Uranium Hexafluoride (UF_6) Process Restart Inspection
Exit Meeting
August 16, 2011

Response to Questions from the Public

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.

2. 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."

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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.

10. Do NRC regulations require an Emergency Planning Zone around facilities that process UF_6?

No. The NRC regulations do not require an Emergency Planning Zone around facilities that process UF_6. 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 train for the emergency response of nuclear and industrial events at fuel facilities and other industrial businesses in their district. The NRC determined that the designation of an Emergency Planning Zone would not materially impact emergency response planning.

11. 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) is 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.

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√ PUBLICLY AVAILABLE ☐ NON-PUBLICLY AVAILABLE ☐ SENSITIVE √ NON-SENSITIVE

ADAMS: √ Yes ACCESSION NUMBER: ML112300109 ☐ SUNSI REVIEW COMPLETE √ FORM 665 ATTACHED

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