Frequently Asked Questions about the Nuclear Fuel Services Fuel Fabrication Facility

Intent

This updated document provides answers to questions frequently asked by members of the public regarding NRC-licensed activities at Nuclear Fuel Services (NFS). It includes a variety of questions posed to the NRC in various public meetings, private conversations with NRC staff members, and written communication. NRC has revised the "Frequently Asked Questions" (FAQs) about NFS to reorganize the subjects and questions into logical groups and, in some places, to consolidate information to make the information provided easier to find and use.

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I. NRC-Specific

1. How does the NRC assure safety at NFS?

Under the Atomic Energy Act of 1954, the NRC has the authority to license and inspect nuclear facilities to protect public health and safety.

The NRC ensures safety at the facility through licensing actions. 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.

The NRC ensures safety at the facility through inspection. 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 onsite 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, 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 25 routine inspections at NFS in addition to the routine inspections conducted by the resident inspectors.

The NRC ensures safety at NFS through 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 are specified in Inspection Manual Chapter (MC) 1246, Formal Qualification Programs in the Nuclear Material Safety and Safeguards Program Area and MC 1247, Qualification Program for Fuel Facility Inspectors in the Nuclear Material Safety and Safeguards Program Area.

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

3. What is an Order?

An order is a written NRC directive to modify, suspend, or revoke a license (see 10 CFR 2.202). 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 gives the NRC the authority to shutdown 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, it would cause a facility to shut down permanently.

5. What is Alternative Dispute Resolution (ADR)?

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.

6. What would happen at NFS in event of a government shutdown?

In the event of a government shutdown, the NRC Resident Inspectors would be characterized as 'Essential Personnel' and continue to inspect full-time. Selected individuals from Region II and NRC Headquarters, including the emergency response organization, would be characterized as 'Essential Personnel' and also continue to work full-time. Much of the staff in Region II and NRC Headquarters would be suspended in furlough status. The status of the inspections conducted out of Region II and Headquarters would depend on the length of time the federal government was shut down. The status of the resident inspection would largely be maintained.

7. What is a Severity Level III violation?

The NRC assesses significance by assigning a severity level to all violations. There are four severity levels from I – IV. Severity Level I is the most significant and Severity Level IV is the least significant. Severity Level III violations are those that resulted in or could have resulted in moderate safety or security consequences (e.g., violations that created a potential for moderate safety or security consequences or violations that involved systems not being capable, for a relatively short period, of preventing or mitigating a serious safety or security event).

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

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 affect 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 services as covered by the Atomic Energy Act of 1954, as amended are specified in 10 CFR 170. 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. In some cases, licensees are subject to additional fees in the event of declining performance as determined by the NRC assessment process.

NRC staff salaries are pre-established and are unaffected by the fees collected from the licensee. Cost of living adjustments, when approved for the federal government, are applied consistently throughout the government with pre-established criteria. 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. In NFS's case, there was a significant increase in the annual inspection hours above and beyond the routine core inspection program between 2009 and 2011. The increase in inspection activities was driven by the need to conduct additional inspections in response to poor plant performance issues. These additional inspection efforts result in a direct cost to NFS. NRC salaries remained unaffected during this time period.

II. Environmental Releases and Exposures to the Public

A. Public Dose and Regulatory Jurisdiction

1. What is the public dose limit?

NRC regulations limit exposures to members of the public from a licensed facility to 100 millirem per year. This limit applies 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.

2. Do incremental radiation doses I receive when NFS releases uranium to the environment pose a threat to my health?

No, there is no threat to your health or safety due to any incremental radiation exposures received from liquid or airborne effluents released by NFS.

Radiation exposure limits for members of the public are set by the U.S. Nuclear Regulatory Commission (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. A recent update of the recommendations by the International Commission on Radiological Protection concluded that the estimate of risk from radiation had not substantially changed in the last 20 years, and that there was no need to change the recommended limits. 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, all releases of radioactive material, and exposure to radiation, must be kept as low as is reasonably achievable. This means that actual releases are a small fraction of the limits, which further ensures adequate protection.

3. Which regulatory agency has jurisdiction over radiological effluents from Nuclear Fuel Services 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 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 has jurisdiction over hazardous chemical releases. The primary NRC regulatory requirements for radiological effluent releases from fuel facilities are those specified in Title 10 of the *Code of Federal Regulations* Part 20 (10 CFR 20) and includes all radionuclide effluents, regardless of license.

Section 20.1301, of the *Code of Federal Regulations* (10CFR20.1301), “Dose limits for individual members of the public,” and 10CFR20.1302, “Compliance with dose limits for individual members of the public," apply to 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.

The NRC regulation, 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 are listed in 10 CFR 20, Appendix B, Table 3.

The TDEC has regulatory jurisdiction over the chemical constituents in the effluents. The state issues permits for all chemical releases from the site.

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 Tennessee Department of Environment and Conservation (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. Major environmental programs overseen by the EPA and 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 its State of Tennessee (TDEC) NPDES permit by discharging high enriched uranium as part of its liquid effluents?

No. Enriched uranium is permitted by the NRC license and NRC regulations specify allowable radioactivity levels in effluents.

National Pollutant Discharge Elimination System (NPDES) Permit TN0002038 authorizes uranium concentration discharges up to 2 milligrams (mg) per liter monthly

average and a maximum limit of 4 mg per liter. Effluent discharges from NFS typically do not exceed one tenth of the NPDES permit limits.

7. Does Tennessee Department of Environment and Conservation (TDEC) independently verify that NFS has not exceeded the limits set in 10 CFR Part 20 for radionuclides discharged to offsite 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.

The Tennessee Department of Conservation (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; an on-site groundwater monitoring well sample, a collection of sanitary sewer discharge samples, a collection of the Waste Water Treatment Facility discharge samples, two Nolichucky river samples, two off-site air samples, and a sludge sample from the Erwin, TN municipal wastewater treatment plant. On a quarterly basis, TDEC samples a groundwater well upgradient from the site in order to measure a background reading and an onsite 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.

B. 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 National Pollutant Discharge Elimination System (NPDES) permits.

Nuclear Fuel Services has one main outfall into the Nolichucky River. This is a discharge line which carries the treated water from the NFS onsite waste water treatment facility. 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 Tennessee Department of Environment and Conservation (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 storm water runoff and are not utilized to process effluents from plant operations. The outfalls are authorized by NPDES permit TNR050873. The first storm water outfall carries the majority of storm water from the site. The second outfall carries storm water 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 storm water 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 Waste Water Treatment Facility (WWTF) where the majority of contaminates are removed. NRC regulations in 10 CFR Part 20 require that NFS discharges be less than the amount that could potentially expose a member of the public in excess of 0.1 Rem (100 millirem) in a year.

3. Does NFS release high-enriched uranium (HEU) into the Nolichucky River?

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

Natural uranium, the type of material found in rocks and soil, is composed of approximately 99.3% U-238 and 0.7% U-235. High-enriched uranium (HEU), 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 discharge offsite. The effluent monitoring program ensures that liquid discharges are in compliance with 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 for 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 assumption that a member of the public consumes water directly from the liquid discharge point at this concentration for an entire year. This is a conservative approach and no credit is taken for factors that demonstrate that a member of the public is not continuously exposed to these concentrations.

The recent NFS biannual effluent monitoring reports can be retrieved from the following link: http://www.nrc.gov/materials/fuel-cycle-fac/fuel-fab/nfs-effluent-reports.html.

4. Does NFS discharge high-enriched uranium into Martin's Creek?

No. NFS does not discharge process wastewater to Martin's Creek and therefore does not discharge high-enriched uranium into Martin's Creek.

5. Since NFS discharges high-enriched uranium into the Nolichucky River, are the HEU discharges permitted through NFS's TDEC NPDES permit or through NFS's Special Nuclear Materials license with the NRC?

Effluents containing high-enriched uranium are authorized by the NRC license. All NRC licensees are authorized to discharge water containing trace amounts of radioactive material if the concentrations are below specified limits. These limits are specified in 10 CFR Part 20.

6. Does NFS release tritium into the Nolichucky River?

NFS does not produce tritium (H-3) nor does it discharge tritium into the Nolichucky River.

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

The concentration of radiological materials in the Nolichucky River is safe. The NRC licenses and inspects the samples taken near NFS in Erwin, TN. NRC regulations require facilities like NFS to demonstrate that discharges to the river do not exceed the public dose limit. The river is safe, in regards to radiological materials, for activities such as swimming, fishing, and playing. The public dose limit (100 millirem per year) is less than the dose limit for the embryo/fetus of a pregnant occupational worker (500 millirem during the pregnancy), therefore the river is safe for pregnant woman to enjoy the recreational activities too.

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

We have no information concerning changes in animal populations.

9. Does the amount of high enriched uranium that NFS is allowed to discharge pose a security concern?

No. The amount of high-enriched uranium allowed to be discharged from NFS is too small to be considered a security risk.

10. Is the water coming from NFS' 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 a NRC regulated-effluent discharge point. This outfall is not classified as a source of drinking water. Therefore, Environmental Protection Agency (EPA) drinking water standards would not apply.

11. According to NFS' 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 Waste Water Treatment Facility (WWTF), the total volume reported is the total of all batch releases to the environment for that 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 was the total volume of waste water discharged inconsistent for the radionuclides in the Biannual Effluent Monitoring Report for the period July 1, 2005 to December 31, 2005 (ML060590265)?

The Biannual Effluent Monitoring Report for July 1, 2005 to December 31, 2005 (ML060590265) utilizes two different volume results. The differences in these volumes reflect a change in the process during the time frame. 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 exceed ten percent of the discharge limits. NFS was required to analyze for these new radionuclides. For this reason some effluent calculations utilized the waste water discharge volume for the newly-identified radionuclides while the radionuclides measured for the entire period used the other water discharge volume. Specifically, the 5 million liter volume applied to the originally-specified radionuclides and the 2,286,781 liter volume applied to the new radionuclides identified during the period.

13. How does the NRC verify that the Effluent Monitoring Reports accurately account for the actual volume and activity concentration of each radionuclide discharged to water by NFS?

Inspection activities conducted by both resident inspectors and region-based specialists routinely assess NFS' effluent monitoring program. During the annual environmental protection inspections, inspectors observe the collection and sampling of effluent pathways, review operational status, and history and calibration records for effluent monitoring equipment, and laboratory analysis equipment. Analysis results are randomly reviewed for accuracy and completeness. The purpose of the inspection is to provide a high level of confidence that data contained in effluent monitoring reports accurately reflected the amount of radioactive material released to the environment.

14. Why are negative effluent quantities and percentages listed in the semi-annual radiological effluent release reports?

NFS 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 was calculated based upon the actual amount of radioactivity present in the effluent due to plant operations.

In Inspection Report 70-143/2010-004 (ML110280474), Inspector Follow-up Item 2010-004-01 identified and addressed the use of negative numbers in the Biannual Effluent Monitoring Reports.

According to the National Council on Radiation Protection and Measurements (NCRP), NCRP Report 58, "A Handbook of Radioactivity Measurements Procedures," 2nd edition, in actuality 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. 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 states that under these circumstances a negative value may be reported.

During the inspection, the inspectors questioned the licensee whether utilizing this methodology was conservative for reporting purposes when calculating the Effluent Concentration Values (ECV) for each nuclide. 10 CFR 20 Appendix B, requires that if the radionuclide concentrations are known, then the ECV ratios are calculated by dividing the amount "present" by the concentration limit established in Appendix B. The inspectors opened the Inspector Followup Item to further track this item.

C. Airborne Effluents

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

Workers: NFS uses glove boxes and contained systems to limit the airborne contaminants the workers are exposed to. The Air Sampling program, a system of detectors designed to measure airborne radioactivity, is conducted in work areas routinely and during specific jobs. NFS evaluates the job activities to be performed and determines if the workers should wear a respirator. The NRC inspectors review air sampling results and the respirator program during inspections.

Public: Air discharges pass through scrubbers and High Efficiency Particulate Air (HEPA) filters in order to reduce the amount of contaminants released to the environment. The scrubbers and filters are designed to remove particles (including uranium) and chemicals from the air. In addition, NFS has an air sampling program directly at the stack which monitors the amount of contaminants that enter the environment. NFS also has air sampling equipment posted in outdoor areas on the site and in the community. The NRC routinely reviews both the measured effluent results for radioactive contaminants and the air sampling results for radioactive contaminants in addition to public dose results.

The chemical contaminants are the jurisdiction of Tennessee Department of Environment and Conservation.

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

NFS effluents are not above the regulatory limit for any of the isotopes, including uranium-234.

NRC regulations allow licensees to demonstrate compliance with the public dose requirements utilizing two different methods. In the first method, a licensee may demonstrate 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. The second method is to demonstrate 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.

In practice, the NFS Biannual Effluent Monitoring Reports states the concentrations present in gaseous effluents at the stack exhaust. NFS assumes the worst case scenario when assessing doses to members of the public. NFS 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 in the stack exhaust do not represent the actual concentrations at the boundary of the unrestricted area. Based on dilution and dispersion characteristics of the atmosphere, concentrations would be lower at the boundary of the restricted area than the values measured at the stack exhaust. If the air concentration measured 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 air concentration at the stack exhaust is above the boundary limit in 10 CFR 20 Appendix B, the ECV calculation will have a result greater than 1. Under these circumstances, NFS performs additional calculations to estimate the exposure to an individual located at the NFS site boundary.

If the sum of the ECV for an airborne effluent is greater than one, NFS performs a calculation to assess the dose to the public. The result of this assessment is included in the Biannual Effluent Monitoring Reports found at the following link: http://www.nrc.gov/materials/fuel-cycle-fac/fuel-fab/nfs-effluent-reports.html.

3. A 2005 inspector follow-up item (IFI 2005-003-04) was closed in Inspection Report 70-143/2005-007 for an elevated stack sample above the licensee's action limits. How did the inspector 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 inspector follow-up item 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. Nuclear Fuel Services submitted the air sample filter to an offsite laboratory for isotopic analysis. The inspector follow-up item was opened to ensure that the NRC reviewed the results of

the analysis when they became available. The inspector follow-up item 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 inspector follow-up item in order 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 this 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?

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 Tennessee Department of Environment and Conservation (TDEC). For more information on the chemical component of the airborne effluents, please see the TDEC website (http://www.tn.gov/environment/org/) 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, 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. Airborne chemicals would not be hindered by a fence.

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

The main airborne effluent stack was constructed in approximately 1983.

D. 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) and Technicium-99 (Tc-99) are two contaminants that were introduced to the soil, and then groundwater, from localized spills which occurred in various areas of the plant. TCE is a chemical (not radiological) contaminant that was used at NFS as an industrial solvent and is outside of the NRC jurisdiction. NFS is treating this groundwater contaminate. NFS treated the

Tc-99 (radiological) groundwater contamination by pumping the groundwater out of the ground and treating it. After treatment, NFS would inject the water back into the ground. 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 is using to treat the TCE and has been able to decrease the amount of uranium in the groundwater.

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

Technetium-99 is present in the groundwater onsite at NFS. Nuclear Fuel Services detected elevated levels of Tc-99 in onsite 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 onsite groundwater concentrations, a well pumping process was initiated. The treatment process has lowered Tc-99 onsite 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 offsite 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. In the event that Tc-99 onsite groundwater concentrations indicate an adverse trend in the future, treatment processes could be initiated if necessary.

3. How did technetium-99 (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 technetium-99 (Tc-99) entered the Nolichucky River?

There is no evidence that Tc-99 contaminated groundwater reached the river. Concentrations of radioactive material in river water samples are analyzed for total activity. Provided that gross radioactivity concentrations are below established values, samples are not required to be analyzed for specific radionuclides. 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 waste water settling ponds) pumped?

The NFS lagoons were used in the 1950s through the 1970s. The land around and beneath the lagoons has been remediated and contaminated soil shipped to an authorized off-site disposal facility. Nuclear Fuel Services no longer uses the settling ponds in their waste treatment process. Liquid wastes are now processed utilizing tanks.

The North Site portion of the NFS property (where the lagoons were located) has been cleaned up. As a result of this process, the area contains large pits which have not yet been refilled with soil. The pits fill naturally with groundwater and rain water to form "onsite ponds." The licensee routinely samples surface water that collects in these onsite ponds.

The licensee pumps the water from the onsite ponds to the groundwater treatment facility for processing. The facility treats 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 treats the water for volatile chemicals and also removes uranium and other heavy metals which may have been in the groundwater. The process stream is sampled and analyzed prior to release to the sanitary sewer system.

6. A June 1996 inspection report stated that a significant amount of groundwater was treated by the groundwater treatment facility. How can this vast amount of water be treated for uranium considering that the release limits are so small?

The groundwater treatment facility was designed to process large amounts of water. Inspection Report 70-143/1996-014 from November 1996 states that at "the end of October 1996, the total volume of groundwater treated in the groundwater treatment plant since the start up (799 days) was 4,765,162 gallons." This was an average of 5,964 gallons per day, which was less than a quarter of the facility's maximum capacity for volume.

The purpose of the groundwater treatment facility is to treat the water prior to discharge to the sanitary sewer of the City of Erwin - Publicly Owned Treatment Works. These discharges are conducted in accordance with a formally-issued pretreatment permit.

7. Why does NFS filter its groundwater samples before analyzing for radionuclides?

NFS filters their 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.

NFS evaluated filtered and unfiltered sample data from their wells. A comparison of the analytical results demonstrated that there was little difference between the two sets of data.

E. 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 monitoring well 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 for the last five years 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 detection limits for gross alpha, gross beta, and technetium-99. The detection limit of an instrument is the lowest reading the instrument is capable of. 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 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, NFS officials stated that they never believed the property was contaminated. 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.

NFS investigated this concern per request of the NRC. NFS officials advised that the land was purchased due to the value of the land and its proximity to the plant. Nuclear Fuel Services also advised, and 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. Nuclear Fuel Services reviewed offsite sampling results for air, stream, soil, and vegetation near the property. No contamination was found.

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 offsite property.

III. The Former Plutonium Building

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

Nuclear Fuel Services had removed the physical structure of Building 234 as part of past cleanup activities in 2003. 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 2011, the licensee has begun the cleanup of the contaminated soil beneath the building footprint. NFS' 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. This 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 license does not authorize the reprocessing of spent reactor fuel. The license authorizes the fabrication of new reactor fuel subject to the requirements in 10 CFR Part 70. Facilities licensed under Part 70 are not required to comply with the requirements of 10 CFR Part 50, except for facilities that fabricate reactor fuel containing more than trace amounts of plutonium.

The regulations in 10 CFR Part 50 apply to production facilities and utilization facilities. Under 10 CFR 50.2, a "utilization facility" is defined as "any nuclear reactor other than one designed or used primarily for the formation of plutonium or U-233." NFS does not operate a nuclear reactor.

In Part 50, a "production facility" includes any facility used for processing irradiated materials containing special nuclear material, with certain exceptions. One exception is facilities in which the only special nuclear materials contained in the irradiated material to be processed are uranium enriched in the isotope U-235 and plutonium produced by irradiation, if the material processed contains not more than 10^{-6} grams of plutonium per gram of U-235 and has fission product activity not in excess of 0.25 millicurie (mCi) of fission products per gram of U-235.

The NFS license requires that all uranium enriched in the isotope U-235 must contain no more than 10^{-6} grams of plutonium per gram of U-235 and has fission product activity not in excess of 0.25 mCi of fission products per gram of U-235. Therefore, NFS is not a production facility and the requirements of 10 CFR Part 50 do not apply.

4. Does NFS discharge plutonium to the river?

Yes. Trace amounts of plutonium are discharged in NFS liquid effluents and are in compliance with 10 CFR 20.1301. Specific concentrations of plutonium in the discharge waters can be retrieved from the recent NFS biannual effluent monitoring reports at the

following link: http://www.nrc.gov/materials/fuel-cycle-fac/fuel-fab/nfs-effluent-reports.html.

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

NFS radiation workers are trained annually on the general radiological hazards they will encounter. NFS has determined that most of the radiation workers will not encounter plutonium, thus general radiation worker training does not distinguish plutonium. If workers are going to work in an area where a pre-job survey has identified plutonium, a Radiation Work Permit will provide instructions and the pre-job briefing will discuss 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 years ago.

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 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 Environmental Protection Agency and state officials who stated that the Bumpass Cove landfill was cleaned up. The site was archived as an EPA Superfund site (http://cfpub.epa.gov/supercpad/cursites/calinfo.cfm?id=0404056&prnt=Y) in 2003, meaning no further environmental action will be taken. For further details contact the Environmental Protection Agency (http://www.epa.gov) or the Tennessee Department of Environment and Conservation (http://www.state.tn.us/environment/).

IV. Bowl Cleaning Station event at NFS on October 13, 2009 (EN45446)

1. What enforcement did NFS receive from the NRC with respect to the issues identified during the inspection into the bowl cleaning station event from October 13, 2009 (EN 45446)?

On September 2, 2010, the NRC issued a Severity Level III Notice of Violation and a civil penalty of $140,000 (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 (ML100780127).

The NRC issued the January 7, 2010 Confirmatory Action Letter (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 confirmatory action letter 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 recent 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 (ML070520607).

In accordance with the NRC's Enforcement Policy (http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html), a base civil penalty in the amount of $35,000 is 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 is 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 Confirmatory Action Letter 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 increases to $70,000. Subsequently, the NRC applied discretion due to NFS' poor performance and increased the civil penalty amount to $140,000.

The issues identified in Inspection Report 70-143/2009-011 (ML100780127) contained a Severity Level III violation. The risk 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 Confirmatory Action Letter (CAL) (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 verified and assessed NFS' 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 communication within the NRC, and communication with NFS.

On October 13, 2009, NFS informed the NRC of the bowl cleaning station event (EN 45446) to the NRC. 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 Confirmatory Action Letter (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 (ML100780127) on March 19, 2010. Additional NRC discussion and review characterized the issues as apparent violations in Inspection Report 70-143/2010-007 (ML101460178) on May 26, 2010. The NRC then processed the apparent violations through our 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 (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 (ML0933505520).

V. NFS' January 7, 2010 Confirmatory Action Letter

1. What is a Confirmatory Action Letter (CAL)?

Confirmatory Action Letters are letters 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.

2. What events, inspection results and assessments led to NFS' January 7, 2010 Confirmatory Action Letter being issued?

On October 13, 2009, Nuclear Fuel Services experienced an unanticipated exothermic reaction within the Uranium-Aluminum portion of the Blended Low Enriched Uranium (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' performance since the issuance of the Confirmatory Order dated February 21, 2007. In addition to the event discussed above, the inspectors specifically reviewed the 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 Licensee Performance Review Period Adjustment letter dated November 5, 2010 (ML103090576).

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 Nuclear Fuel Services 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 (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 (ML100430924).

Inaccurate Reply to a Notice of Violation: In a letter dated October 13, 2009 (ML092930282), Nuclear Fuel Services informed the NRC that a response to a Notice of Violation previously submitted in November 2008 (ML083370179) was not accurate. NRC enforcement regarding this issue resulted in the November 17, 2010 Confirmatory Order (ML103210221).

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

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

The licensee committed to suspend Special Nuclear Material processing operations associated with all production lines until the commitments listed as "Actions Prior to Restart of Operations" in Confirmatory Action Letter (CAL) 2-2010-001 (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' commitments included inspections and assessment of the completed actions for each process.

4. 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 Confirmatory Action Letter (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.

5. What would happen if Nuclear Fuel Services 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 Nuclear Fuel Services license.

6. Did this CAL relieve Nuclear Fuel Services of the commitments it has already made with regard to the 2007 Confirmatory Order?

No. The Confirmatory Action Letter (CAL) (ML100070118) issued on January 7, 2010 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 (ML103210213), issued on November 16, 2010, does supersede the February 21, 2007 Confirmatory Order (ML070520607).

7. 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:
1. Navy Fuel process line – March 23, 2010
2. Uranium Metal/ Oxide process line – May 19, 2010
3. Uranium-Aluminum process line and Building 301 Column Dissolvers – July 6, 2010

4. Ammonium Diuranate (ADU) process and support equipment – October 22, 2010
5. Uranium Hexafluoride (UF_6) process line – July 12, 2011

VI. NFS Process Line Restarts in 2010 and 2011

A. Naval Fuel Process Line Restart

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

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

1) Verifications that the "Actions Prior to Restart of Operations," as noted in the CAL, had been completed;
2) Verifications that the licensee's assessment and corrective actions sufficiently addressed the concerns about the adequacy of NFS' management oversight of facility process changes, perceived production pressures, lack of questioning attitude by workers and management, and poor communication;
3) An assessment of the licensee's readiness to restart the Navy Fuel process line; and
4) 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 Augmented Inspection Team (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 had 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 (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 onsite 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 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 onsite NRC resident inspectors. The NRC resident inspectors implement daily, Monday

through Friday inspections of licensee activities that are supplemented with periodic back shift inspections on nights and weekends.

3. Is it against the law to lie to the NRC? Is this text an example of lying to the NRC? "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."

Yes. It is a violation to deliberately withhold information that the licensee has identified as significant to public health and safety. It is also a violation to deliberately submit information to the NRC which the licensee knows to be incomplete or inaccurate. However, neither of the those violations occurred in this case.

This question stemmed from Restart Readiness Assessment Team (RRAT) #1 inspection report which examined the restart of the Navy fuel process line. Inspection Report 70-143/2010-005 Section C.2 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; 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 determined that the issue was not considered significant to the proper implementation of the outstanding modification work and that the confusion of the status of the modifications indicated a lack of engineering management oversight in the modification process.

The NRC regulation 10 CFR 70.9, Completeness and Accuracy of Information, maintains that a licensee violates this paragraph only if the licensee fails to notify the Commission of information that the licensee has identified as having a significant implication for public health and safety. The NRC inspectors, in this case, noted that the issue was *not* considered significant to the proper implementation of the outstanding modification work.

The NRC regulation 10 CFR 70.10, Deliberate Misconduct, maintains that deliberately submitting information that the person knows to be incomplete or inaccurate to the NRC is subject to enforcement action. In other words, it is against the law to lie to the NRC. The NRC inspectors, in this case, determined that the misleading interaction was due to confusion and not the willful falsification of information. Licensee confusion is not investigated and prosecuted in a way characteristic of the willful falsification of information.

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 URI or IFI?

This question stemmed from Restart Readiness Assessment Team (RRAT) #1 inspection report which examined the restart of the Navy Fuel process line. Inspection Report 70-143/2010-005 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 inspection report continues the discussion by stating that "based on the team's observations, the licensee initiated actions to address the aforementioned weaknesses in their initial evaluation of open work items. These actions included the development of specific restart evaluation criterion for reviewing all open work request items, with the review conducted by specific work request identification number vice a general topic item description. The subsequent review using the developed evaluation criteria would document the decision-making process and be maintained in a consolidated evaluation database up to and including restart of the Navy Fuel line to ensure new work items would be properly evaluated and documented. The licensee indicated that this evaluation methodology would be used for the restart of the remaining NFS product lines. The team concluded that the actions proposed by the licensee were comprehensive and adequately addressed the concerns."

An unresolved item (URI) or Inspector Follow-up Item (IFI) was not opened for this concern.

B. Uranium Metal/Oxide Process Line Restart

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

The NRC formed a five person inspection team (Restart Readiness Assessment Team 2) on May 3, 2010 to review the readiness of NFS to restart the uranium metal/oxide process line. The team spent more than 200 inspection hours evaluating the effectiveness of the various changes that NFS has implemented as a result of the Confirmatory Action Letter (CAL) to improve plant operations, design basis documentation, and safety culture at the plant 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 (ML102070447).

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

The NRC performed enhanced onsite 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 onsite 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' operational performance has been, and will continue to be, conducted with an appropriate focus on safety. Following this period, the NRC's oversight returned to its normal oversight coverage with the two onsite NRC resident inspectors.

C. Uranium-Aluminum Process Line Restart

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

The NRC formed a four person inspection team (Restart Readiness Assessment Team 3) on June 21, 2010 to review the readiness of NFS to restart the uranium-aluminum process line. The team spent more than 120 inspection hours evaluating the effectiveness of the various changes that NFS has 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 (ML102430129).

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

The NRC performed enhanced onsite inspections with two NRC resident inspectors during the initial startup phase of the uranium-aluminum process line. Through the enhanced onsite coverage, the inspectors independently examined and evaluated licensee activities to ensure the facility was being safely operated. This focused inspection continued until the NRC was assured 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.

D. Ammonium Diuranate Process Line Restart

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

The NRC sent a three person inspection team (Restart Readiness Assessment Team 4) on September 27, 2010 to review the readiness of NFS 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 has 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).

2. What did the NRC do to inspect NFS as it restarted these processes?

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

E. Uranium Hexafluoride (UF_6) Process Restart

1. What did the NRC inspect to verify NFS' readiness to restart the Uranium Hexafluoride Process?

The NRC sent a six person inspection team (Restart Readiness Assessment Team 5) on May 2, 2011, to review the readiness of NFS to restart the uranium hexafluoride (UF_6) process with in-office reviews continuing until June 30, 2011. The team spent more than 190 hours evaluating the continued effectiveness of the various changes that NFS implemented as a result of the Confirmation Action Letter (CAL) with a focus on the uranium hexafluoride 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 (ML112570351)

2. What did the NRC do to inspect NFS as it restarted this process?

The NRC resident inspectors performed enhanced onsite inspections during the initial startup phase to ensure that safety was maintained.

VII. Handling, Storage, and Processing of Uranium Hexafluoride (UF_6)

1. Is NFS licensed to possess, store, process, and transport uranium hexafluoride (UF_6)?

Yes. NRC License No. SNM-124 authorizes NFS "to receive, possess, use, store, and ship authorized special nuclear material pursuant to 10 CFR Part 70." Chapter 1, Appendix B of the application referenced in the license lists "Uranium hexafluoride (UF_6)" as a "chemical form of uranium which may be used in licensed operations." Authorized activities include "conversion of highly enriched uranium 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. The UF_6 containers at NFS are rated for temperatures greater than those that occur in summer for the area of eastern Tennessee. Specifically, per the American National Standards Institute – American National Standard (ANSI-ANS-14.1), "Uranium Hexafluoride – Packaging for Transport," Table 1, note b, "fill limits are based on 250^{o}F maximum UF_6 temperature. This maximum temperature shall not be exceeded."

In addition to the robust UF_6 containers, it can be noted that the containers are stored indoors in a climate-controlled area.

5. Does NFS' 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)?

The NRC evaluation of the current design for processing UF_6 determined that NFS has established processes and controls to provide reasonable assurance that the operation does not pose an unacceptable risk to workers, to members of the public, or the environment. The NRC has determined that the UF_6 process could be operated safely.

The fire in the UF_6 process line that occurred on November 14, 2009 was evaluated by the NRC. The results of the inspection were reported in NRC Inspection Report 70-143/2009-004 (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 ensured that the corrective actions identified in the evaluation of this event were implemented at NFS to prevent reoccurrence.

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

No. The storage of UF_6 cylinders does not pose an excessive risk to the public, workers, or environment because NFS has identified controls which make UF_6 accidents highly unlikely or mitigates the consequences so that significant consequences are highly unlikely.

Uranium hexafluoride is stored in cylinders specially designed to hold UF_6. The vast majority of the cylinders are approximately 8 to 12 inches in length and 2 to 4 inches in diameter. The amount of material in each of these cylinders is roughly equivalent to the contents of a standard tube of tooth paste. A small number of larger cylinders are approximately 2-1/2 feet in length and 6 inches in diameter.

A worker responsible for working around the UF_6 cylinders is not at excessive risk as the cylinders are below the pressure that the cylinders were designed to contain. In a situation in which a smaller cylinder stored inside a shipping container ruptured due to overpressure, the shipping container would contain the contents and maintain integrity. A worker would not be at an excessive risk during such an event.

An evaluation of the consequences due to a total release of UF_6 from the cylinders at NFS (in 2010) was performed by the NRC. The NRC calculated the concentration of hydrofluoric acid (HF), Fluorine (F_2), or UF_6 gases at the fence (exposure to a member of the public), if all the cylinders were to release their entire contents at one time. The resulting concentrations would lead to discomfort and irritation, but would not represent a significant health effect for an individual and it would not impair the person's ability to take protective action.

The NRC performed an independent calculation of the consequences due to a release of UF_6 from the largest cylinder, and found the consequence to be negligible at the fence. This calculation used realistic assumptions, but did not include containment from the glovebox or building 301.

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

No. The cylinders are stored inside the shipping containers in which they were originally transported. The shipping containers/cylinders are stored in protected climate-controlled indoor areas for security reasons and are 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?

The worst case accidental release (a fire involving a cylinder containing 24.9 kilograms of UF_6) of hydrofluoric acid from operations related to the UF_6 process line would result in a 0.4 parts per million potential exposure at the site boundary, which would result in no adverse public health effects.

9. What are the waste streams leaving the UF_6 Process Line?

There are three general waste streams (liquid and solid) leaving the UF_6 process line:

Scrubber blow-down: The building ventilation uses 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 is directed to the waste water treatment facility. The water is 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 hydrofluoric acid (HF) would be neutralized with a caustic to form water and a salt. The remaining liquid is sampled and sent to the Nolichucky River once the water concentrations meet the requirements of 10 CFR 20.

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

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

VIII. Material Control and Accountability Inventory Exemption

1. What is an exemption?

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.

2. How often does the NRC grant an exemption?

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.

3. 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 (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 Confirmatory Action letter. 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.

4. 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 material control and accountability (MC&A) inventory requirements.

Information regarding MC&A inspections and enforcement are consider ‘Official Use Only – Security Related Information’ and are withheld from the public.

IX. Facility and 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. Resource Conservation and Recovery Act (RCRA) hazardous waste is not authorized for storage in the Industrial Park Facility. Transfers of shipping packages via highway and/or railroad are conducted per DOT regulations. NRC approved the Industrial Park Facility operations in License SNM-124 Amendment No. 11, effective 09/13/2000. The Industrial Park Facility is described in Appendix 10.1-A of Chapter 10, Part II, of the current SNM-124 License.

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

The NRC license authorizes NFS to receive, store, and process high-enriched uranium from any source. NFS has processed material from foreign entities and may continue to process material from foreign governments in the future as per their current license.

NFS and its customers transport the high-enriched material using secure transportation. In addition, all parties are required to comply with the Department of Transportation (DOT) requirements.

X. Emergency Planning

A. 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 in maintaining emergency preparedness capabilities.

Detailed guidance on emergency planning and preparedness is contained in NRC's Regulatory Guide 3.67, entitled “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 Part 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 [ML062020791]). The extent of the postulated UF_6 accident consequences are 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.

3. Why is the NFS Emergency Plan not publically available?

The NFS Emergency Plan is not publically available because it would be useful to an adversary planning an attack. Therefore, the document has a security classification of ‘Official Use Only.’ NFS supplies a copy of the Emergency Plan to each supporting offsite agency on a need to know basis, including: Unicoi County, Tennessee Emergency Management Agency (TEMA), law enforcement, fire departments, hospitals, etc. The NFS Emergency Plan does not contain any unique information that would be needed by the public.

4. How often is the NFS Emergency Plan updated?

The NFS Emergency Plan is updated on an annual basis, usually in the February time frame.

5. How has the NRC improved it 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. Emergency preparedness exercises and drills are 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. Lessons-learned at one facility are shared with the nuclear industry in order 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. 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 offsite 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.

B. Earthquake

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

The Integrated Safety Analysis (ISA) Summaries submitted by NFS provide the results of risk assessments for all potential accidents, including accidents caused by earthquakes. The assessments concluded that the risk of significant consequences from accidents caused by an earthquake is low. Strong earthquakes are rare in northeastern Tennessee. If a strong earthquake occurred, it could cause releases of hazardous material and fires. NFS has identified controls which make these accidents highly unlikely or mitigates the consequences so that significant consequences are highly unlikely.

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?

We do not know. When Nuclear Fuel Services requested authority to process uranium fluoride compounds in the new Commercial Development 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 (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.

C. Liability Insurance

1. Is Nuclear Fuel Services (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.

NFS is not licensed to conduct any of the activities listed above. NFS is licensed under Part 70; however NFS is licensed to fabricate fuel from uranium that is already enriched. NFS does not enrich uranium and it does not use plutonium in its fuel fabrication process.

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

The NRC approves and maintains license applications based on the requirements in NRC regulations. Since NFS is not required to have coverage from ANI 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, (b) equipment and facilities adequate to protect health and minimize danger, and (c) procedures adequate to protect health and minimize danger. The NRC 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 safety program provides reasonable assurance that people and the environment will be protected.

Liability insurance does not prevent damages from occurring. Insurance provides a source of funds, in addition to the licensee's assets, to provide compensation after damages have occurred. The ability of NFS to implement its safety program is not adversely affected by the lack of liability insurance.

XI. 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 presentation can be reviewed in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/readingrm/adams.html, under accession number ML092730303.

2. Did a criticality almost occur at NFS due to the March 6, 2006 spill of the high enriched uranium solution?

No. The liquid containing the high-enriched uranium was never close to the conditions required for a criticality accident. The issue was that 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 high-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 (ML072630328).

3. 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 quality assurance requirements for new and existing fuel fabrication facilities 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 items relied on for safety (IROFS), to ensure the items are available and reliable to perform their functions when needed. Management measures include (1) Configuration Management, (2) Maintenance, (3) Training and Qualifications, (4) Procedures, (5) Audits and Assessments, (6) Incident Investigations, (7) Records Management, and (8) Other QA Elements. This regulation also *requires e*ach applicant or licensee to establish management measures to ensure compliance with the performance requirements of § 70.61.

NFS is required to establish and maintain elements of a quality assurance (QA) program that ensure the maintenance and operability of items relied on for safety (IROFS). These requirements include the key attributes of a QA program appropriate for a fuel

facility. Even though NFS is not required to meet the provisions of ASME NQA-1, the licensee is required to implement and maintain a graded QA program commensurate with the risk posed by the facility.

4. 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 that occurred in the above inspection report did not meet the criteria for reporting to the NRC. The requirements for NFS reporting an event to the NRC are listed in 10 CFR Parts 70.50. 10 CFR 70.50, "Reporting Requirements," specifies the conditions under which a licensee is required to make a report at the NRC. From time to time, every licensee inevitably takes an action, or fails to take an action, that results in violating one of their procedures, their license, or some other requirement. When a violation occurs, a review is performed to determine if the violation meets the reporting requirements of 10 CFR 70.50. Even though these two violations fell below 10 CFR 70.50 reporting requirements, they met NRC Enforcement Policy requirements for citing a violation in an inspection report. The violations are described in Inspection Reports 70-143/2011-002 (ML111190234) and 70-143/2011-003 (ML112092311).