.C.2 of the Enforcement Policy. The NRC concluded that credit was not warranted for the factor of *Identification* because the violations in Part I of the Notice were identified as the result of an event. The NRC concluded that without NRC intervention (in the form of the CAL of January 7, 2010), NFS would not have fully understood the root and contributing causes; and would not have identified and implemented comprehensive corrective actions. Based on the above, the NRC concluded that credit was not warranted for the factor of *Corrective Action*. Therefore, the base civil penalty amount increased to $70,000. Subsequently, the NRC applied discretion due to NFS's poor performance and increased the civil penalty amount to $140,000.

The issues identified in Inspection Report 70-143/2009-011 (ADAMS ML100780127) contained a Severity Level III violation. The significance of the issues would have to be greater for the civil penalty amount to exceed $140,000.

3) When did NFS pay the fine?

The civil penalty was paid by NFS on September 20, 2010.

4) In the wake of this enforcement, why was NFS allowed to operate?

The enforcement to the bowl cleaning station event was issued on September 2, 2010. Prior to this enforcement, the NRC had already taken enforcement action to ensure NFS implemented the necessary corrective actions before restarting NFS operations. The January 7, 2010 CAL (ADAMS ML100070118) specified the commitments NFS was required to perform prior to resuming operations. The CAL commitments were derived from the results of the augmented inspection of the bowl cleaning station event.

Prior to authorizing NFS to resume operations of a process line, the NRC conducted inspections to verify and assess NFS's readiness to restart that process line. Using this assessment, the NRC had reasonable assurance that NFS could operate the plant safely.

5) Why did it take the NRC almost 10 months from the date of the event to issue the final enforcement action?

The time between the event at NFS and the issuance of the final enforcement action was

due to an increased inspection effort, analysis of the inspection results, internal discussions and communications within the NRC, and communications with NFS.

On October 13, 2009, NFS informed the NRC of the bowl cleaning station event (EN 45446) to the NRC and that immediate corrective actions were taken to insure health and safety. The NRC identified and confirmed various issues through an augmented inspection in late 2009. Upon identification of those issues, the NRC took enforcement action through the issuance of the January 7, 2010 CAL (ADAMS ML100070118), resulting in an extended shutdown of the facility. The results of that augmented inspection were later issued in Inspection Report 70-143/2009-011 (ADAMS ML100780127) on March 19, 2010. Additional NRC discussion and review characterized the issues as apparent violations in Inspection Report 70-143/2010-007 (ADAMS ML101460178) on May 26, 2010. The NRC then processed the apparent violations through its enforcement process to determine the appropriate significance. The NRC also held a public pre-decisional enforcement conference with NFS on July 13, 2010, to provide NFS the opportunity to present facts that should be considered as part of the enforcement process. Subsequently, the NRC issued the final enforcement action on September 2, 2010, as Inspection Report 70-143/2010-010 (ADAMS ML102450223).

6) Why did the NRC not identify this issue earlier?

The specific performance deficiencies that resulted in the Severity Level III violation occurred in the September to October 2009 timeframe. The NRC identified the violation shortly after the actual performance deficiencies manifested in the October 13, 2009, process upset (ADAMS ML093350552).

NFS's January 7, 2010 Confirmatory Action Letter

1) What events, inspection results and assessments led to NFS's January 7, 2010 CAL being issued?

On October 13, 2009, NFS experienced an unanticipated exothermic reaction within the uranium-aluminum portion of the BLEU Preparation Facility (EN 45446) referred to as the 'Bowl Cleaning Event'. The NRC dispatched a Special Inspection Team and then elevated its response to an Augmented Inspection Team (AIT) when the licensee evaluated the event as having potential to be a high-consequence event under certain circumstances.

Based on preliminary indications from the AIT, the NRC conducted a review of NFS's performance since the issuance of the Confirmatory Order dated February 21, 2007. In addition to the event discussed above, the inspectors specifically reviewed the uranium hexafluoride (UF_6) Commercial Development (CD) line operational readiness review of June 2009, the CD line glove box fire of November 2009, and recent enforcement activities including an inaccurate reply to a notice of violation. The results of the NRC's deliberations on these issues are documented in the LPR Period Adjustment letter dated November 5, 2010 (ADAMS ML103090576) and summarized below.

CD line Operational Readiness Review: The NRC staff conducted an operational readiness review of the CD line in June 2009. The staff identified one significant design inadequacy with regard to accident scenarios for certain process columns. The staff

also had to prompt NFS to initiate a root cause analysis to identify corrective actions to address the circumstances that may have contributed to the failure to initially recognize the design inadequacy. The results of the NRC inspection are documented in Inspection Report 70-143/2009-009 (ADAMS ML092050562).

CD line glove box fire: The CD line experienced a process upset in November 2009. That event (EN 45497) involved an unexpected fire which damaged portions of a glove box containing a cylinder of UF_6. The results of the NRC inspection of the event are documented in Inspection Report 70-143/2009-004 (ADAMS ML100430924).

Inaccurate Reply to a Notice of Violation: In a letter dated October 13, 2009 (ADAMS ML092930282), NFS informed the NRC that a response to a Notice of Violation previously submitted in November 2008 (ADAMS ML083370179) was not accurate. NRC enforcement regarding this issue resulted in the November 16, 2010, Confirmatory Order (ADAMS ML103210221).

These events and inspection results led to CAL No. 2-2010-001 issued by the NRC on January 7, 2010 (ADAMS ML100070118).

2) What was NFS committed to do in CAL No. 2-2010-001? What was required before NFS could resume operation?

The licensee committed to suspend SNM processing operations associated with all production lines until the commitments listed as "Actions Prior to Restart of Operations" in CAL 2-2010-001 (ADAMS ML100070118) were completed and inspected by the NRC. In addition, NFS was committed to complete the "Actions Post Restart of Operations" list in the CAL.

Before NFS could resume operations, they were required to complete the appropriate "Actions to Restart of Operations" commitments associated with the process line. The NRC oversight of the implementation of NFS's commitments included inspections and assessment of the completed actions for each process.

3) Is it typical to use a CAL in this type of situation?

Yes. When the NRC has a safety concern pertaining to the operation of the plant, it may be appropriate to issue a CAL to ensure that the licensee maintains the facility, process, or equipment in a safe condition (including shutdown when appropriate) while the licensee takes appropriate action to correct the concern. If the licensee agrees to take the actions the NRC believes are necessary to resolve its safety concerns, these commitments are communicated in a letter to the NRC and affirmed in a CAL back to the licensee. This process provides timely action while ensuring adequate protection of public health and safety, and protection of the environment.

4) What would happen if NFS did not follow-through on its commitments?

The failure to fulfill the terms of the CAL would result in NRC consideration of a confirmatory order. The NRC would evaluate the need to modify, suspend or revoke the NFS license.

5) Did this CAL relieve NFS of the commitments it made with regard to the 2007 Confirmatory Order?

No, the CAL issued on January 7, 2010 (ADAMS ML100070118) does not relieve NFS of the 2007 Confirmatory Order commitments. The CAL was written to seek short-term corrective actions designed to ensure that the events leading up to the Confirmatory Action Letter were properly evaluated and corrected to prevent recurrence of the problems.

The 2010 Confirmatory Order (ADAMS ML103210213), issued on November 16, 2010, did supersede the February 21, 2007 Confirmatory Order (ML070520607).

6) When did the NRC authorize NFS to restart the various process lines?

The NRC authorized NFS to restart the various process lines on the following dates:

- Navy Fuel process line – March 23, 2010
- Uranium Metal/Oxide process line – May 19, 2010
- Uranium-Aluminum process line and Building 301 Column Dissolvers – July 6, 2010 (Note: This process is no longer in operation.)
- Ammonium Diuranate (ADU) process and support equipment – October 22, 2010 (Note: This process is no longer in operation.)
- UF_6 process line – July 12, 2011 (Note: This process is no longer in operation.)

NFS Process Line Restarts in 2010 and 2011

Naval Fuel Process Line Restart

1) What did the NRC inspect to verify NFS's readiness to restart the Navy Fuel process line?

On February 22, 2010, the NRC formed a six-person inspection team (Restart Readiness Assessment Team 1) to review the NFS's readiness to restart the Navy Fuel process line. The team spent more than 720 inspection hours evaluating various changes that NFS had implemented as a result of the January 7, 2010 CAL to improve plant operations, design basis documentation, and safety culture at the site. The inspection objectives were completed as planned and included the following activities:

- verifications that the "Actions Prior to Restart of Operations," as noted in the CAL, had been completed;
- verifications that the licensee's assessment and corrective actions sufficiently addressed the concerns about the adequacy of NFS's management oversight of facility process changes, perceived production pressures, lack of questioning attitude by workers and management, and poor communication;
- an assessment of the licensee's readiness to restart the Navy Fuel process line; and
- an evaluation of the basis to support approval to restart the Navy Fuel process line.

The inspectors verified that the requirements for restart were completed in accordance with the CAL. The inspectors also performed a series of in-depth interviews with plant personnel to verify that weaknesses noted by the AIT such as lack of management oversight, perceived production pressures, lack of questioning attitude, and poor

communications had been shared with all plant personnel, and that recent conduct of operations changes addressed these concerns. The inspectors noted no overarching safety concerns during these interviews. Finally, the inspectors performed a detailed review of the licensee's efforts regarding outstanding corrective actions, procedure changes, outstanding work orders, and a review of recent plant events to verify the site's readiness to restart the Navy Fuel process line. The inspectors noted no outstanding safety concerns in this process line. The results of the inspection were documented in Inspection Report 70-143/2010-005 (ADAMS ML101530164).

2) What did the NRC do to inspect NFS as it restarted the operation of the Navy Fuel process line?

The NRC formed a three-person team to perform on-site inspections during the initial startup phase of the Navy Fuel process line. The inspectors provided 24 hours per day coverage during process operations and independently examined and evaluated licensee activities to ensure the facility was being safely operated. This inspection continued for approximately three weeks until the NRC obtained reasonable assurance that NFS's operational performance was conducted with an appropriate focus on safety. Following this period, the NRC's oversight returned to its normal oversight coverage with the two on-site NRC resident inspectors. The NRC resident inspectors implemented daily, Monday through Friday inspections of licensee activities that were supplemented with periodic back shift inspections on nights and weekends.

3) NRC Inspection Report 70-143/2010-005 (ADAMS ML101530164), Section C.2, stated that "*modifications had been completed to the point where post-modifications testing was the next stage in the process. However, from a review of the work request packages that were posted at the job locations, the team noted that none of the modifications selected had been inspected by the process engineers responsible for the modifications.*" Is this text an example of lying to the NRC? Is it against the law to lie to the NRC?

This question stemmed from Restart Readiness Assessment Team (RRAT) #1 inspection report which examined the restart of the Navy Fuel process line. The subject inspection report described NRC interviews with managers in the process engineering department. The managers believed that most modifications were complete and that they were ready for the next stage in the process, i.e., post-modification testing. Upon further inspection, the NRC inspectors determined that NFS was not ready for the post-modification inspection and that the licensee still needed to complete the process engineer modification inspections. The NRC inspectors determined that the inconsistent information was due to confusion among NFS staff and the issue did not involve licensee staff providing materially inaccurate or incomplete information to the NRC.

The NRC regulation 10 CFR 70.9, “Completeness and Accuracy of Information,” states, in part, that information provided to the Commission by a licensee or information required by statute or by the Commission's regulations, orders, or license conditions to be maintained by the licensee shall be complete and accurate in all material respects. Additionally, 10 CFR 70.10, “Deliberate Misconduct,” states in part, that a licensee may not deliberately submit to the NRC information that the person submitting the information knows to be incomplete or inaccurate in some respect material to the NRC. In the context of these regulations, it is a violation to provide, either unintentionally or deliberately, incomplete or inaccurate information that is material in some respect to the NRC. However, neither of those violations occurred in this case.

4) One of the issues associated with Work Request M141767 included the calibration of important plant equipment in the Navy Fuel line, which should have been identified as restart items, but were not. Is this being tracked as an unresolved item (URI) or IFI?

No, an URI or IFI was not opened for this concern. This question stemmed from Restart Readiness Assessment Team (RRAT) #1 inspection report 70-143/2010-005 (ADAMS ML101530164) which examined the restart of the Navy Fuel process line. This report discussed an NRC review of work requests and noted that Work Request M141767, "Calibration of Important Plant Equipment," was an example of a work request that was not identified by the licensee's screening program as necessary for restart when the NRC determined it should have been. The licensee-initiated actions to address the aforementioned weaknesses in their initial evaluation of open work items. The team concluded that the actions proposed by the licensee were comprehensive and adequately addressed the concern. Therefore, an URI or IFI was not opened for this issue.

Uranium Metal/Oxide Process Line Restart

1) What did the NRC inspect to verify NFS's readiness to restart the uranium metal/oxide process?

On May 3, 2010, the NRC formed a five-person inspection team (Restart Readiness Assessment Team 2) to review the readiness of NFS to restart the uranium metal/oxide process line. The team spent more than 200 inspection hours evaluating the changes that NFS had implemented as a result of the CAL to improve plant operations, design basis documentation, and safety culture at the site. The inspectors verified that the requirements for restart were completed in accordance with the CAL. The inspectors noted no outstanding safety concerns in this process line. The results of the inspection were documented in Inspection Report 70-143/2010-006 (ADAMS ML102070447).

2) What did the NRC do to inspect NFS as it restarted the uranium metal/oxide process line?

The NRC performed enhanced on-site inspections with two NRC resident inspectors and a regional inspector during the initial startup phase of the U-metal/oxide process line. Through the enhanced on-site coverage, the inspectors independently examined and evaluated licensee activities to ensure that the facility was being safely operated. This inspection continued until the NRC was assured that NFS's operational performance was conducted with an appropriate focus on safety. Following this period, the NRC's oversight returned to its normal oversight coverage with the two on-site NRC resident inspectors.

Uranium-Aluminum Process Line Restart

1) What did the NRC inspect to verify NFS's readiness to restart the uranium-aluminum process line?

On June 21, 2010, the NRC formed a four-person inspection team (Restart Readiness Assessment Team 3) to review the readiness of NFS to restart the uranium-aluminum process line. The team spent more than 120 inspection hours evaluating various changes that NFS had implemented as a result of the CAL. The inspectors also performed a detailed review of the licensee's efforts regarding outstanding corrective actions, procedure changes, outstanding work orders, and a review of recent plant events to verify

the site's readiness to restart the process line. The inspectors noted no outstanding safety concerns in this process line. The results of the inspection were documented in Inspection Report 70-143/2010- 008 (ADAMS ML102430129). Eventually, the licensee determined this process was no longer necessary and removed it from current operations.

2) What did the NRC do to inspect NFS as it restarted the uranium-aluminum process line?

The NRC performed enhanced on-site inspections with two NRC resident inspectors during the initial startup phase of the uranium-aluminum process line. Through the enhanced on-site coverage, the inspectors independently examined and evaluated licensee activities to ensure the facility was being safely operated. This focused inspection continued until the NRC obtained reasonable assurance that NFS's operational performance was conducted with an appropriate focus on safety. The resident inspectors also continued to provide inspection oversight of routine activities of the Navy Fuel and the uranium metal/oxide process lines. Eventually, the licensee determined this process was no longer necessary and removed it from current operations.

Ammonium Diuranate Process Line Restart

1) What did the NRC inspect to verify NFS's readiness to restart Ammonium Diuranate Process and other Building 301 equipment?

On September 27, 2010, the NRC sent a three-person inspection team (Restart Readiness Assessment Team 4) to review NFS's readiness to restart the ammonium diuranate (ADU) process and other Building 301 equipment. The team spent more than 90 inspection hours evaluating the continued effectiveness of the various changes that NFS implemented as a result of the CAL to improve implementation of the change control program, ability to respond to the added workload of an additional process line, and establishment of safety basis at the plant site. The inspectors performed a detailed review of the licensee's efforts regarding outstanding corrective actions, procedure changes, outstanding work orders, and a review of recent plant events to verify the site's readiness to restart the processes. The inspectors noted no outstanding safety concerns in this process line. The inspection results were captured in Inspection Report 70-143/2010-011 (ML103560078). Eventually, the licensee determined this process was no longer necessary and removed it from current operations.

2) What did the NRC do to inspect NFS as it restarted the Ammonium Diuranate Process and other Building 301 equipment?

Similar to uranium-aluminum process restart, the NRC resident inspectors performed enhanced on-site inspections during the initial startup phase of the various processes to ensure that safety was maintained.

UF_6 Process Restart

1) What did the NRC inspect to verify NFS's readiness to restart the uranium hexafluoride process?

On May 2, 2011, the NRC formed a six-person inspection team (Restart Readiness Assessment Team 5), to review NFS's readiness to restart the uranium hexafluoride (UF_6) process. The NRC's inspection effort continued with in-office reviews until June 30, 2011.

The team spent more than 190 hours evaluating the various changes that NFS implemented as a result of the CAL with a focus on the UF_6 process. The review included the implementation of the change control program, safety design reviews, training course lesson plans, management oversight, communications between organizations, and organizational ability to respond to the additional workloads from the restart of the process. The inspectors conducted walk downs of the equipment and processes. The inspectors performed a detailed review of the licensee's efforts regarding corrective actions, procedure changes, and outstanding work orders in order to verify the site's readiness to restart the process. The inspectors noted no outstanding safety concerns. The results of the inspection were documented in Inspection Report 70-143/2011-007 (ADAMS ML112570351). Eventually, the licensee determined this process was no longer necessary and removed it from current operations, including removal of all UF_6 inventory from the site.

2) What did the NRC do to inspect NFS as it restarted the UF_6 process?

The NRC resident inspectors performed enhanced on-site inspections during the initial startup phase to ensure that safety was maintained. Eventually, the licensee determined this process was no longer necessary and removed it from current operations, including removal of all UF_6 inventory from the site.

Handling, Storage, and Processing of Uranium Hexafluoride

1) Is NFS licensed to possess, store, process, and transport UF_6?

Yes, NRC Materials License SNM-124 authorizes NFS "to receive, possess, use, store, and ship authorized SNM pursuant to 10 CFR Part 70." Chapter 1, Appendix B, of the application referenced in the license lists UF_6 as a "chemical form of uranium which may be used in licensed operations." Authorized activities include "conversion of HEU hexafluoride to other uranium compounds."

2) When was NFS first licensed to possess, store, process, or transport UF_6?

NFS has been licensed to use UF_6 since the late 1960s.

3) Had NFS ever processed UF_6 prior to the 2009 license amendment that authorized the conversion of UF_6 to other uranium compounds?

Yes, prior to the license renewal in 1999, NFS previously utilized various methods to process UF_6. Those activities were conducted under previous licenses.

4) Are the containers of UF_6 that NFS possesses threatened by the greater than 100 degrees Fahrenheit weather that occurs in the summer?

No. Currently, the UF_6 process is not in operation and there is no UF_6 inventory on-site. Additionally, the UF_6 containers that NFS used when the UF_6 process was active were rated for temperatures greater than those that occur in the summer for the area of eastern Tennessee. Specifically, per the American National Standards Institute – American National Standard 14.1 (ANSI-ANS-14.1), "Uranium Hexafluoride – Packaging for Transport," the UF_6 cylinders were designed for a maximum temperature of 250°F. In

addition to the robustness of the UF_6 containers, these were stored indoors in a climate-controlled area.

5) Does NFS's processing of UF_6 pose excessive risk to the public, workers, or environment? What about the fire that occurred in the UF_6 process line in November 2009 (Event No. 45497)?

No. Currently, the UF_6 process is not in operation and there is no UF_6 inventory on-site. The NRC evaluation of the former UF_6 process determined that NFS had established processes and controls to provide reasonable assurance that the operation did not pose an unacceptable risk to workers, to members of the public, or the environment.

The NRC evaluated the fire in the UF_6 process line that occurred on November 14, 2009, and documented the results in NRC Inspection Report 70-143/2009-004 (ADAMS ML100430924). When the fire occurred in the glove box, the controls performed as designed and no material of any type escaped from the glove box. The event did not result in any impact on the health or safety of the workers, public, or the environment. The NRC verified via inspection that corrective actions to prevent reoccurrence were implemented.

6) Does NFS's storage of UF_6 cylinders pose excessive risk to the public, workers, or environment?

No. Currently, the UF_6 process is not in operation and there is no UF_6 inventory on-site. The storage of UF_6 cylinders did not pose an excessive risk to the public, workers, or environment because NFS identified safety controls to make UF_6 accidents highly unlikely or mitigate the consequences so that significant consequences are highly unlikely. At NFS, uranium hexafluoride was stored in cylinders specially designed to safely hold UF_6. When the process was active, the vast majority of the cylinders at NFS measured approximately 8 to 12 inches in length and 2 to 4 inches in diameter. The amount of material in each of these cylinders was roughly equivalent to the contents of a standard tube of toothpaste. A small number of larger cylinders were also on-site and measured approximately 2-1/2 feet in length and 6 inches in diameter.

NRC Inspection Report 70-143/2009-004 (ADAMS ML100430924) describes independent evaluations performed by NRC staff as part of the UF_6 process restart readiness assessment. The NRC's evaluation included UF_6 release accidents and concluded that the storage and handling of UF_6, along with the licensee's safety controls, did not impose an excessive risk to the public, workers, or environment.

7) Is corrosion from exposure to weather a concern with the UF_6 cylinders at NFS?

No. Currently, the UF_6 process is not in operation and there is no UF_6 inventory on-site. When the process was active, the cylinders were stored inside the shipping containers in which they were originally transported. The shipping containers/cylinders were then stored in protected climate-controlled indoor areas for security reasons and were constructed of corrosive-resistant metal alloy.

8) What is the worst off-site release of hydrogen fluoride that can occur during operation of the UF_6 process line?

Currently, the UF_6 process is not in operation and there is no UF_6 inventory on-site. When

the process was active, a release of hydrofluoric acid (HF) resulting from a fire involving a UF_6 cylinder was considered the worst case accidental release. That kind of release would result in a potential HF exposure of 0.4 parts per million at the site boundary, which would not result in adverse health effects to the public.

9) What are the waste streams leaving the UF_6 process line?

Currently, the UF_6 process is not in operation and there is no UF_6 inventory on-site. When the process was active, there were three general waste streams (liquid and solid) leaving the UF_6 process line:

Scrubber blow-down: The building ventilation used a scrubber system to remove contaminants from the various glove boxes prior to releasing the treated air to the environment. The scrubber water blow-down was directed to the WWTF. The water was processed using a lime treatment. Most of the ammonium fluoride in this solution would precipitate out as calcium fluoride and be shipped to an off-site disposal facility. Any remaining liquid HF would be neutralized with a caustic to form water and a salt. The remaining liquid was sampled and sent to the Nolichucky River once the water concentrations met the requirements of 10 CFR 20.

Ammonium diuranate (ADU) filtrate: The sublimation stations converted the UF_6 to a solution composed of uranyl fluoride (UO_2F_2) and HF. This solution was then processed through the ADU precipitation system where ammonium hydroxide was added to precipitate out ammonium diuranate ($(NH_4)_2U_2O_7$). The liquid HF was converted to liquid ammonium fluoride (NH_4F). Most of the ammonium fluoride solution was retained in the filtrate water and then pumped to the filtrate waste columns. From there, the solution was pumped to the WWTF tanks. The goal was to eventually solidify the contents of this tank. The solid waste was then shipped to an authorized off-site disposal facility.

Building solid waste (trash): This material was collected and placed in either 55-gallon drums or other bulk shipping container. Less than one drum of trash per day was produced. This solid waste was then shipped to an authorized off-site disposal facility.

Material Control and Accountability Inventory Exemption

1) Why did the NRC grant NFS an exemption from a material control and accountability inventory deadline on May 17, 2010?

The NRC, in a letter dated May 17, 2010 (ADAMS ML101050560), granted a one-time exemption for NFS from meeting a material control and accountability (MC&A) inventory deadline. The NRC requires regular inventories of enriched uranium to protect against theft and diversion. To inventory the uranium, the uranium must be in a form that can be measured. NFS process lines contained uranium in various forms when the lines were shutdown. NFS was unable to process the uranium into a suitable form for measurement due to the January 7, 2010 CAL. Therefore, NFS could not measure the uranium until the NRC granted NFS restart authorization for the process line. The delay in conducting the inventory was acceptable because NFS continued to implement other controls such as item monitoring, process monitoring, and alarm resolution. These controls maintained accountability and security until an inventory could be performed.

2) Does the NRC take enforcement action for non-compliances with the inventory requirements?

Yes, NRC would take enforcement action for a non-compliance with the MC&A inventory requirements. Information regarding MC&A inspections and enforcement are considered 'Official Use Only – Security Related Information' and are withheld from the public in accordance with 10 CFR 2.390.

Facility Operations

1) Is NFS allowed to store, load, and unload materials in the Industrial Park Facility?

Yes. NFS is authorized to use the Industrial Park Facility to store low-level radioactive waste in approved shipping containers prior to loading onto railcars for shipment to licensed disposal facility. The containers are packaged and sealed in accordance with Department of Transportation (DOT) regulatory requirements at the main NFS facility before they are moved to the Industrial Park Facility. The Industrial Park Facility is authorized for storage of low-level radioactive waste (LLRW) in DOT-approved shipping packages. The LLRW materials may only be in solid form as required by DOT and NRC regulations. Hazardous waste as defined in RCRA regulations is not authorized for storage in the Industrial Park Facility. Transfers of shipping packages via highway and/or railroad are conducted per DOT regulations. The NRC approved the Industrial Park Facility operations in License SNM-124 Amendment No. 11, effective 09/13/2000.

2) Is NFS authorized to process highly enriched material from foreign countries, and if so, how is it transported?

Yes. The NRC Materials License granted to NFS authorizes the licensee to receive, store, and process HEU from any source. The NFS site has processed material from foreign entities and may continue to process material from foreign governments in the future as per their current license. The licensee and its customers transport the highly enriched material using secure transportation. In addition, all parties are required to comply with the DOT requirements.

3) If at least 200 acres are required for the siting of UF_6 facilities, such as NFS, per Federal Code 651, how was NFS allowed to be sited where it is?

The NRC does not impose a generic 200-acre requirement on any of its licensees and is not aware of a need to impose such a requirement. The NFS facility was originally licensed by the Atomic Energy Commission (AEC) in 1957. The NRC staff could not identify the existence of a Federal Code 651. However, there is a guidance document known as United States Enrichment Corporation 651, “Uranium Hexafluoride, a Manual of Good Handling Practices.”. This document is not applicable to NFS and does not make reference to a 200-acre requirement. Currently, the NFS’s UF_6 process is not in operation and there is no UF_6 inventory on-site.

4) Why does the NRC-approved license allow pyrophoric material at NFS?

In accordance with 10 CFR 70.22(a)(2) and (4), NFS's license application described the types, quantities, and forms of licensed material to be permitted at this site. This information is identical to the material and uses authorized in the previous license (1999), except for the removal of restrictions on pyrophoric forms of uranium and plutonium. Chapter 7 of the Safety Evaluation Report (SER) for the license renewal contains the staff's evaluation of, and agreement with removing the restrictions. As a result, NFS could change its operations to receive and process uranium in pyrophoric forms provided the change does not require prior NRC approval under 10 CFR 70.72.

The staff concluded that NFS has established adequate change control requirements consistent with 10 CFR 70.72 to address the fire hazards associated with handling uranium in pyrophoric forms. Therefore, the restriction on pyrophoric forms of uranium is no longer needed and it was not included in the renewed NFS license.

5) What was the environmental and safety impact of the 17-liter spill of uranyl nitrate on July 11, 2018 (EN 53502), which involved worker contamination?

There was no adverse impact to the environment or significant safety concerns as a result of this event. On July 12, 2018, a report was made to the NRC regarding a radiological spill that occurred in Building 333. The radiological spill of approximately 17 liters occurred in Building 333 on July 11, 2018, due to a leak in glass column containing licensed material undergoing processing.

The inspectors confirmed the spill was contained within a radiologically controlled area. The inspectors reviewed the licensee's actions to contain and clean up the spill and stabilize the glass column. The inspectors reviewed steps taken to account for the spilled material and replace the glass column; and the measures taken to prevent release outside the facility and to control personnel contamination. The licensee entered the issue into the corrective action program and the NRC reviewed the results of the investigation and corrective actions. The NRC documented the resolution of this issue in NRC Inspection Report 07000143/2018005 (ADAMS ML19025A027). No violations of NRC requirements were identified.

6) Do the recurring issues with the Criticality Accident Alarm System (CAAS) at NFS represent a significant safety concern?

No. NRC regulations require licensees to maintain the functionality of the CAAS. The CAAS is subject to periodic testing to verity it is operating as designed. Testing and maintenance of the CAAS is included in the scope of the NRC's core inspection program. The licensee also applies the corrective action program to identify and resolve issues affecting CAAS operability. In recent years, the NRC has dispositioned violations associated with NRC requirements for the CAAS. Those violations have been determined to be of very low safety significance. In calendar year 2023, the licensee continued implementing upgrades to the facility's CAAS system.

7) Did a criticality almost occur at NFS due to the March 6, 2006, spill of the HEU solution?

No. The liquid containing the HEU was never close to the conditions required for a criticality accident. In this case, NFS lost control of the liquid transfer and did not know

where the liquid was going. NRC licensees that handle enriched uranium must maintain control of the material at all times to avoid conditions favorable for a criticality accident.

On March 6, 2006, approximately nine gallons of highly enriched uranyl nitrate solution leaked into a glovebox and spilled onto the process floor. A criticality did not occur due to the functioning glovebox drains and the safe geometry of a puddle on the floor. The puddle of solution was approximately six feet from an open elevator pit. The elevator pit had the potential of collecting the solution into a geometry favorable for criticality and did not have controls in place to prevent the buildup. For additional details, refer to Inspection Report 70-143/2006-006 (ADAMS ML072630328).

8) NRC Inspection Report 70-143/2011-006 (ML110950103) described two process upsets that occurred in January 2011 in the column dissolvers of Building 301 involving uranium tetrafluoride (UF_4). Why were these not reportable?

The process upsets discussed in the subject inspection report did not meet the criteria for reporting to the NRC. The applicable requirements for reporting an event to the NRC are listed in 10 CFR 70.50. When a violation occurs, NRC inspectors review the circumstances of the issue to determine whether the violation meets the reporting requirements of 10 CFR 70.50. Even though these two violations did not meet the threshold for reporting to the NRC, they met the NRC Enforcement Policy requirements for citing a violation in an inspection report. The violations were documented in Inspection Reports 70-143/2011-002 (ADAMS ML111190234) and 70-143/2011-003 (ADAMS ML112092311).

9) What was the environmental and safety impact of the 2018 fire water pipe break where a portion of the water and dirt from the excavation flowed into a nearby stormwater drainage system?

There was no adverse impact to the environment or significant safety concerns as a result of this event since no NRC regulatory limits were exceeded.

On May 3, 2018, the licensee experienced a break in the main fire water loop due to construction activities. Damage to a fire water pipe occurred as construction personnel were excavating to prepare the area for a concrete pad to be poured. The break caused water and soil to be displaced into the nearby storm drainage system. The water was isolated by closing valves within the licensee's fire water loop system. The licensee estimated the amount of chlorinated water lost was 5,000 to 7,000 gallons and the volume of potentially contaminated soil displaced was approximately one cubic yard. On May 8, 2018, NFS reported to the TDEC and the NRC the accidental release of city water and soil to the stormwater drainage system.

The majority of the water and soil was contained within the storm drainage system, but a discharge did occur to Martins Creek via the South West Stormwater Ditch. The TDEC Johnson City Field Office was made aware of the discharge on May 4, 2018. On May 18, 2018, TDEC issued a notice of violation to NFS for failure to notify the Division of Water Resources within 24 hours of the discharge in accordance with the licensee's NPDES permit TN0002038, Part II Section C.2.a, 24-Hour Reporting.

The inspectors reviewed documents provided by the licensee which indicated that immediately following the fire line break, NFS stopped the flow of water, pumped the water

from the excavation and adjacent ditch, began the necessary line repairs, tested the line and placed it back into service two days later. NFS also entered the event into the corrective action program.

The inspectors reviewed the analysis of the samples collected during and after the event to verify the results were within the limits established in NRC regulations. The NRC documented the resolution of this issue in NRC Inspection Report 07000143/2018005 (ADAMS ML19025A027). No violations of NRC requirements were identified as a result of this event.

10) What was the safety impact of a process upset reported to the NRC on January 25, 2022, concerning a chemical reaction in Building 302 (EN 55712)?

On January 25, 2022, a chemical reaction occurred in a two-liter container during material inventory cleanout activities in Building 302. The container was inside a process enclosure at the time plant operators observed the first indications of a chemical reaction and smoldering, which eventually progressed to a small fire. The NFS's Fire Brigade responded promptly and extinguished the fire inside the enclosure. There were no reported personnel injuries, exposures, contamination, or releases to the environment exceeding regulatory limits.

The NRC inspected this issue and issued a Severity Level IV, cited violation of NRC requirements as discussed in detail in NRC Inspection Report 0700143/2022002 (ADAMS ML22213A046).

11) What was the safety impact of a criticality safety issue reported to the NRC on October 6, 2022, concerning the ventilation system?

On October 6, 2022, the licensee submitted EN 56149 to the NRC regarding a plant configuration issue that potentially increased the likelihood of a high-consequence event beyond the performance requirements in 10 CFR 70.61. The event did not result in personnel injuries, exposures, contamination, or releases to the environment exceeding regulatory limits. Additionally, there were no immediate concerns with nuclear criticality safety of licensed material. On October 19, 2022, the NRC completed a Special Inspection at NFS (NRC Inspection Report 07000143/2022006, ADAMS ML22332A498) to review the circumstances surrounding the issue of concern. The Special Inspection resulted in three unresolved items associated with condensation drains credited as part of item relied on for safety (IROFS) FPV-4 in the 300 Complex Process Ventilation System. On December 1, 2022, the licensee submitted a 60-Day Event Follow-up report to the NRC in accordance with Appendix A of 10 CFR 70 (ADAMS ML22355A062).

The NRC's follow-up inspection of this event resulted in two Severity Level IV, non-cited violations of NRC requirements as discussed in detail in NRC Inspection Report 0700143/2023001 (ADAMS ML23122A308).

12) What was the safety impact of the chemical event reported to the NRC on January 30, 2023?

On January 30, 2023, the licensee submitted a concurrent notification to the NRC (EN 56326) for an event for which the licensee issued a news release. The event involved a chemical reaction in Area 800 of the facility while operators were conducting cleanout

activities for material inventory purposes. There were no acute radiological or chemical exposures to any of the workers or releases to the environment exceeding regulatory limits. Two operators involved in the event were evaluated at a local hospital and cleared to return to work the same day of the event. The event did not result in an emergency declaration based on the criteria in NFS's Emergency Plan.

The NRC's inspection of this issue resulted in two cited Severity Level IV violations of NRC requirements. The violations and corrective actions are documented in NRC inspection report 07000143/2023002 (ML23221A234).

13) What happens to NFS if there is a loss of power?

NFS systems are designed to be fail-safe which means that if they are affected in an event, the equipment or system will default to a safe condition. For example, in the event of a loss of off-site power, the operations will simply stop (e.g., heaters shut down and valves close). This state is considered safe due to the physical characteristics of the operations.

Down-blending Process

1) What is down-blending?

Down-blending is a process in which HEU is mixed with natural uranium to make low enriched uranium.

2) Is NFS authorized to perform down-blending?

Yes. Condition S-1 of the license issued to NFS authorizes the use of licensed material in accordance with the application submitted by the licensee. The NFS application describes the process of dissolving HEU to form a HEU solution (uranyl nitrate) which is then mixed with a similar solution of natural uranium to form a low enriched uranium solution.

3) Does the NRC inspect the down-blending process?

Yes. The down-blending process is included within the scope of the NRC's Fuel Cycle Resident Inspection Program and the Core Inspection Program. The process is inspected in the areas of safety operations (which includes nuclear criticality safety and fire protection), radiological controls, facility support (which includes emergency preparedness and plant modifications), and safeguards to verify that NFS complies with the applicable NRC regulations. The impact of this process on the environmental effluents of the facility is also monitored as part of the annual effluent control and environmental protection inspection. NRC inspections routinely review the effluent reports and dose assessment methodology to verify compliance with the safety regulations in 10 CFR 20.

4) Is the NRC required to approve NFS's down-blending contracts?

No. NRC approves the safety and safeguards programs for down-blending based on the information provided in the license application. The licensee (NFS) can perform services for new customers if they are performed in accordance with the approved safety and safeguards programs.

5) Why didn't the public have an opportunity to comment on the most recent down-blending contract?

NRC only publishes proposed regulatory actions for public comment. Down-blending of HEU is authorized under the current NRC license issued to NFS. As of May 2023, the NRC has not received any applications to amend the down-blending process as stated in the current license. Therefore, NRC has no proposed actions to publish for public comment with respect to the down-blending process.

6) NFS completed demolition of certain buildings on-site. Will NFS build new buildings for the most recent down-blending contract?

No. The buildings that were demolished did not involve down-blending operations. Those buildings housed a process for converting low enriched liquid to a low enriched powder. This process is no longer performed at NFS. The process for blending HEU with natural uranium to produce low enriched uranium are still housed inside the protected area.

7) Will a license amendment be required to authorize the down-blending process?

As of May 2023, NFS has not requested a license amendment for the down-blending process. Operation of the existing down-blending processes was reviewed and approved by the NRC previously. The NRC staff understands that NFS can provide services for the most recent down-blending contract using the existing processes.

8) Will the NRC require an Environmental Assessment or Environmental Impact Statement?

No. An environmental review would assess the impact of approving a change to the license. As of May 2023, NFS has no requested any changes to the license with respect to the down-blending process. An environmental review is not required because no regulatory decision is being made.

9) Where does the natural uranium for down-blending come from and how much is received?

NFS is authorized to possess natural uranium via a materials license issued by the State of Tennessee. The license has a possession limit of 350,000 pounds of natural uranium. As of May 2023, NFS is obtaining natural uranium from Cameco, a corporation based in Canada.

10) Where does the waste from down-blending operations go?

The down-blending operations generate minimal waste because all the uranium is contained in the final product (low enriched uranium). Contaminated waste such as drop cloths and wipes are shipped with other low-level waste to an authorized site.

11) A report from the DOE’s National Nuclear Security Administration (NNSA) titled "Supplement Analysis – Disposition of Surplus Highly Enriched Uranium," dated October 2007, states that the calculated off-site population risk from NFS down-blending operations is equivalent to an increased annual risk of latent cancer fatalities (LCF) occurring in the total off-site population of 1 chance in 71. What does that risk mean?

In 2008, the NRC contacted the U.S. DOE to clarify statements in the subject Supplement Analysis. According to the information provided by DOE, the "1 chance in 71" estimate refers to the increased risk of a latent cancer fatality. Specifically, the NNSA analysis concluded that the exposure of the entire population within 50 miles of NFS, to the annual doses estimated by DOE, for a period of 71 years, would increase the risk of fatal cancer by no more than 1 cancer death in the entire population. In terms of individual risk, the population risk of 1 chance in 71 translates to an individual risk of 1 chance in 85 million of developing cancer as a result of down-blending operations at NFS. Additional information about the NNSA Supplement Analysis for the Disposition of Surplus Highly Enriched Uranium is available in ADAMS via Accession Numbers ML081050594 and ML081070225.

Emergency Planning

General

1) What kinds of regulations are applicable to fuel facilities, like NFS, with respect to emergencies?

   The regulatory requirements for an Emergency Plan, as applicable to NFS, are contained in the NRC regulations 10 CFR 70.22. Fuel facilities are required to either (1) submit an Emergency Plan for NRC approval, or (2) submit an evaluation showing that the maximum dose to a member of the public would not exceed specified levels. After the Emergency Plan is approved, the licensee is required to comply with the approved Emergency Plan. Emergency Plans for fuel facilities address such topics as the classification of accidents, measures to mitigate the consequences of accidents, the roles and responsibilities of personnel with emergency response responsibilities, training and qualification of emergency response personnel, periodic drills and exercises and other functions important to maintain emergency preparedness capabilities.

   Detailed guidance on emergency planning and preparedness is contained in NRC's Regulatory Guide 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities."

2) Do NRC regulations require an Emergency Planning Zone around facilities that process UF_6?

   No. The NRC regulations in 10 CFR 70 do not require an Emergency Planning Zone around facilities that process UF_6. When the final rule was published on April 7, 1989 (54 FR 14051), the Commission stated that formal evacuation planning was not considered necessary, appropriate, or feasible because of two factors – (1) realistically, exposures should generally be low compared to protective action guides and (2) the fast-moving nature of accidents of concern. Potential accident scenarios for fuel facilities handling and processing UF_6 have been extensively studied (See NUREG-1140, ADAMS ML062020791). The extent of the postulated UF_6 accident consequences is similar in response and magnitude to accidents associated with other nuclear and industrial facilities which are not required to have an Emergency Planning Zone. On-site and off-site emergency response organizations are prepared for and continually trained for the emergency response of nuclear and industrial events at fuel facilities and other industrial

businesses in their district. Currently, the UF_6 process is not in operation and there is no UF_6 inventory on-site.

3) Why is the NFS Emergency Plan not publicly available?

The NFS Emergency Plan is not publicly available because it would be useful to an adversary planning an attack. Therefore, the document has a security classification of "Official Use Only." As discussed in NRC RIS 2005-31, Revision. 1 (ADAMS ML16196A237), the NRC withholds a document in its entirety if it contains site-specific information on emergency planning or fire protection that would be useful to an adversary in planning a malevolent act. NFS supplies a copy of the Emergency Plan to each supporting off-site agency on a need-to-know basis, including: Unicoi County, Tennessee Emergency Management Agency (TEMA), law enforcement, fire departments, hospitals, etc.

4) How often is the NFS Emergency Plan updated?

Generally, the NFS Emergency Plan is updated on an annual basis.

5) How has the NRC improved coordination among various government agencies with respect to emergency preparedness?

The NRC requires licensees to conduct routine emergency preparedness exercises. In addition, exercises periodically include participation of the NRC and other government agencies in addition to local law enforcement and various state agencies with emergency response responsibilities. NRC's participation in emergency preparedness exercises and drills is critiqued and evaluated. Lessons-learned from practice drills and exercises identify areas in need of improvement, including any issues that may be identified associated with coordination among government agencies.

Lessons-learned have emphasized the importance of maintaining good communication and effective coordination among agencies with emergency response responsibilities. Lessons-learned also serve as a basis to strengthen NRC's inspection program and regulations pertaining to emergency preparedness. As applicable, lessons-learned at one facility are shared with the nuclear industry to improve emergency preparedness programs at other licensed facilities. Inspection efforts, drills, and exercises all serve to ensure continued improvement in emergency preparedness activities and programs.

6) How are local residents notified in the event of an emergency at NFS, who would make the notifications and what methods would be used to notify the public? What type of actions could local residents be called upon to take?

The NRC requires NFS to have an Emergency Plan which is incorporated by reference in the materials license. In the event that NFS declares an emergency, the Emergency Plan requires notifications to local, state, and federal agencies. Those notifications include information regarding the nature of the event and protective action recommendations. Emergency notifications to local and state agencies must be made within 15 minutes of the emergency classification. One of those initial notifications is made directly to a local agency, the Unicoi County Emergency Management Agency. That agency reviews the information and recommends the appropriate public protection actions to local government officials. The licensee will also notify the TEMA, the state agency that implements the

state emergency plan, and the NRC.

The two primary responses members of the public may be expected to take during an emergency are to shelter in place or evacuate. Various methods are used to alert the public. Some of the notification methods currently available include the Integrated Protective Warning and Alert System (IPAWS), local law enforcement announcements, announcements over the National Oceanic and Atmospheric Administration (NOAA) Weather Radio channels, and/or announcements made through local radio, television, and the internet.

Earthquake

1) Does an earthquake pose a significant risk to NFS?

No. The NFS's Integrated Safety Analysis (ISA) Summary required in 10 CFR 70 provide the results of risk assessments for all potential accidents, including accidents caused by external events like earthquakes. As a result of NRC Generic Letter 2015-001, "Treatment of Natural Phenomena Hazards in Fuel Cycle Facilities," NFS hired a contractor to analyze all existing buildings containing SNM to ensure they satisfied the current earthquake requirements in the International Building Code. The contractor also analyzed all IROFS whose failure could lead to a high-consequence event. The evaluation concluded the buildings would be subject to very low earthquake-induced stress and all internal components relevant to the ISA were determined to have sufficient capacity to withstand the loads from the evaluation-basis earthquake. Therefore, the existing ISA was determined to be bounding of natural phenomena hazard events.

2) What impact does the tectonic plate shift have on ground water contamination?

Plate tectonics and associated shifting does not have an effect on the groundwater at NFS. Erwin, Tennessee is part of the North American plate; however Erwin is not located near the plate boundary where plate rubbing and excessive faulting might be expected. The Southern and Midwestern regions of the United States do experience intraplate earthquakes which is an earthquake that occurs within a plate. These earthquakes occur at the location of ancient rifts (places where the crust was stressed by being pulled apart), because these geologic structures may present a weakness in the crust where it can slip to accommodate tectonic strain. Erwin is not known to be located on an ancient rift.

In other areas of the country, earthquakes and associated faults have been known to disrupt groundwater. The disruption is only applicable if the groundwater aquifer is confined (the aquifer has an impermeable layer of rock above or below it). If a fault occurs through a confined aquifer, then groundwater can pass through the broken rock in the previously impermeable rock and change the groundwater aquifer characteristics. In Erwin, this kind of disruption is not applicable. The aquifer below NFS is not confined and the rock layer (bedrock) below the aquifer has many known natural fractures.

3) Who was the contractor that shored up the buildings for the seismic risks?

The NRC staff does not know. When NFS requested authority to process uranium fluoride compounds in the new CD line, it confirmed that the building structure was upgraded to

withstand a design basis earthquake. The NRC staff reviewed the information and inspected the structural supports added to the building. The review did not include the identity of the contractor. When Amendment 88 (ADAMS Accession Number ML090490664) was issued to approve the request, the NRC staff concluded that there was reasonable assurance that an earthquake would not cause a UF_6 release having a significant impact on the environment.

Liability Insurance

1) Is NFS required to have liability insurance or indemnity? If not, who is required to have liability insurance or indemnity and why is NFS not included?

   NFS is not required to have liability insurance or indemnity. Only the facilities specified in Sections 170 and 193 of the Atomic Energy Act of 1954, as amended, are required to have liability insurance. The NRC regulations in 10 CFR 140 implement these sections of the Act. 10 CFR 140 requires the following licensees to have liability insurance and indemnity: (a) nuclear reactors licensed under Parts 50, 52, or 54; (b) facilities licensed under Part 70 to use plutonium in a processing and fuel fabrication plant, and (c) uranium enrichment facilities licensed under Parts 40 and 70. The Act gives the NRC authority to extend these requirements to other types of licensees, but to date the NRC has not chosen to do so.

   The fuel production activities performed at NFS, as authorized by NRC Materials License SNM-124, do not meet the any of the facility types listed above. NFS does not operate a nuclear reactor of any kind, processes or use plutonium to fabricate fuel, or conduct uranium enrichment activities.

2) Why should NFS continue to hold its NRC license if it does not have coverage from American Nuclear Insurers?

   The NRC approves and maintains license applications based on the requirements in NRC regulations. Since NFS is not required to have coverage from American Nuclear Insurers per NRC regulations, the NRC license is unaffected.

3) What assurance does the NRC have that NFS can protect people and the environment without liability insurance?

   The NRC requires its licensees to conduct a safety program that includes: (a) workers qualified by training and experience to use license material safely and (b) equipment, facilities, and procedures adequate to limit the risk of accident consequences.. The safety program provides reasonable assurance that people and the environment will be protected. The NRC's licensing reviews confirm that NFS has committed to this safety program and the NRC inspections verify that NFS is implementing its safety program adequately. The ability of NFS to implement its safety program is not adversely affected by the status of its liability insurance.

Sinkholes

1) Why was the NFS license renewed given the existence of sinkholes in the local area?

   As discussed in Chapter 3 of the NFS License Renewal EA (ADAMS ML112560265), the NFS site is underlain by the Rome Formation, which is composed predominantly of siltstones and sandstones with deeper levels containing limestone and dolomite. NFS has reported some evidence of karstic dissolution features in the deep bedrock of the Rome Formation at the north end of the site. Because of this geography, sinkholes are less likely to form at NFS than in the boundary regions of the Rome Formation, which is where sinkholes in the local area have formed. It is the NRC's assessment that sinkholes do not pose a significant threat to the site.

   As the NRC considered the license renewal application for NFS, the consequences of accidents caused by natural phenomena were considered in the EA. The sinkhole events constituted new information, but the NRC staff concluded that the consequences from a sinkhole event were bound by the consequences from earthquakes, floods, and other natural phenomena that were already evaluated.

Uranium Purification and Conversion to Metal Project

1) What's the purpose of the proposed uranium purification and conversion to metal (U-metal) project at NFS?

   The license amendment request submitted to the NRC would authorize NFS to perform uranium purification and conversion services at the NFS facility pursuant to a contract with the U.S. DOE's NNSA. NNSA contracted NFS to design and license a process for uranium purification and conversion to HEU metal (U-metal). NFS has stated that the purpose of the activities under the contract would be to allow NNSA to maintain an oxide-to-metal conversion capability while the Y-12 National Security Site (Y-12) in Oak Ridge, TN, draws down its current oxide-to-metal conversion capability to later ramp up with the establishment of new technologies such as Direct Electrolytic Reduction (DER) in enduring facilities at Y-12.

   The process proposed by NFS to fulfill the NNSA contract would utilize portions of existing processes at the NFS facility and some processes that would be new to the NFS facility. Consistent with 10 CFR 70.72, NFS submitted a license amendment request to the NRC that addresses the new types of accident scenarios and technologies.

   For further information on the contract relative to ongoing activities at Y-12, please refer to NNSA's announcements, dated March 1, 2021, and April 10, 2023 (https://www.energy.gov/nnsa/listings/nnsa-news).

2) What is NRC's role in licensing and inspecting the proposed U-metal project at NFS?

   The NRC's review of the license amendment request for the proposed U-metal project will determine if the application meets the applicable requirements of the Atomic Energy Act

and NRC regulations in 10 CFR Part 70, which relate to protection of health and safety and security. If the NRC determines the submittal is acceptable, a license amendment would be issued that documents the safety and security bases for the U-metal project. NRC inspectors would inspect for compliance with these license requirements, as well as requirements in NRC regulations, during construction and operation of the project.

3) Did the NRC issue the $428M contract to NFS for the proposed U-metal project?

No. The U.S. DOE's NNSA contracted with NFS for the proposed U-metal project. The NRC is an independent agency whose mission is to license and regulate the Nation's civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety and to promote the common defense and security and to protect the environment. The NRC is not involved in the process of awarding contracts to the facilities it regulates.

4) Will the proposed U-metal project make nuclear weapons?

No. The U-metal contract envisions NFS providing uranium purification and conversion services and returning the resulting U-metal to NNSA for use in support of its mission. Prior to receiving the license amendment request from NFS, the NRC staff engaged NNSA staff in discussions concerning the HEU subject to their conversion and purification (i.e., U-metal) contract with NFS. NNSA has three mission pillars: Defense Programs, Defense Nuclear Nonproliferation, and Naval Reactors. The U-metal from the NNSA/NFS contract is intended to support all three of these mission pillars.

5) Is NFS inventing a new process for producing HEU for nuclear weapons? If so, why is NFS inventing a new process when a state-of-the-art processing facility for a new procedure is under construction at Oak Ridge?

No. NFS is not inventing a new process for producing HEU for nuclear weapons. The license amendment request submitted to the NRC would authorize NFS to perform uranium purification and conversion services at the NFS facility under a contract with the NNSA. NNSA contracted NFS to design and license a process for uranium purification and conversion to HEU metal (U-metal). NFS has stated that the purpose of the activities under the contract would be to allow NNSA to maintain an oxide-to-metal conversion capability while the Y-12 National Security Site (Y-12) in Oak Ridge, TN, draws down its current oxide-to-metal conversion capability to later ramp up with the establishment of new technologies such as DER in enduring facilities at Y-12.

The process proposed by NFS to fulfill the NNSA contract would utilize portions of existing processes at the NFS facility and some processes that would be new to the NFS facility.

Consistent with 10 CFR 70.72, NFS submitted a license amendment request to the NRC that addresses the new types of accident scenarios and technologies.

6) What is the difference between HEU and the very highly enriched uranium (VHEU) discussed in the U-metal license amendment request?

HEU is uranium that is enriched to at least 20 percent, by weight, in the fissile isotope uranium-235. VHEU is uranium enriched to more than 94 percent, by weight, in the fissile

isotope uranium-235. Therefore, the definition of HEU includes all VHEU. Materials License SNM-124 currently authorizes NFS to possess uranium up to 100 percent, by weight, in the uranium-235 isotope and in a wide variety of chemical and physical forms. The proposed uranium purification and conversion process (U-metal) would not change the existing possession limits in the NFS materials license. Thus, VHEU is not a new type of material to be handled at NFS.

7) Is the NFS site secure enough to protect the U-metal process and material?

NFS is currently licensed by the NRC to possess HEU, including U-metal, in the quantities and forms (i.e., material possession limits) specified in the Materials License SNM-124. NFS has not requested any changes to its material possession limits for the U-metal project. The NRC license requires NFS to maintain a “Physical Protection Plan” that specifies measures to protect HEU and a “Fundamental Nuclear Material Control Plan” that specifies controls to safeguard HEU. The NRC routinely inspects these physical security and material control programs to verify compliance with the applicable requirements.

The NRC staff will review safety and security matters of the license amendment request in accordance with applicable NRC regulations, and this review will ultimately inform the NRC’s finding under the Atomic Energy Act of whether the proposed activity will be inimical to the common defense and security. The NRC staff’s review will cover issues such as physical security and protection against radiological sabotage, theft, and diversion.

8) Will the NRC prepare an Environmental Impact Statement (EIS) for the proposed U-metal project at NFS?

The NRC is currently preparing an Environmental Assessment (EA) for the proposed U-metal project at NFS. The NRC typically prepares an EA for actions that are not those identified as requiring an EIS per 10 CFR 51.20 and that do not meet the categorical exclusion criteria at 10 CFR 51.22.

The EA, which must satisfy the requirements of 10 CFR 51.30, will document whether the action is a major federal action that requires preparation of an EIS. If the NRC determines on the basis of the EA that the action will not have a significant impact on the environment, the NRC will prepare a Finding of No Significant Impact (FONSI) as specified at 10 CFR 51.32. Otherwise, if the NRC determines that the proposed action has the potential to significantly impact the environment, the NRC will prepare an EIS. Note that either type of environmental review (i.e., EA or EIS) will be focused on the impacts of the U-metal project.

9) What QA measures are proposed for the construction and operation of the U-metal process?

The proposed U-metal process would utilize some existing processes and safety controls; however, the addition of new processes/technologies requires that NFS develops and/or enhances additional safety controls. The provisions of 10 CFR 70.61 require that certain safety controls are identified as IROFS. To ensure the IROFS are available and reliable to perform their functions when needed, management measures are performed by the licensee in accordance with 10 CFR 70.62(d), Management measures include:

(1) Configuration Management, (2) Maintenance, (3) Training and Qualifications, (4) Procedure Development and Implementation, (5) Audits and Assessments, (6) Corrective Action Program, (7) Records Management, and (8) other QA Elements.

NFS is required to establish and maintain elements of a QA program that ensure the maintenance and operability of IROFS. These requirements include the key attributes of a QA program appropriate for a fuel facility. NRC would inspect the construction and operation of the U-metal process for compliance with the requirements for management measures and QA.

10) What opportunities did the public have to comment or request a hearing on the license amendment request for the proposed U-Metal process at NFS? Did a hearing take place?

NRC staff addressed questions related to U-metal during two public meetings on May 18, 2023 (ML23146A115 and ML23152A006), and June 29, 2023 (ML23206A171). While the purpose of either meeting was not to actively solicit comments towards regulatory decisions, as clearly stated in the public meeting notices dated April 11, 2023 (ML23102A010), and June 16, 2023 (ML23173A161), the NRC listened to concerns and answered questions from the public in a variety of topics related to NFS, including the U-metal license amendment request.

For the NFS license amendment application regarding the U-metal project, the NRC staff issued a Federal Register Notice (FRN) that provided an opportunity for a hearing (ML22094A077). Individuals or entities wishing to request a hearing on a license amendment application, are required to request intervention in a proceeding in accordance with the applicable regulations in 10 CFR Part 2, as explained in this FRN.

A three-judge Atomic Safety and Licensing Board (ASLB or Board) empaneled from the Atomic Safety and Licensing Board Panel, the independent trial-level adjudicatory body of the NRC, reviewed written filings from the petitioner—Erwin Citizens Awareness Network (ECAN), the NRC staff, and NFS and held an oral argument to determine whether ECAN met the requirements for intervention. On January 30, 2023, the Board issued an Order denying ECAN's intervention petition (ML23030B891). ECAN subsequently appealed the Board's decision to the Commission, and the Commission issued an Order affirming the Board's decision on October 5, 2023 (ML23278A060).

Miscellaneous and General

1) During the public meeting on September 24, 2009, NFS presented a slide regarding employee-identified items. What were the items classified as having a "high" safety significance that were reported during 2006 and 2007?

Nuclear Fuel Services characterized seven items in the January 1, 2006, to September 18, 2009, timeframe as having a "high" safety significance. Of these events, only one event involved radioactivity while the others involved industrial safety. The NFS's presentation is available on ADAMS via Accession Number ML092730303.

2) Is NFS required to meet ASME NQA-1? If not, why and what QA requirements do they meet?

NFS is not required to meet the American Society of Mechanical Engineers (ASME) Nuclear Quality Assurance (NQA-1) standard. The QA requirements for new and existing fuel fabrication facilities licensed under Part 70 are specified in 10 CFR 70.62(d), "Management Measures;" and 10 CFR 70.64, "Requirements for New Facilities or New Processes."

Management measures are those functions performed by the licensee that are applied to IROFS, to ensure the items are available and reliable to perform their functions when needed. At NFS, management measures include: (1) Configuration Management, (2) Maintenance, (3) Training and Qualifications, (4) Procedure Development and Implementation, (5) Audits and Assessments, (6) Corrective Action Program, (7) Records Management, and (8) Other QA Elements.

Even though NFS is not required to meet the provisions of ASME NQA-1, the “Other QA Elements” consists of a quality system with an organizational structure, procedures, processes, and resources needed to implement quality management. The elements of this quality system align with the key attributes in ASME NQA-1, and as appropriate, are applied on individual projects using a graded approach based on the degree of importance to safety.

3) What was Project Sapphire and was NFS involved?

Project Sapphire involved the removal of HEU from Kazakhstan by the U.S. DOE under a cooperative program. Project Sapphire also involved the Department of State and the Department of Defense (DOD). The NFS facility in Erwin, TN was not involved in receiving or processing material in support of Project Sapphire.