January 10, 2003

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

SUBJECT: NUCLEAR FUEL SERVICES, INC., (TAC NO. L31688) REQUEST FOR ADDITIONAL INFORMATION RELATED TO NUCLEAR CRITICALITY SAFETY EVALUATION AND ISA SUMMARY FOR URANYL NITRATE BUILDING

Dear Ms. Moore:

This refers to your License Amendment Request to Support the Uranyl Nitrate Building at the BLEU Complex, dated February 28, 2002 (NFS No. 21G-02-0051), the Revised Integrated Safety Analysis Summary for Uranyl Nitrate Building dated August 23, 2002 (NFS No. 21G-02-0268), the nuclear criticality safety evaluation (NCSE) provided electronically on December 12, 2002, and the reply to NRC request for additional information (RAI reply) dated December 23, 2002 (NFS No. 21G-02-0409).

Our review of the application, ISA Summary, NCSE, and RAI reply has identified additional information related to nuclear criticality safety that is needed before final action can be taken on the license amendment request. The additional information, specified in the enclosure, should be provided within 30 days of the date of this letter. Please reference the above TAC No. in future correspondence related to this request.

If you have any questions regarding this matter, I can be reached on (301) 415-7249 or by e-mail at mta@nrc.gov.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Sincerely,

Mary T. Adams, Senior Project Manager
Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket 70-143
License SNM-124
Enclosure: Request for Additional Information

January 10, 2003

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Sincerely,

/RA/

Mary T. Adams, Senior Project Manager
Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
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Docket 70-143
License SNM-124
Enclosure: Request for Additional Information
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Request for Additional Information
Application Dated February 28, 2002, and
Revised ISA Summary dated August 23, 2002, and
NCSE dated December 12, 2002, and
RAI reply dated December 23, 2002
Nuclear Fuel Services, Inc.
70-143

Please provide the following information:

1. Revise the definitions of "highly unlikely" and "unlikely" to meet the acceptance criteria of Standard Review Plan (SRP) NUREG-1520, to which NFS committed in their ISA plan.

NFS's response, dated December 23, 2002, to item 2.2 of NRC's request for additional information does not justify NFS's definitions for highly unlikely and unlikely. Part of NFS's justification is provided in their response to item 2.1 and states that the definitions of highly unlikely and unlikely were shifted one order of magnitude due to the "conservative" IROFS failure indices used by NFS. The SRP gives a range of failure indices for different types of IROFS. This is because for a given type of IROFS there can be a wide range of failure frequencies. NFS chose to use the most conservative value for the failure indices (instead of providing justification for using the less conservative value) and then NFS shifted the definitions of highly unlikely and unlikely in a less conservative direction than given in the SRP. However, when a range is given for failure indices, the most conservative value should be used UNLESS otherwise justified which has not been done in this case. Using the more conservative failure indices does not justify the use of a less conservative value for the definitions of highly unlikely and unlikely especially given the uncertainties present in the overall analysis.

Revision of the definitions of highly unlikely and unlikely is necessary to ensure that the likelihood of a criticality is sufficiently low given the potential consequences, that the performance requirements of 10 CFR 70.61 are not exceeded, and that the goal of no inadvertent nuclear criticality accidents is met.

2. For the scenario descriptions provide justification in the ISA Summary as to why each scenario is deemed highly unlikely, unlikely, etc. and how it meets the double contingency principle.

In many of the scenario descriptions, a statement is made that a scenario is highly unlikely without adequate justification. For example, in Scenario 1.26.3 there is not adequate justification that contingency number one is unlikely. In general, a failure of a single administrative control does not constitute a contingency and may not be unlikely. Generally some type of independent verification or a large safety margin is required when relying on a single administrative control to make a contingency unlikely.

This information is required to determine if the likelihood of the scenarios are sufficiently low to meet the performance requirements of 10 CFR 70.61 and to ensure it meets the double contingency principle of 10 CFR Part 70.

3. For Scenarios 1.25.1, 1.38.1, 1.54.1, 1.55.1, 1.59.1, 1.61.1, and 1.62.1 provide justification for the assumption that IROFS UNB-E and UNB-F can handle the maximum

flow rate. Provide this flow rate. Can the maximum flow to TK-10 exceed the maximum flow of these IROFS? This information is also required to justify the conclusion that cases 5,9,10,11,12,13 and 14 in the NCSE meet the double contingency principle.

For defense in depth the above listed cases state that this ductwork is inspected each time a HEPA filter is changed and in addition that the drains are inspected. Provide the frequency of the filter changeouts and drain inspections and why they can be relied upon.

This information is required to determine if these IROFS are sufficient to perform their intended function for all credible flow rates such that the postulated accident scenario will be highly unlikely and meet the performance requirements of 10 CFR 70.61.

4. Define limiting condition of operation and show that this was the initial concentration used in the calculations for Scenarios 1.26.2 and 1.76.1 in the ISA summary and cases 6, 18 and 20 in the NCSE. If the criticality safety limit is actually the LCO rather than the routine operating limit, then this is the value that should be used for these calculations.

Also provide additional description of the sampling credited in contingency #2 in the NCSE. Describe how this will reduce the likelihood to unlikely since as discussed, it does not include dual independent sampling.

This information is required to determine whether this control is adequate to meet the performance requirements of 10 CFR 70.61.

5. For scenario 1.26.3 justify why the value specified at UNB-L was used. At what value can precipitation become a problem? How much can safely precipitate out and not be a criticality safety concern? For this case what would be the total change in value? Demonstrate why this value will ensure that a minimum critical mass will not precipitate out before this value is reached for all credible uranyl nitrate solutions in the UNB.

This information is needed to ensure that the pH monitor and the limit chosen are adequate IROFS for this scenario and meet the performance requirements of 10 CFR 70.61

6. Since concentration is a controlled parameter, justify why the density monitor in the recirculation system is not designated as IROFS. Since density is the controlled parameter, the density monitor should be an IROFS.

This information is required to demonstrate compliance with the performance requirements of 10 CFR 70.61 as items relied on for safety are to be designated as an IROFS.

7. In the NCSE the term “failure limit” is used in Table 5 and appears to be where keff=1.0. However, in the NFS license, the term “failure limit” appears to be used to describe NFS’s subcritical limit. Please clarify this discrepancy.

This information is needed to ensure that the request is in agreement with the NFS license.

8. Provide a table of operating control limits for enrichment that is similar to that for concentration (Table 5 of the NCSE). The NCSE only gives the operating limits for the parameter of concentration but enrichment is also a controlled parameter.

This information is necessary to evaluate the limits for enrichment to ensure that these limits will maintain operations subcritical and to ensure that this operation meets the double contingency principle of 10 CFR Part 70.

9. The criticality analysis in the NCSE assumes the failure of one tank at a time due to reliance on the isolation valves of the storage tanks. Explain how human error was considered here and provide further details on whether there are independent checks on the opening and closing of these valves. Also justify why these are not designated as IROFS.

This information is required to demonstrate compliance with the performance requirements of 10 CFR 70.61 as items relied on for safety are to be designated as an IROFS.

10. For the NCSE, cases 3 and 7, (both address a criticality due to U precipitation) provide details on why contingency #1 is considered unlikely in both cases. As described this contingency consists of only a failure of a single administrative control (trained operator using a procedure) which may not constitute a contingency as described above in question number 2.

Also, in Case 7, contingency #2 does not justify the limit chosen. This information is needed for question 5 above.

This information is required to determine if this control is adequate to meet the performance requirements of 10 CFR 70.61 and to determine if this scenario meets the Double Contingency Principle of 10 CFR Part 70.

11. Cases 15, 16, and 19 in the NCSE rely on the tank being sealed. Provide the inspection frequency for the tanks and justify why this frequency is acceptable.

This information is required to determine if this control is adequate such that it meets the performance requirements of 10 CFR Part 70.61.

12. For case 21 in the NCSE (U in ductwork from storage tank overflow), provide the flow rates to the tanks. Can the tank flow rates exceed the maximum drain flow rates? The description provided indicates that these may be different that those listed in question 3 above. Please state whether these are the same.

This information is required to determine if these IROFS are sufficient to perform their intended function for all credible flow rates such that the postulated accident scenario will be highly unlikely and meet the performance requirements of 10 CFR 70.61.

13. For cases 24, 25, and 26, NFS is relying on actions by the shipper as a control. Provide further details on how the sampling is controlled at SRS such that the samples are representative of the material that arrives at NFS. Information is needed on how the tank at SRS is isolated, what parameters are controlled at SRS, what the tank limits are at SRS such that the material meets the shipping container limits and NFS limits, and how the sampling is done such that both samples are independent of each other, and the accuracy of the sampling. Explain how human error has been taken into account during the sampling, the sample analysis, and the overcheck at NFS. Similar information is also required to justify the conclusion of cases 24, 25, and 26 in the NCSE.

Provide details on how NFS will ensure that the Quality Assurance Process at SRS will ensure that the operation is not altered in a manner that is inconsistent with the details provided to the questions in the previous paragraph.

This information is necessary to determine if these controls are adequate such that they satisfy the performance requirements of 10 CFR 70.61 and that the double contingency principle of 10 CFR Part 70 is met.

14. The validation report referenced implies that it is only valid for up to 5wt % enriched U material. The NCSE has calculations up to 7.5wt % enriched material. Justify why it is acceptable to use a validation methodology which is limited to 5wt % enriched material for calculations for 7.5wt % material.

This information is necessary in order to verify that the methodology used is acceptable and that operations will be maintained subcritical as required by 10 CFR Part 70.

15. Justify the assumption in the demister calculations that the material is a homogenous mixture rather than a heterogenous mixture. It is not clear that U would accumulate in such a manner as to be bounded by assuming a homogenous mixture. This is necessary since heterogenous uranium mixtures are typically more reactive than homogenous mixtures.

16. Justify why not following an approved procedure is always assumed to be unlikely. Explain how the training programs and procedures will prevent or mitigate human errors from occurring which could cause the performance requirements of 10 CFR 70.61 to be exceeded.

This information is needed to determine that the performance requirements of 10 CFR 70.61 are being met.

17. For Scenario 1.5.1 in the ISA summary and Cases 24, 25, and 26 in the NCSE contingency number 2 is not independent and thus not acceptable. Provide details of the second contingency and justify why it is independent and unlikely.

This information is needed to determine that the double contingency principle of 10 CFR Part 70 is met.