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21G-08-0096
GOV-01-55-04
ACF-08-0174
June 25, 2008

Director
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

References:

1) Docket No. 70-143; SNM License 124

2) NFS letter from B. Marie Moore to Director, Office of Nuclear Material Safety and Safeguards, dated June 19, 2008, "Reply to RAI Concerning NFS' CD Line Facility," (21G-08-0093)

3) NRC Letter from Kevin Ramsey to B. Marie Moore, dated May 23, 2008 (TAC L32653), "Nuclear Fuel Services, Inc., Request for Additional Information Concerning the CD Line Facility"

4) NFS letter from B. Marie Moore to Director, Office of Nuclear Material Safety and Safeguards, dated August 31, 2007, (TAC L32653) "License Amendment Request for Processing UF_6 in the CD Line Facility at the NFS Site," (21G-07-0086)

5) NFS letter from B. Marie Moore to Director, Office of Nuclear Material Safety and Safeguards, dated May 23, 2007, (TAC L32599) "Reply to RAI concerning NFS' Updated Decommissioning Cost Estimate," (21G-07-0071)

6) NFS letter from B. Marie Moore to Director, Office of Nuclear Material Safety and Safeguards, dated December 1, 2006, (TAC L32599) "Updated Decommissioning Cost Estimate as Required by 10 CFR 70.25(e)," (21G-06-0211)

Subject: Redacted Version of Reply to RAI Concerning NFS' CD Line Facility

Dear Sir:

Per a request from your staff, Nuclear Fuel Services, Inc. (NFS) hereby submits a redacted version of the reply to the request for additional information concerning NFS' CD Line Facility submittal.

NMSS01

21G-08-0096
GOV-01-55-04
ACF-08-0174

If you or your staff have any questions, require additional information, or wish to discuss this, please contact me, or Mr. Rik Droke, Licensing and Compliance Director, at (423) 743-1741. Please reference our unique document identification number (21G-08-0096) in any correspondence concerning this letter.

Sincerely,

NUCLEAR FUEL SERVICES, INC.

B. Marie Moore
Vice President
Safety and Regulatory

/pdj
Attachments

~~OFFICIAL USE ONLY~~

ATTACHMENT 1

REDACTED VERSION

NFS Responses to NRC Request for Additional Information Concerning NFS' CD Line Facility

29 Pages

~~OFFICIAL USE ONLY~~

ATTACHMENT
NFS Responses to NRC Request for Additional Information Concerning NFS' CD Line Facility

NRC:

1.
The transmittal letter for your request states that no changes to your existing environmental reports are necessary. However, the existing reports fail to address contributions that the new processing line will make to environmental impacts (i.e., radiation exposures, effluents, etc.). In addition, the existing reports fail to address what alternatives are available for processing the material. Estimate the contributions to environmental impacts from the new processing line and discuss what alternatives are available for processing the material.

This information is required to verify compliance with 10 CFR 70.23(a)(7), which requires a Commission finding that issuing the amendment is the appropriate action after weighing the environmental benefits against the environmental costs and considering available alternatives.

NFS RESPONSE:

The proposed change does not require an expansion of the site. Modifications are being made to an existing building where uranium operations were previously performed. NFS has prior experience processing these types of materials and the isotopic distribution is consistent with license requirements.

A newly installed high-efficiency gaseous effluent treatment system is replacing the existing one, however, the release point is basically the same. A source term was developed and a dose evaluation to the public was made based upon the design and planned throughput of the system. The activity derived for each radionuclide was used to determine the maximum annual dose equivalent to a member of the public using CAP88-PC computer code. Based upon site specific parameters and conservative source term assumptions, the estimated Annual Effective Dose Equivalent to the Maximally Exposed Member of the Public is 0.0032 mrem from all proposed operations. In addition, an application was approved by the Tennessee Department of Environment and Conservation, Division of Air Pollution for this activity as an insignificant emissions unit. Specifically, the proposed operation would result in potential emissions from the source of less than five tons per year of each air contaminant and each regulated air pollutant that is not a hazardous air pollutant, less than 1,000 pounds per year of each hazardous air pollutant, and less than 0.1 mrem per year of radionuclides.

At the direction of the Secretary of Energy, HEU production was suspended at the Portsmouth Gaseous Diffusion Plant in 1991 and actions were taken to remove stored materials from the site to minimize long-term safeguards and security cost. In 1999, a subcontract was awarded to NFS for receipt and interim storage of HEU in the form of uranium hexafluoride and uranyl fluoride. Based upon the value and strategic importance of similar materials located at Oak Ridge Y-12 Plant and Ames Laboratory in Ames, Iowa, the DOE has chosen to include these in this scope of work. The process will convert the DOE's inventory of HEU material to either highly enriched triuranium octoxide for shipment to the Y-12 Plant or to a form acceptable for transfer to the Tennessee Valley Authority Off-Specification Fuel Project at NFS. The goal is to convert these materials to a stable form for safe long term storage or convert them from a strategic form to a usable energy source.

NRC:

2.

Section 3.1.3 and Table 3-3 of the Integrated Safety Analysis (ISA) Summary state that a full 5A cylinder contains 15 kg of UF6. In addition, Section 2.1.2 of the Nuclear Fuel Services, Inc. (NFS) Emergency Plan lists the airborne release of 16 kg of UF6 as the worst UF6 accident. However, ANSI N14.1, Table 1, lists a 5A cylinder as having a maximum fill limit of 25 kg (55 lbs.) of UF6. Please explain why the accident analyses do not consider a cylinder containing 25 kg of UF6.

This information is needed to verify compliance with 10 CFR 70.62 which requires, in part, that each licensee perform an analysis that identifies the radiological and chemical hazards related to licensed processes at its facility.

NFS RESPONSE:

The values in Table 3-3 provide the maximum amount of uranium in one cylinder or tube to be processed in CDL. It does not address the maximum amount of UF_6 allowed in the cylinders, and the units for the values in the table are kg of uranium, not kg of UF_6. Therefore, the value of 15 kg uranium listed as the maximum amount of uranium for a 5A cylinder equates to 22.6 kg of UF_6, which is the maximum amount of UF_6 in any one 5A cylinder to be processed in the facility. However, the analyses have been re-evaluated using the maximum amount of UF_6 allowed in the 5A and 2S cylinders per ANSI N14.1 in case there are inaccuracies in the inventory. These values will be reflected in the revision to Table 3-3, which is provided below. The 16.8 kg of uranium in a 5A is the amount of uranium in 24.9 kg of UF_6 and likewise the 1.50 kg of uranium listed as the maximum value for a 2S is the amount of uranium in 2.22 kg of UF_6. Both of these limits are obtained from Table 1 of ANSI N14.1. This increase does not change the consequences of any accident scenario. In addition, the UF_6 accident in the Emergency Plan will be evaluated to ensure the maximum release of UF_6 is used, but some of the

conservatism will be removed from the evaluation to make the estimates more credible. Revision to Table 3-3 will be reflected in the CD Line ISA Summary to be submitted prior to facility start-up. A revision to the Emergency Plan will also be submitted at this time as well.

Table 3-3 Summary of Container Types and Amount of Uranium

Container Type	Containers Included	U Max (kg)	U Gas Max (kg)
Hoke Tube	Hoke Tubes	0.0839	1.65E-09
2S Cylinder	All 1S, 1H, All 2S, and P–990	1.50	4.02E-06
5A Cylinder	5A, 5B	16.8	3.15E-03

NRC:

3.

Section 4.2.5 states that earthquakes are not expected to result in significant consequences because the building meets the requirements of the Building Code. This provides reasonable assurance that the building will not collapse during an earthquake. However, it will still shake. Describe how the new processing line was evaluated to identify components that could be damaged during the shaking of an earthquake, and whether the accident sequences cover all possible leaks and spills resulting from earthquake damage.

This information is needed to verify compliance with 10 CFR 70.62 which requires, in part, that each licensee perform an analysis that identifies the radiological and chemical hazards related to licensed processes at its facility.

NFS RESPONSE:

The CD Line was evaluated to identify components that could be damaged due to any type of mechanical failure (such as cracking or rupturing during an earthquake) in the Process Hazard Analysis (PHA) tables. In these tables, postulated accidents caused by mechanical failures include the breach of every enclosure, column, vessel, tank, and process solution line in the CD Line process. These postulated accidents were then analyzed for applicable Chemical (occupational and environmental), or Radiological (occupational and environmental) consequences.

NRC:

4.

Justify each use of modeling conservatism as an enabling event for accident sequences described in the ISA Summary. Replace the phrase "Modeling Conservatisms" in Table 4-5 with a description of the actual physical events that could contribute to the accident. The justification in the nuclear

criticality safety evaluations (NCSEs) for crediting modeling conservatism is inadequate since only the bounding and realistic normal cases were compared. Process upsets are evaluated using the modeling assumptions in the bounding normal case but not the realistic normal case. Thus, it has not been demonstrated that the conservative conditions must occur before a criticality is possible. For example, if a leak occurs in an enclosure with two plugged drains (Sequence 4.1.6a) it has not been demonstrated that extreme reflection is also required before a criticality could occur.

In addition, provide revised NCSEs that address the following concerns:

a) **In the NCSE for the cylinder test and overpack station the realistic normal case assumes that UF6 is the most reactive material normally available in the two-liter bottles. However, the process description indicates that removed valves will be placed in two-liter bottles of water, forming a UO2F2 solution. In addition, the cylinders are expected to contain varying amounts of UF4, which has a higher density than UF6.**

b) **In the NCSE for sublimation station #3 and the heel removal station the realistic normal case assumes that that UF6 is the most reactive material normally available in the 5A cylinder. This does not appear to account for any UF4 that may be present. In addition, water is used in the heel removal station as part of the normal operations to rinse out the cylinders, which could result in a UO2F2 solution.**

This information is needed to determine compliance with 10 CFR 70.65(b)(3) and 70.65(b)(4). 10 CFR 70.65(b)(4) requires that the ISA Summary contain information that demonstrates compliance with the performance requirements of 10 CFR 70.61. In addition, 10 CFR 70.65(b)(3) requires that the ISA Summary contain a general description of the types of accident sequences.

NFS RESPONSE:

Consideration of modeling conservatism in the NCS analysis allows credit to be taken for the realistic, expected operating conditions. However, instead of taking credit for these modeled conservatisms as enabling events, upset conditions in the NCSEs will be modified to reduce some conservatism in the modeled reflection, while maintaining compliance with the SNM-124 license conditions. This reduction is necessary to demonstrate that the systems will remain subcritical with additional upsets considered. (See response for Question #9 in regards to establishing independence of administrative controls.)

"Modeling Conservatisms" will be removed from the risk assessment. The realistic normal case will be modified to consider UF4 in the cylinders, and will include a container of UO2F2 solution where applicable (i.e., one bottle in the Cylinder Test & Overpack Station and one bottle in the Heel Removal Station). The realistic normal case will be included to demonstrate defense-in-depth only.

Revision to Table 4-5 will be reflected in the CD Line ISA Summary prior to facility start-up.

Table 4-5 included in the ISA Summary document is only a summary of the risk assessment performed for NCS. A complete description of the items presented in that table is documented in the corresponding NCSEs. A general description of the accident sequences has been provided in the ISA Summary as required by 10 CFR 70.65(b)(3).

NRC:

5.
Revise the description of the item relied on for safety (IROFS) CDS3-16, in the CDL ISA Summary. CDS3-16 is listed as a passive engineered control; however, it is described as a management measure (pressure test) to ensure the structural integrity of the condenser tubes.

This information is needed to determine compliance with 10 CFR 70.65(b)(4), which requires that the ISA Summary contain information that demonstrates compliance with the performance requirements of 10 CFR 70.61.

NFS RESPONSE:

The IROFS will be revised to clearly state that the control is the integrity of the condenser tubes, as opposed to the pressure test to ensure there are no leaks. Revision to IROFS CDS3-16 will be reflected in the CD Line ISA Summary prior to facility start-up.

NRC:

6.
Revise the CDL ISA Summary to clearly indicate the IROFS that prevent accident sequences 4.1.1c, 4.1.4b, 4.1.6c, 4.1.6e, 4.1.6i, 4.1.7b, 4.1.7d, and 4.1.7g. Administrative IROFS CDG-17 is credited twice for each of these sequences. Once an IROFS has failed it cannot be considered available and reliable to perform its safety function.

This information is needed to determine compliance with 10 CFR 70.65(b)(4), which requires that the ISA Summary contain information that demonstrates compliance with the performance requirements of 10 CFR 70.61.

NFS RESPONSE:

CDG-17 provides protection against open and unattended favorable geometry containers, while CDG-1 helps prevent the handling of open unfavorable geometry containers within the facility. Both of those controls help to provide protection against this accident sequence. Since containers handled under CDG-17 are favorable geometry, there is no concern with the second failure unless an additional failure involving spacing occurs. The second occurrence of IROFS CDG-17 will be removed from these accident sequences since this sequence meets the performance requirements without the second failure of this IROFS. Revision to Tables 4-5 and 6-1 will be reflected in the CD Line ISA Summary prior to facility start-up.

It should be noted here that single administrative IROFS may be considered available and reliable if independence can be established. See response for Question #9 in regards to establishing independence of administrative controls.

NRC:

7.

Revise accident sequences 4.1.6g, 4.1.6h, 4.1.6j, 4.1.7f, and 4.1.7h for the CDL to clearly indicate the IROFS that have failed and the IROFS that remain available and reliable to prevent the accident. These sequences identify a leak test (CDS1-1 or CDS3-20) as preventing a leak that has already occurred as an initiating event.

This information is needed to determine compliance with 10 CFR 70.65(b)(4), which requires that the ISA Summary contain information that demonstrates compliance with the performance requirements of 10 CFR 70.61.

NFS RESPONSE:

The initiating event (leak in connection) will be revised to reflect the actual event of concern, an improperly connected system. Inside the enclosures, the only piping that is routinely disconnected as part of normal operations is the fitted connections to the UF6 cylinders. There may also be an occasional need to disconnect the sanitary fittings on the eductor (e.g., maintenance purposes). IROFS CDS1-1 and CDS3-20 are the administrative checks to ensure there are no leaks in these connections prior to processing. These IROFS will be revised to clearly indicate that they are applicable only

to the connections inside the enclosures. Revision to Table 6-1 will be reflected in the CD Line ISA Summary prior to facility start-up.

NRC:

8.

Justify why a leak in a connection is not a failure of one of the enclosure process lines (IROFS CDS1-2 or CDS3-19) for CDL accident sequences 4.1.6g, 4.1.6h, 4.1.6j, 4.1.7f, and 4.1.7h. Justify why the failures of CDS1-2 and CDS3-19 occur at an index frequency of -2, while a leak in connections occurs at an index frequency of -1. Revise the description of IROFS CDS1-2 to correctly identify the components as the ENCLOS-1B/C01 process lines.

This information is needed to determine compliance with 10 CFR 70.65(b)(4), which requires that the ISA Summary contain information that demonstrates compliance with the performance requirements of 10 CFR 70.61.

NFS RESPONSE:

Since there are connections in the enclosures that are routinely disconnected as a part of normal operations (e.g., the UF6 cylinder valve fitted connections), a distinction is necessary between these two failures. Both initiating events are addressed in Section 4.1.6 and 4.1.7 of the NCSEs. A leak in a connection or, more specifically, an improperly connected system (see response to Question #7), is not controlled and is therefore assigned a failure frequency of -1. IROFS CDS1-2 and CDS3-19 are intended to cover those system components that are not routinely disconnected (i.e., the engineered features of the system that do not contain connections), such as the alloy-20 steel lines inside the enclosures. An effectiveness of protection index, as opposed to a failure frequency, of -2 is conservatively assigned to the failure of those IROFS since they are passive engineered features not subject to change without review and approval.

The components listed for IROFS CDS1-2 in Table 6-1 will be revised to identify the correct components. Revision to Table 6-1 will be reflected in the CD Line ISA Summary prior to facility start-up.

NRC:

9.

Revise CDL accident sequences, 4.1.15a, 4.1.15b, 4.1.20, 4.1.16, and 4.1.21 to include additional IROFS. Justify that this revision addresses the following concerns regarding these accident sequences:

a) **The sequences are protected by a single administrative IROFS that is credited with providing protection after it has failed. Once an IROFS has failed it cannot be considered available and reliable to perform its safety function. These IROFS are not listed as sole IROFS.**

This information is needed to determine compliance with 10 CFR 70.65(b)(4) and 70.65(b)(8). 10 CFR 70.65(b)(4) requires that the ISA Summary contain information that demonstrates compliance with the performance requirements of 10 CFR 70.61. In addition, 10 CFR 70.65(b)(8) requires that the ISA Summary contain a descriptive list identifying all sole IROFS.

b) **The sequences do not meet double contingency requirements. The NCSE suggests that a small number of related process upsets (e.g., addition of two extra containers into an enclosure) could lead to a criticality. Since these actions can be performed by a single operator, these process upsets cannot be considered independent.**

This information is needed to determine compliance with 10 CFR 70.64(a)(9), which requires adherence to the double contingency principle.

c) **The sequences have not been demonstrated to be subcritical under all credible abnormal conditions. According to Section 9.0 of the NFS Site ISA Summary, an event is considered credible unless it consists of a sequence of many unlikely human actions or errors. The NCSE indicates that only one or two repeat failures of an administrative control were evaluated.**

This information is needed to determine compliance with 10 CFR 70.61(d), which requires that all nuclear processes will remain subcritical under credible abnormal conditions.

d) **The reliance on a single administrative control does not appear to meet defense-in-depth practices. Defense-in-depth requires a design preference for engineered controls and features that enhance safety by reducing challenges to IROFS.**

This information is needed to determine compliance with 10 CFR 70.64(b), which requires that new system designs be based on defense-in-depth practices.

e) **Section 4.1.15.1 of NCSE for the cylinder test and overpack station states that this enclosure is limited to three UF6 cylinders and one two-liter**

bottle, but IROFS CDS1-8, that implements this limit, permits four containers of either type.

This information is needed to determine compliance with 10 CFR 70.65(b)(4), which requires that the ISA Summary contain information that demonstrates compliance with the performance requirements of 10 CFR 70.61

NFS RESPONSE:

As discussed in the response to Question #4, the models developed in the NCSEs will be revised to reduce some of the conservatism in the upset cases which will allow for a greater number of upsets to be shown subcritical. "Modeling Conservatisms" will be removed from the risk assessment for sequences 4.1.15a, 4.1.15b, 4.1.20, 4.1.16 and 4.1.21. The revised NCSEs will also include a control on reflection.

NFS evaluates the independence of administrative controls based upon the following criteria from Attachment III (Independence Criteria Guide) of procedure NFS-HS-A-068, ISA Risk Assessment Procedure:

2. *Administrative controls with an assigned safety margin, such that multiple failures of each independent control (two or more times) would not result in a high consequence, may be considered independent.*

In accordance with Criteria #2, the following discussion will be added to Section 4.1.15 and 4.1.16 of the NCSE for these particular upsets.

The initiating event is a failure of Administrative Control IROFS CDS1-3, CDS1-8, CDS3-1 or CDS3-14, which limits the number of containers in the respective enclosure. A trained and qualified operator performing the routine task of placing containers in the enclosure during processing does not correctly verify the correct number of containers in the enclosure prior to placing an additional container into the enclosure. The container limits will be enforced via postings on the enclosures, operating procedures and during training. Given that essentially all enclosures at NFS have some type of container limit, it is unlikely that this control would be violated since operators are accustomed to having a container limit and the specific limit is clearly posted on the enclosure.

Previous experience at NFS shows one documented case where an empty extra container was positioned within an enclosure, but there are no documented cases of two extra containers being positioned inside an enclosure, in violation of the posted enclosure limit. Based on this history, the first additional container is an anticipated upset event because it would probably be added as a result of an operator failing to observe that the container limit is already reached in the enclosure.

A second violation of the IROFS controlling the number of containers in the enclosures is subcritical with reduced reflection, as will be demonstrated by the revised cases in the NCSEs. An event leading to the introduction of more than two additional containers above the enclosure limit, by a trained and qualified operator, in accordance with an approved, written procedure is considered a malicious event and is not an accident.

It is unlikely that if an operator sees the enclosure already contains the maximum number of containers, the operator would add one more container to the enclosure. Operators must verify the enclosure container limit will not be exceeded prior to placing a container inside the enclosure. In addition, the operator can only place one container inside the enclosure at a time since IROFS CDG-3 only allows one item to be hand carried at a time. Therefore, because the administrative controls have an assigned safety margin such that multiple failures of the container limit (two or more failures) will not result in a criticality, the addition of a second extra container is considered an independent failure.

A similar discussion will be added to Section 4.1.20 and 4.1.21 of the NCSEs for the upset related to hand carry spacing violations. However, the hand carry control CDG-3 can actually be considered two distinct controls: 1) only one approved item may be hand carried at a time and 2) hand carried items shall be spaced at least 12 inches from other fissile material. Both parts of this control would need to fail to have more than one item placed next to an enclosure (i.e., less than 12 inches from fissile material in the enclosure). Independence can be argued for this scenario since it would likely take more than one operator to have such a condition. Regardless, the same approach considering an adequate safety margin will be conservatively applied to this upset sequence.

This is a manual operation, and therefore, administrative controls are required and necessary to demonstrate compliance with the Double Contingency Principle and 10 CFR 70.61. In regards to the defense-in-depth practices with a preference for engineered controls, there are rack positions inside the enclosures that are designated in the NCSE. These engineered features are designed to accommodate a single container and provide spacing which is controlled through the NFS configuration controlled equipment (CCE) program.

The discussion presented in Section 4.1.15.1 of the NCSE will be revised to ensure consistency with IROFS CDS1-8.

NRC:

10.

Revise the description of IROFS CDS3-14 in the CDL ISA Summary to indicate the size limit of the rinse bottle.

This information is needed to determine compliance with 10 CFR 70.65(b)(6), which requires that the ISA Summary contain a brief description of each IROFS.

NFS RESPONSE:

For conservatism, the rinse bottle will be limited to 1-liter or less. The NCSE will be revised to include this restriction. Revision to IROFS CDS3-14 will be reflected in the CD Line ISA Summary prior to facility start-up.

NRC:

11.
Revise the process description in the CDL ISA Summary for Sublimation Station #3 to include the purpose of the two-liter bottle that is mentioned in IROFS CDS3-1.

This information is needed to determine compliance with 10 CFR 70.65(b)(3), which requires that the ISA Summary contain a description of each process in sufficient detail to understand the theory of operation.

NFS RESPONSE:

The 2-liter bottle is included in the control since those bottles are typically used for clean-up activities. This description will be included in the revised NCSE. This will be reflected in Section 3.1.3 of the CD Line ISA Summary as well prior to facility start-up.

NRC:

12.
Revise the CDL ISA Summary to indicate that the cylinder test and over-pack station does not have drains. The ISA Summary should also indicate those features of this enclosure that ensure that accumulation of water or fissile material solution will not result in a criticality.

This information is needed to determine compliance with 10 CFR 70.65(b)(4), which requires that the ISA Summary contain information that demonstrates compliance with the performance requirements of 10 CFR 70.61.

NFS RESPONSE:

There are no solution lines in the Cylinder Test & Overpack Station. Each pass-through to Sublimation Station #1 & 2 is required to be positioned such that it is greater than one inch above the floor of the sublimation station to prevent solution from spilling into the

test/overpack enclosure. The Safety Related Equipment overflows in the sublimation enclosures provide the necessary protection in this case.

Section 3.1.1 of the CD Line ISA Summary will be revised to reflect those aspects of the Cylinder Test & Overpack Station prior to facility start-up.

NRC:

13.

What is the maximum allowable service temperature of the sample cylinders that are to be used (5A, 2S, 1S, and P-990)? What is the peak temperature from the most severe fire conditions that the cylinders are expected to withstand?

10 CFR 70.65(b)(3) states that the ISA Summary must contain "a general description of the facility, with emphasis on those areas that could affect safety." The acceptance criteria in Standard Review Plan, Section 7.4.3.4, Process Fire Safety, states - in areas that have fire hazards that may threaten licensed material, the application should identify the hazardous chemicals, processes, and design standards used to ensure fire safety.

NFS RESPONSE:

The maximum allowable service temperature of the cylinders is ~100 °C (212 °F). The electrical tubular, self-contained, heating units utilized in the sublimation station have a designed operating range of 70 to ~100 °C (158-212 °F).

Historical literature[1] indicates the use of a conservative threshold failure of a UF_6 cylinder with a liquefied UF_6 temperature of 235 °F. The electrical tubular, self-contained, heating units are equipped with high temperature sensing and control-interlocks through the heater control panel to shut down the heater if malfunctions occur and temperature exceeds 110 °C (230 °F), providing an additional 2.12 % safety margin above the conservative threshold failure of a UF_6 cylinder.

Hydraulic pressure increases inside the cylinder and threatens the pressure rating integrity of a closed cylinder when the liquefied UF_6 reaches 300 °F. Research shows that explosive rupture of a cylinder can occur when UF_6 contents inside a cylinder reaches temperatures varying between 330-440 °F, with the cylinder wall approaching 1,000 °F.[2]

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[1] "Uranium Hexafluoride-Safe Handling, Processing, and Transporting, Conference Proceedings," May 24-26, 1988, Oak Ridge, Tennessee, Sponsored by the Department of Energy; Editors: W.D. Strunk, S.G. Thornton.

[2] "ORGDP Container Test and Development Program: Fire Tests of UF6-Filled Cylinders," January 12, 1966, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee; Author: A.J. Mallett.

NFS' ISA assumes that the cylinders will not withstand the bounding fire conditions for CDL, and rupture of the UF_6 cylinder will occur.

NRC:

14.

There are various flammable, combustible, and explosive gasses and liquids referenced throughout the ISA Summary; however, no specific code commitments were found in reference to the safe handling, storage, and use of these materials. In the ISA Summary, provide either a code commitment or the details on how safe practices are insured in the handling, storage, and use of these materials.

10 CFR 70.65(b)(3) states that the ISA Summary must contain "a general description of the facility with emphasis on those areas that could affect safety." The acceptance criteria in Standard Review Plan Section 7.4.3.4, Process Fire Safety, states - in areas that have fire hazards that may threaten licensed material, the application should identify the hazardous chemicals, processes, and design standards used to ensure fire safety.

NFS RESPONSE:

The CD Line does not process or use flammable, combustible, and explosive gases and liquids. Flammable and combustible liquids used as cleaning supplies are referenced in Section 2.7.1 of the CD Line ISA Summary, and these liquids will be stored in appropriate safety cabinets.

The applicable codes addressing the CD Line are as follows:

NFPA 10, *Standard for Portable Fire Extinguishers*
NFPA 30, *Flammable and Combustible Liquids Code*
NFPA 70, *National Electric Code*
NFPA 72, *National Fire Alarm Code*
NFPA 86, *Standard for Ovens and Furnaces*
NFPA 90A, *Installation of Air-Conditioning and Ventilating Systems*
NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids*
NFPA 101, *Life Safety Code*
NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*

NFPA 30 and NFPA 86 will be added to Section 2.7.1 of the Site ISA Summary at the next annual update.

NRC:

15.

Section 2.7.2 of the ISA Summary discusses the fire detection and alarm system in Building 301. Provide clarification in the ISA Summary if the smoke detection system is provided throughout the building or only within the glove boxes.

10 CFR 70.65(b)(3) states that the ISA Summary must contain "a general description of the facility with emphasis on those areas that could affect safety." The acceptance criteria in Standard Review Plan Section 7.4.3.3, Facility Design, states that an adequate application documents the fire safety considerations used in the general design of the facilities containing licensed material or facilities that impose an exposure threat to radiological facilities.

NFS RESPONSE:

An NFPA 72 compliant Fire Detection and Alarm system will be installed throughout the 301 Building. The system will consist of manual pull activation stations, and smoke, heat, and/or combination detectors. Linear heat detection may be installed in certain enclosures for additional fire detection.

Additional smoke detectors may be installed in some enclosures for operational monitoring. They will be used to alert operations personnel of operational upset conditions. These detectors will not be tied into the plant fire alarm system.

NRC:

16.

Provide details in the ISA Summary on the fire brigade's water supply or suppression agent availability. Provide a site plan showing fire hydrant and suppression agent cart locations nearby or within Building 301.

10 CFR 70.65(b)(3) states that the ISA Summary must contain "a general description of the facility with emphasis on those areas that could affect safety." The acceptance criteria in Standard Review Plan Section 7.4.3.3, Facility Design, states that an adequate application documents the fire safety considerations used in the general design of the facilities containing licensed material or facilities that impose an exposure threat to radiological facilities.

NFS RESPONSE:

[redacted]

NRC:

17.

Section 7.13 of the Fire Hazards Analysis (FHA) for Building 301 states that "this FHA assumes that following detection of a fire situation, a minimum five trained firefighters are always available, via the NFS Plant Fire Brigade or the Erwin Public Fire Department, to respond to this area and effectively suppress a fire within a 15.0 to 20.0 minute time frame." Given the cross-cutting nature of the detection system and fire brigade availability, both of these features are required to be listed as IROFS, and comply with 10 CFR 70.61(e).

10 CFR 70.65(b)(4) states that the ISA Summary must contain "information that demonstrates the licensee's compliance with the performance requirements of 10 CFR 70.61." The acceptance criteria in Standard Review Plan, Section 7.4.3.2, Fire hazards Analysis, states - the ISA Summary is acceptable if the credible fire hazards (e.g., from the FHA) are identified for each process fire area, and information is provided to detail how each fire hazard was considered and addressed (i.e., the management measures and/or IROFS) for each process accident sequence that consequence could exceed the performance requirements in 10 CFR 70.61

NFS RESPONSE:

Instead of crediting the NFS Plant Fire Brigade or the Erwin Public Fire Department as IROFS, NFS will add a new IROFS to prevent the start of a fire. The new IROFS will be FIRECD-1 "Weekly Operations Combustible Control Review." This review will be performed weekly by qualified CD Line Operations staff using an approved procedure to verify the required area around the UF_6 cylinder storage racks are clear of transient combustibles. FIRECD-1 will be conducted by Operations staff, so will be independent from FIRE-2, which will be conducted by Safety department personnel. Addition of IROFS FIRECD-1 is preferred to crediting the NFS Plant Fire Brigade or the Erwin Public Fire Department as IROFS, since it addresses fire prevention versus fire mitigation. Management Measures will be applied to IROFS FIRECD-1 per Section 2.12 of NFS License SNM-124 to show the IROFS is reliable and available.

Revisions to Tables 4-1, 4-2, 4-3, 4-4 and 4-6, and addition of IROFS FIRECD-1 to Table 6-2 "Fire Safety IROFS" will be reflected in the CD Line ISA Summary to be submitted prior to facility start-up.

IROFS FIRE-2 and FIRECD-1 will be risk indexed in Table 4-6 to verify that the performance criteria in 10 CFR 70.61 are met (see below). The NFS Plant Fire Brigade and the Erwin Public Fire Department will be credited as Defense-in-Depth measures.

Table 4-6 Fire Safety Risk Assessment

Item	What if...?	Cause	Initiating Event Failure Frequency Index Number	Mitigative / Preventive $IROFS_1$ and IROFS failure	Mitigative/ Preventive $IROFS_2$ and IROFS failure	IROFS1 Effectiveness of Protection	IROFS2 Effectiveness of Protection	U/C	Likelihood Index T	Likelihood Category	Consequence Category	Risk Index	Controls (Defense in Depth)
High Consequences													
CDL-RPO-006, CDL-OCC-CHEM-22, and CDL-ENV-CHEM-22 Fire Exposure to UF_6 Cylinders in Staging Area													
CDL04 /05.035 and CDL06.035	Fire in cylinder storage area	Mechanical failure Human error	-1	**FIRE-2** Administrative Control: Monthly surveillances are conducted to ensure compliance with the combustible control program to minimize fire potential. Monthly surveillances are conducted for the following area in Building 301: UF_6 cylinder feed storage racks/staging areas located in the Main Processing Room	**FIRECD-1** Administrative Control: Weekly Operations Combustible Control Review. Weekly review will be completed by the CD Line Operations staff for the following area in Building 301: UF_6 cylinder feed storage racks/staging areas located in the Main Processing Room	-2	-2	U C	-1 -5	3 1	3 3	9 3	Operator fire extinguisher training Fire detection NFS Plant Fire Brigade Erwin Public Fire Department

NRC:

18.

It is our understanding that an automatic sprinkler system is normally required by the Building Code, however a sprinkler system has not been installed because of criticality safety concerns. During our meeting on March 10, 2008, it was noted that the sprinkler system would have been considered an IROFS. Demonstrate in the ISA Summary how the proposed IROFS provide an equivalent level of safety to an automatic sprinkler system.

10 CFR 70.65(b)(4) states that the ISA Summary must contain "information that demonstrates the licensee's compliance with the performance requirements of 10 CFR 70.61." The acceptance criteria in Standard Review Plan Section 7.4.3.2, Fire hazards Analysis, states - the ISA Summary is acceptable if the credible fire hazards (e.g., from the FHA) are identified for each process fire are, and information is provided to detail how each fire hazard was considered and addressed (i.e., the management measures and/or IROFS) for each process accident sequence whose consequence could exceed the performance requirements in 10 CFR 70.61.

NFS RESPONSE:

A sprinkler will not be installed in Building 301 due to NRC criticality safety concerns of increased moderation and reflection. However, if a sprinkler were available and was designated as an IROFS, it would be assigned an Effectiveness of Protection (EOP) Index of -2 since it would be considered "a single functionally tested Active Engineered Control" per NFS-HS-A-68, "ISA Risk Assessment Procedure." FIRE-2 and FIRECD-1 are the IROFS that will be credited to protect against the fire scenario that results in high consequences (see NFS response to Question 17). Since each of these IROFS are considered per NFS-HS-A-68 as administrative controls "protected by a trained operator performing a routine task with an approved procedure," they will each be assigned an EOP Index of -2. Use of IROFS FIRE-2 and FIRECD-1 meet the performance criteria in 10 CFR 70.61 without the need to credit any other IROFS.

NRC:

19.

a) Table 3-6 on page 24 indicates that 0.84 kg of material could be released and entrained in an off-gas trap. Section 3.4.6 "Radiological Controls-Occupational" indicates process containment and the ventilation system prevent exposure to individuals. If this same amount of material was released without the mitigating effects of containment (glovebox) and

ventilation (trap), internal exposure above 70.61(b) limits to a worker appears possible.

NFS RESPONSE a):

Table 3-6 provides an extremely conservative estimate of the maximum amount of uranium that would be on the filter due to normal operations, and Section 3.4.6 describes the defense in depth measures that are inherent to the facility to ensure the safety of the workers and the protection of the environment. These two items are not related nor is the off-gas trap system used to mitigate accidents. In the event of an accident involving the release of material, no reduction in material released through the stack is assumed due to the off-gas trap. All accident scenarios identified through the CDL PHA process assumed all material is released to either the workspace and or the environment. The release of material in the off-gas trap system is a low consequence event.

NRC:

19.

b) Consistent with 10 CFR 70.65(b)3, clarify under what conditions 0.84 kg of material (Table 3-4 & 3-6) could be released, and specify the path (to workers or through the stack).

NFS RESPONSE b):

In accordance with 10 CFR 70.65(b)3, the scenario that releases the material held by FILTER-5A03 is due to high pressure of nitrogen in CDL-09, UF_6 Cylinder Test and Overpack Station during a leak check of a valve in ENCLOS-1A02. The sudden increase in pressure causes the release of material in the enclosure, which is assumed to be contaminated with a 0.001 kg of uranium, to the ventilation system. It also causes the filter to fail, discharging its material directly to the environment through the stack. No scenario was identified where the material on the filter would be released to the workspace.

NRC:

19.

c) In addition, Section 3.3.1 on page 23 of the ISA Summary indicates the off-gas trap system is sized to capture the uncontrolled release of a full 5A cylinder of UF6.

NFS RESPONSE c):

Section 3.3.1 describes the capabilities of the system, not the maximum credible accident that involves the off-gas trap system. As stated previously, the trap system is assumed not to reduce the amount of material that is released from the facility. The material assumed to be on the filter is that amount which would be deposited on it during normal operations.

NRC:

19.

d) Justify why the maximum uranium in the off-gas trap system would be limited to 0.84 kg (Table 3-4 & 3-6). Specify the amount of time over which this material would accumulate, (single release or slow accumulation).

NFS RESPONSE d):

The 0.84 kg of uranium is reported in error, and the correct value is 0.0065 kg of uranium. The mass of uranium due to normal operations deposited on the filter is estimated assuming that all the material in the components connected to the filter is subject to entrainment. The 11 components, including the heating vessels, enclosures, and connections are assumed to have 0.001 kg of contamination which is entrained at a rate of 4E-5 h^{-1} (NUREG-6410) for 24 hours/day for 1 year. The uranium in the dissolver (0.42 kg) in one of the enclosures is also assumed to become suspended and trapped on the filter at a rate of 4E-07 h^{-1} for the same period. Furthermore, it is assumed that all 5A and 2S cylinders are opened and the heel material removed in another enclosure. This powder is assumed to be available for entrainment for 8 hours for every 5A cylinder and 4 hours for each 2S cylinder. Note the estimate assumed the cylinders are filled with UF_6 and not limited to the amount of heels per ANSI 14.1. An additional margin of safety of 20% was applied to ensure that the estimated material on the filter bound any amount that would accrue during normal operations of the facility. The amount of material on FILTER-5A03 will be changed to 0.0065 kg, which will be reflected in the CD Line ISA Summary to be submitted prior to facility start-up.

NRC:

19.

e) Describe what inherent conditions (chemical form, time, particle size, etc.) would exist to make the unmitigated release of the 0.84 kg not meet the criteria for intermediate or high consequence to workers. If necessary, declare the containment (glovebox) and ventilation (trap) as IROFS.

NFS RESPONSE e):

There is no pathway identified to expose the workers to the uranium deposited on FILTER-5A03. Failure of this filter will release the material to the environment via the stack. Neither enclosures nor the ventilation trap system needs to be declared as IROFS since the accident involving the filter does not meet the definition of a high consequence event per 10 CFR 70.61(b) or an intermediate one per 10 CFR 70.61(c).

NRC:

20.

Table 3-7, Hazard Summary for Process Ventilation UF6 Off-gas Trap System, lists two controls for fire; one Passive Engineered Control, "Fire Rated Materials Of Construction," and one Administrative Control, "Combustible Control Program." Table 4-6, Fire Safety Risk Assessment, and Table 6-2, Fire Safety IROFS list two controls, "FIRE-29 Passive Engineered Control: Bldg 301's Main Processing Room (Process Area A) is separated by a two-hour rated firewall and fire-rated penetration barriers in the North and West directions to prevent a fire in Bldg 301 Main Processing Room from migrating to adjacent areas" and "FIRE-2, Administrative Control: Monthly surveillances are conducted to ensure compliance with the combustible control program to minimize fire potential. Monthly surveillances are conducted for the following area in Building 301: UF6 cylinder feed storage racks/staging areas located in the Main Processing Room."

a) Clarify whether passive engineered control IROFS is "Fire rated materials of construction" or if it is "FIRE-29 Firewall and penetration barriers." This is necessary to determine compliance with 10 CFR 70.65(b)(6).

NFS RESPONSE a):

IROFS FIRE-29 is "Bldg 301 Main Processing Room (Process Area A) is separated by a two-hour rated firewall and fire-rated penetration barriers in the North and West directions to prevent a fire in Bldg 301 Main Processing Room from migrating to adjacent areas." The controls listed in Table 3-7 include credited IROFS, but also include Defense-in-Depth items, such as fire resistant materials of construction (e.g., stainless steel filter housings).

NRC:

20.

b) Clarify whether administrative control IROFS is "Combustible Control Program" or if it is "Monthly surveillances of the UF6 cylinder feed storage racks." Provide criteria used to determine if this IROFS is available and effective. Identify management measures used to maintain this IROFS. This is necessary to determine compliance with 10 CFR 70.65(b)(6) and 70.62(d).

NFS RESPONSE b):

The administrative IROFS FIRE-2 is "Monthly surveillances are conducted to ensure compliance with the combustible control program to minimize fire potential. Monthly surveillances are conducted for the following areas in Building 301: UF_6 cylinder feed storage racks/staging areas located in the Main Processing Room." This is consistent with NFS' response to NRC Site-Wide ISA Summary Review Question F2 (Letter from B.M. Moore to Director, NMSS NRC, dated April 27, 2007, 21G-07-0052/ACF-07-0114/GOV-01-55-04). As stated in the previous NFS response, each month an Industrial Safety Specialist will use a check list to inspect the areas or equipment included in IROFS FIRE-2.

Regarding the effectiveness of the IROFS, the majority of corrective actions resulting from the surveillances are completed within their required due dates.

Management measures are applied to the administrative IROFS FIRE-2 per Section 2.12 of NFS License SNM-124 to show the IROFS is reliable and available. These include:

- procedural identification in NFS procedure NFS-GH-62 "Control of Combustibles,"
- periodic audits of IROFS completed every 2 years per NFS procedure NFS-HS-A-96 "Integrated Safety Analysis Audit Writer's Guide,"
- training and qualification as documented in NFS' Training and Qualifications System, and
- maintenance of documented records of monthly combustible control program inspections for a minimum of two years.

NRC:

20.

c) Identify credible scenarios leading to a fire in the UF6 cylinder storage area and provide initiating Event Frequency Index and IROFS Effectiveness of Protection Index for these scenarios, as described in the Section 5.2.4, Event Frequency, IROFS, and Risk Categorization, or an equivalent method of likelihood determination (describe methodology if different method is used). This information is needed to determine if a

fire in the UF6 cylinder storage area, which has been identified as a high consequence chemical and radiological hazard, has been mitigated to "highly unlikely" as required per 10 CFR 70.61(b).

NFS RESPONSE c):

See Table 4-6 included in NFS response to Question 17.

NRC:

21.

Section 3.2.3, Chemical Hazards – Occupational lists as chemical inputs "uranium compounds—toxic;" however, there is no further discussion in this section regarding any possible accident sequences leading to operator exposure to these chemicals. Establish whether the controls afforded by NFS' Radiation Protection Program for CDL operations, as discussed in Section 3.2.6, Radiological Controls - Occupational, are sufficient to also protect against chemical toxicity of these compounds as required per 10 CFR 70.61(b)(4) and 70.61(c)(4).

NFS RESPONSE:

As described in *NFS Site ISA Summary*, Section 5.2.2.4.1, the chemical hazard due to the intake of soluble uranium is evaluated with the radiological consequences in Section 4.2.3 of the CD Line Summary. Revision to Tables 4-3 and 4-4 will clarify that they include the intake of soluble uranium and will be reflected in the CD Line ISA Summary to be submitted prior to facility start-up. There is no release of soluble uranium that results in a high or intermediate consequence as defined by 10CFR 70.61(b)(4) or 70.61(c)(4), respectively. Since no release of soluble uranium requires the establishment of IROFS, the defense in depth measures used to protect the workers and the environment from radiological hazards will also protect them from the chemical hazards of uranium.

NRC:

22.

Section 3.2.3, Chemical Hazards-Occupational states that all postulated scenarios with the potential to release Hydrofluoric Acid (HF) into the CDL process yielded airborne concentrations that are significantly below the TEEL-2 threshold. No mention is made of exposure other than airborne. Evaluate whether credible release scenarios are capable of producing high or intermediate consequences via skin or eye contact, to workers if unmitigated. Describe methodology and/or assumptions used, as appropriate, for this evaluation. This information is needed to determine compliance with 10 CFR 70.61(b)(4) and 70.61(c)(4).

NFS RESPONSE:

In order to perform consistent quantitative evaluations for employee exposure, NFS selected a tiered approach to selecting exposure limits. Evaluation results are compared to established Protective Action Criteria for Chemicals (PACs) maintained by the Subcommittee on Consequence Assessment and Protective Actions (SCAPA). These PACs include documented Acute Exposure Guideline Levels (AEGLs), Emergency Response Planning Guidelines (ERPGs), and Temporary Emergency Exposure Limits (TEELS). Hydrogen fluoride releases are evaluated using the AEGLs and are developed by the US National Research Council's Committee on Toxicology. The guidelines define three tiered AEGLs as follows:

AEGL-1 the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL-3 The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

AEGLs for HF were derived based on inhalation as discussed in the Acute Exposure Guideline Levels for Selected Airborne Chemicals (AEGL Development Team 2004). The AEGL-1 was based on an exposure at 3 ppm for 1 hour which was the threshold for pulmonary inflammation. The 30 min and 1 h, 4 h and 8 h AEGL-2 values were based on a study in which dogs exposed at 243 ppm for 1 h exhibited coughing. The moderate eye and nasal irritation observed in dogs at 243 ppm was considered the threshold for impaired ability to escape. The 10-min AEGL-3 was based on the reported 10-min lethal threshold of 1,764 ppm reported in orally cannulated rats (Dalbey 1996, Dalbey et al. 1998).

According to the Standard Operating Procedure for Developing Acute Guidelines for Hazardous Chemicals (Commission on Life Sciences 2001), toxicity data from routes of exposure other than inhalation will not be used as key or supporting data for the derivation of AEGLs. Data from alternate routes are considered in the absence of inhalation if sufficient data are available to perform a credible route to route extrapolation.

Section 5.2.2.3.1 of the NFS Site Summary states that accident scenarios with the potential to result in chemical inhalation exposures are of primary concern. The criteria for determining whether a chemical hazard requires further evaluation is based on ERPG-2 (AEGL-2) or equivalent concentration levels for that chemical. The airborne concentration level of each chemical is used to determine consequence levels for releases of potentially hazardous chemicals.

NFS recognizes that there may be situations which fall outside the current ISA consequence evaluation guidelines which could result in the potential for employee injury. For example, a steam release could result in employee burns. In these cases, procedural instructions and training instructions may address specific situations. For hydrofluoric acid, building training would address the specific hazards of hydrofluoric acid and response actions. These response actions would include immediate identification of HF contact, immediate short water flush time and application of calcium gluconate gel (HF Burn Cream) which will be stocked in designated HF Burn Cream Boxes in the work area. Training and procedures will also specify appropriate PPE to be used in the work area and response actions for off normal occurrences. The hazards associated with HF are known and appropriate safeguards such as double containment for overhead HF bearing lines, spill response procedures and supplies, emergency eye wash and safety showers, first aid and emergency procedures, general safety practices, training, monitoring, and personal protective equipment will be used to minimize these hazards.

NRC:

23.

Section 5.2.2.3.2, Occupational and Environmental Chemical Exposure Levels, Occupational Exposure methodology states that for indoor spills, it is assumed that materials spread "uniformly and instantaneously throughout the available volume." Determine whether a worker may be in close proximity to a leak in the postulated HF release scenarios, and, if so, whether the above assumption is valid for that scenario. If the assumption is not valid, evaluate whether the worker could credibly be exposed to HF vapor concentrations higher than calculated by the above assumption. This information is needed to determine compliance with 10 CFR 70.61(b)(4) and 70.61(c)(4).

NFS RESPONSE:

The release of an individual cylinder was evaluated as an instantaneous release of the entire contents of the cylinder in the process area. This bounding scenario assumes 100 percent conversion to HF. For indoor liquid spills, airborne concentration was estimated by assuming that the quantity of released material is dispersed into a volume equal to the volume of the building in which the spill occurs, assuming that the material at risk spreads uniformly and instantaneously throughout the building with no ventilatory or

non-ventilatory losses. The vapor pressure of HF is lighter than air (<1.0) so it will disperse throughout the process area. The concentrations of HF in the process areas are below the AEGL-2 threshold. While there are scenarios where a release could occur in the vicinity of a worker, NFS personnel are trained to exit the building in the event of a chemical release. Workers are expected to be able to exit the building in one minute or less. Workers will be wearing appropriate personal protective equipment and will be trained to respond to an exposure to HF.

NRC:

24.

Section 9.0 refers to a definition of "credible" which means "an external event whose frequency of occurrence can be... quantitatively determined to be </= 1E-6 events per year." Section 6.2 Flooding, states that "Building 301 is located above the 100 year flood plain base flood evaluation threshold. As such, there is no credible accident scenario that could result in a flood of the facility." By definition, 100-year flood plain is expected one flood per 100 years, or 1E-2 events per year. By definition, a 100-year flood is still credible. Previous NRC evaluations of flood scenarios have considered the height above the 100-year flood plan and the consequences of a layer of water in the building. Specify the height of building floor above the 100-year flood plain and describe the consequences that would result if a layer of water entered the building and covered the floor. This information is needed to determine compliance with 10 CFR 70.62(c).

NFS RESPONSE:

The CD Line will be located in Building 301, which has an elevation of 1,645 feet, approximately 5 feet above the 100-year flood plain.

If water did enter the building, operation of the CD Line may be affected solely by the displacement of operating staff. Flooding is not considered to be a contributor to the postulated consequences of radiological or chemical hazards. The effects of flooding on the CD Line would be minimized by early warning and associated mitigation (controlled cessation of operations, sandbagging, water removal) during potential flooding conditions.

NRC:

25.

Per Site ISA Summary, Section 1.3.4 "without specified code protection there is a moderate to severe risk of facilities being damaged by lightning." Per CD Line ISA Summary, Section 6.2 "Lightning protection is installed in Building 301 per the applicable portions of NFPA 780. There are no credible

accident scenarios that result in an intermediate or high consequence event as a result of a lightning strike." Clarify whether Section 6.2 is stating that a lightning strike to the building would not result in an intermediate or high consequence event or if a lightning strike is not credible due to the installed lightning protection.

NFS RESPONSE:

Section 6.2 is stating that a lightning strike to the building would not result in an intermediate or high consequence event.

NRC:

26.
The cost estimate needs to include the costs for transportation of waste material. Discuss the estimated costs for this item and confirm that it is included in the cost estimate. This information is necessary to confirm compliance with 10 CFR 70.25(e).

NFS RESPONSE:

Per our Cost Accounting Disclosure Statement, NFS collects the costs of waste packages or containers, waste transportation, and waste disposal under our heading of Contract Services—Waste Burial (Reference 5 – Reference 4 in prior submittal).

NRC:

27.
NUREG-1757, "Consolidated Decommissioning Guidance," Vol. 3, App. A.3.1.2.1 states, "Labor costs associated with all decommissioning tasks and activities should include basic wages and benefits for licensee and contractor staff performing decommissioning-related tasks, overhead costs, and contractor profit (sufficient to allow an independent third party to carry out the decommissioning project)." Discuss the estimated costs for these items and confirm that they are included in the cost estimate. This information is necessary to confirm compliance with 10 CFR 70.25(e).

NFS RESPONSE:

Decommissioning activities in the past have utilized in-house labor forces for the majority of decommissioning activities. The costs estimated for "operators" are calculated using base wages and benefits. The use of contract labor will be dedicated to the actual demolition of the building outer shell after all equipment has been removed and the building is isolated from all utilities and services if decommissioning planning shows

this to be a reasonable course of action. In addition, contract labor may be used to provide services for capital projects required to support the decommissioning activities. Contractor labor and overhead (including profit) are included in the base rates of the labor and are included in the costs associated with "Capital Investments" or "Depreciation." The estimated cost for contract labor to perform building demolition was based on cost per square foot and determined from past experience. The estimated costs for capital expenditures were based on a percentage of the overall building area and /or burial costs. An actual determination of costs for capital expenditures would require a detailed decommissioning plan for each building to scope the capital investments required (Reference 5 – Reference 4 in prior submittal).

NRC:

28.

NUREG-1757, Vol. 3, App. A.3.1.2.3 states: "Because of the uncertainty in contamination levels, waste disposal costs, and other costs associated with decommissioning, the cost estimate should apply a contingency factor of 25 percent to the sum of all estimated decommissioning costs." Discuss the estimated cost of this item and confirm that it is included in the cost estimate. This information is necessary to confirm compliance with 10 CFR 70.25(e).

NFS RESPONSE:

The procedure used in developing the waste volumes involved obtaining information such as floor plans, equipment lists, process and instrumentation drawings (P&IDs), and materials of construction. The engineer, through discussion with project team members, reviews process and site utilities, equipment sizes, and other data as necessary to estimate systems, piping runs (sizes and lengths) building construction, possible process contamination, and the potential for decontamination, if feasible. Contingency is added to the waste volumes per item and again to the system total depending on the extent of the known knowledge. This contingency may represent an increase anywhere from 10% to 40%. D&D operational man-hours are then estimated for each identified task or equipment system based on historical data. These can range from 0.5 to 1.5 man-hours/ft3 of waste volume. The man-hours are adjusted for site specific conditions such as accessibility, radiation control measures, effort involved in sectioning, personal protective equipment (PPE) required, etc. Manpower contingency is therefore built into the man-hour estimates since they are based on the waste volume estimate, which already contains a contingency (Reference 6 – Reference 5 in prior submittal).

NRC:

29.

Describe the means of adjusting the cost estimate and associated funding level periodically over the life of the facility. This information is necessary to confirm compliance with 10 CFR 70.25(e).

NFS RESPONSE:

Nuclear Fuel Services, Inc. reviews and adjusts the decommissioning cost estimate and associated funding levels every three years per 10 CFR 70.25(e) which states "Cost estimates must be adjusted at intervals not to exceed 3 years." The cost estimate for the CD Line will be included within the next site-wide Decommissioning Cost Estimate Update.

NRC:

30.

The NRC has previously accepted U.S. Government assurances of decommissioning funds for NFS facilities processing U.S. Government material. This was documented in an amendment issued on November 24, 1993, and referenced in the license renewal issued on July 2, 1999. Please clarify whether the material to be processed in the new CD line is U.S. Government material or commercial material.

NFS RESPONSE:

Yes, the material to be processed through the new CD Line will be U.S. Government material.

NRC:

31.

If the answer to the previous question is U.S. Government material, please provide a letter of intent from the appropriate Government agency confirming that it is aware of the cost estimate, and intends to budget funds in that amount, when the facility is decommissioned. Otherwise, provide a funding mechanism that guarantees the amount of the cost estimate, using one of the methods specified in 10 CFR 70.25(f).

NFS RESPONSE:

Please reference SNM-124, Chapter 9, Appendix C (Rev. 0 8/31/07) "Excerpts from DOE Prime Contract" (Reference 4 – Reference 3 in prior submittal).

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ATTACHMENT 2

REDACTED VERSION

NFS Responses to NRC Request for Additional Information Concerning NFS' CD Line Facility

Plant Fire Water Lines Drawing 000-C0106

1 Page

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Plant Fire Water Lines Drawing 000-C0106

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