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AIRBORNE EXPRESS

21G-03-0320
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ACF-03-0434

December 10, 2003

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) Letter from B.M. Moore to NRC, License Amendment Request for BLEU Preparation Facility, dated October 11, 2002 (21G-02-0310)
3) Letter from NRC to B.M. Moore, Nuclear Fuel Services, Inc., Blended Low-Enriched Uranium Preparation Facility Remaining Questions (TAC NO. L31693), dated October 17, 2003
4) Letter from B.M. Moore to NRC, Responses to Remaining Questions Regarding License Amendment Request for BLEU Preparation Facility, dated October 31, 2003 (21G-03-0284)
5) Letter from B.M. Moore to NRC, Responses to Remaining Question Numbers 28, 32, 39, 49, 50 and 51 Regarding License Amendment Request for BLEU Preparation Facility, dated November 5, 2003 (21G-03-0288)
6) Letter from B.M. Moore to NRC, Revised Response to Question 39 Regarding License Amendment Request for BLEU Preparation Facility, dated November 7, 2003 (21G-03-0299)
7) Letter from NRC to B.M. Moore, Nuclear Fuel Services, Inc., Further Clarification of Question 39: Red Oil Scenario/Chemical Safety (TAC NO. L31693), dated November 13, 2003
8) Letter from B.M. Moore to NRC, Response to Further Clarification of Question 39 Regarding License Amendment Request for BLEU Preparation Facility, dated December 5, 2003 (21G-03-0312)

Subject: Revised Response to Question 34 and Additional Information for Questions 32 and 33 Regarding License Amendment Request for BLEU Preparation Facility

NMSS01

Dear Sir:

Nuclear Fuel Services, Inc. (NFS) hereby submits a revised response to Question 34 and additional information regarding Questions 32 and 33 of Reference 3 concerning the licensing action for the BLEU Preparation Facility (BPF). The changes and new information are highlighted in gray.

This response (Attachment I) is considered proprietary information, as set forth in the enclosed affidavit; therefore, NFS requests that this information be withheld from public disclosure. You will find a non-proprietary version of this response suitable for public disclosure in Attachment II.

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-03-0320) in any correspondence concerning this letter.

Sincerely,

NUCLEAR FUEL SERVICES, INC.

for B. Marie Moore
Vice President
Safety and Regulatory

JKW/lsn
Enclosure
Attachments

cc:
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ENCLOSURE

AFFIDAVIT
TRADE SECRETS OR COMMERICAL INFORMATION

I, Richard L. Booth, Vice President of Corporate Services at Nuclear Fuel Services, Inc. (NFS), that to the best of my knowledge and beliefs, make the following representation contained herein:

A. The following document(s) which Nuclear Fuel Services, Inc. (NFS) wishes to have withheld from public disclosure is:

Attachment I to Letter dated December 10, 2003, B.M. Moore to Director, NMSS, "Revised Response to Question 34 and Additional Information for Questions 32 and 33 Regarding License Amendment Request for BLEU Preparation Facility" (21G-03-0320)

B. The information contained in the document(s) cited in A above has been held in confidence by Nuclear Fuel Services, Inc. (NFS), in that it contains trade secrets or commercial information as specified in Title 10, Code of Federal Regulations, Part 2.790(a). The basis for requesting that this document(s) be withheld from public disclosure is explicitly marked on the cover page to each of the aforementioned documents and/or the top of each affected page, as appropriate, in accordance with 10 CFR 2.790(b)(i)(B).

C. The information contained in the document(s) cited in A above is the intellectual property of Nuclear Fuel Services, Inc. (NFS), and as such is customarily held in confidence by Nuclear Fuel Services, Inc. (NFS). As such, Nuclear Fuel Services, Inc. (NFS) has customarily submitted privileged and confidential information of this type to the Nuclear Regulatory Commission (NRC) and to its predecessor, the Atomic Energy Commission (AEC), in confidence.

The information contained in the document(s) cited in A above has not been made available to public sources by Nuclear Fuel Services, Inc. (NFS), nor has Nuclear Fuel Services, Inc. (NFS) authorized that it be made available. In accordance with Nuclear Fuel Services, Inc. (NFS) policies governing the protection and control of information, proprietary information contained herein has been made available, on a limited basis, to others outside NFS only as required and under suitable agreement providing for nondisclosure and limited use of the information.

The public disclosure of the information contained in the document(s) cited in A above is likely to cause substantial economic harm to the competitive advantage held by Nuclear Fuel Services, Inc. (NFS). The basis for withholding said information is that it contains distinguishing aspects of a process, methodology, or component(s), the exclusive use of which provides a competitive advantage for NFS in product optimization or marketability.

D. The proprietary information that Nuclear Fuel Services, Inc. (NFS) requests to be withheld from public disclosure is contained in the entire document(s) as so marked.

12/10/03

Richard L. Booth Date
Vice President
Corporate Services

I certify the above named person appeared before me and executed this document on this the 10th day of December, 2003.

Notary Public

My commission expires: 02/04/2007

Attachment I

Revised Response to Question 34 and Additional Information for Questions 32 and 33
Regarding License Amendment Request for BLEU Preparation Facility
Proprietary Version
(10 pages to follow)

Attachment II

Revised Response to Question 34 and Additional Information for Questions 32 and 33 Regarding License Amendment Request for BLEU Preparation Facility

Non-Proprietary Version

(10 pages to follow)

Revised Response to Question 34 and Additional Information for Questions 32 and 33 Regarding License Amendment Request for BLEU Preparation Facility

RAI Question 34:

NFS' response identified "impaired coordination" at 15 – 19% oxygen level. Based on the calculations provided it appears an oxygen level in this range could occur in Scenario A. Justify how this atmosphere would not hinder the operator's ability to perform functions associated with IROFS. 10 CFR 70.22(a)(7) requires a description of the equipment and facilities to protect health and minimize danger to life or property.

Revised NFS Response:

The original scenario specific verbage contained information on release rates and air changes. The scenario specific information for U Metal stated that "Although nitrogen is not a chemical hazard in itself, it does displace oxygen and can result in an oxygen deficient atmosphere. The room area is approximately . (Later information used as the room volume.) With an estimated release rate of 409 cubic feet per minute for an open end break on the 1 inch supply line, an estimated release rate of 35 cubic feet per minute from the 3/8 inch tubing before the regulator, an estimated release rate of 14 cubic feet per minute for a break after the regulator, an estimated 31.2 recirculation air changes per hour, and an estimated 4.0 fresh air changes per hour, no exposure above the TEEL-1 is expected."

The following bounding scenarios were reviewed and calculated for a 5 minute exposure consistent with other chemical calculations. Exposure limits were as follows: TEEL-2 = 350,000 ppm (intermediate consequence) and TEEL-3 = 500,000 (high consequence).

Scenario A: Assume Nitrogen line break or leak inside building. Assume open end break on the 1-inch schedule 40 pipe supplying the building. Per engineering information, the release rate would be 408.6 cfm, assuming nitrogen tank pressure is 75 psig.

Estimate Spill Duration

Multiply release rate in cfm x 5 min to estimate vaporization generation for a 5 minute exposure.

Calculations:

408.6 cfm x 5 min = 2043 cubic feet

Estimate Exposure in ppm

Parameters:

$$\frac{\text{Cubic feet of chemical}}{\text{Cubic feet of air}} \times 10^6 = \text{concentration in ppm}$$

Calculations:

2043 x 10^6 = HEU

(10,000 parts per million equals 1% by volume).

10,000 = change in air. Air has approximately 21% Oxygen by volume. (change in total air volume) x .21 (percentage of Oxygen in Air) = change in oxygen from release of Nitrogen. 21% (original Oxygen Level) – (change in Oxygen Level from Nitrogen Release) = level in air.

2043 x 10^6 = SX

(10,000 parts per million equals 1% by volume).

/10,000 = change in air. Air has approximately 21% Oxygen by volume. (change in total air volume) x .21 (percentage of Oxygen in Air) = change in oxygen from release of Nitrogen. 21% (original Oxygen Level) – (change in Oxygen Level from Nitrogen Release) = Oxygen level in air.

2043 x 10^6 = Outside

(10,000 parts per million equals 1% by volume).

/10,000 = change in air. Air has approximately 21% Oxygen by volume. (change in total air volume) x .21 (percentage of Oxygen in Air) = change in oxygen from release of Nitrogen. 21% (original Oxygen Level) – (change in Oxygen Level from Nitrogen Release) = Oxygen level in air.

TEEL Limits

TEEL-1 = 210,000ppm

210,000 ppm (10,000 parts per million equals 1% by volume). 210,000/10,000 = 21% change in air. Air has approximately 21% Oxygen by volume. 21 (change in total air volume) x .21 (percentage of Oxygen in Air) = 4.41% change in air from release of 210,000 ppm Nitrogen. 21% (original Oxygen Level) – 4.41% (change in Oxygen Level from 210,000 ppm Nitrogen Release) = 16.59% Oxygen level in air.

TEEL-2 = 350,000 ppm

350,000 ppm (10,000 parts per million equals 1% by volume). 350,000/10,000 = 35% change in air. Air has approximately 21% Oxygen by volume. 35 (change in total air volume) x .21 (percentage of Oxygen in Air) = 7.35% change in air from release of 350,000 ppm Nitrogen. 21% (original Oxygen Level) – 7.35% (change in Oxygen Level from 350,000 ppm Nitrogen Release) = 13.65% Oxygen level in air.

TEEL-3 = 500,000 ppm

500,000 ppm (10,000 parts per million equals 1% by volume). 5000,000/10,000 = 50% change in air. Air has approximately 21% Oxygen by volume. 50 (change in total air volume) x .21 (percentage of Oxygen in Air) = 10.5% change in air from release of 500,000 ppm Nitrogen. 21% (original Oxygen Level) – 10.51% (change in Oxygen Level from 500,000 ppm Nitrogen Release) = 10.5% Oxygen level in air.

Scenario B: Assume Nitrogen line break or leak inside building. Assume break/leak on the ¼-inch stainless steel tubing. Per engineering information, the release rate would be 13.98 cfm, assuming nitrogen tank pressure is 20 psig.

Estimate Spill Duration

Multiply release rate in cfm x 5 min to estimate vaporization generation for a 5 minute exposure.

Calculations:

13.98 cfm x 5 min = 69.9 cubic feet

Estimate Exposure in ppm

Parameters:

$\frac{\text{Cubic feet of chemical}}{\text{Cubic feet of air}} \times 10^6$ = concentration in ppm

Calculations:

69.9 x 10^6 = HEU

(10,000 parts per million equals 1% by volume).

/10,000 = change in air. Air has approximately 21% Oxygen by volume. (change in total air volume) x .21 (percentage of Oxygen in Air) = change in oxygen from release of Nitrogen. 21% (original Oxygen Level) – (change in Oxygen Level from Nitrogen Release) = Oxygen level in air.

69.9 x 10^6 = SX

(10,000 parts per million equals 1% by volume).

/10,000 = change in air. Air has approximately 21% Oxygen by volume. (change in total air volume) x .21 (percentage of Oxygen in Air) = change in oxygen from release of Nitrogen. 21% (original Oxygen Level) – (change in Oxygen Level from Nitrogen Release) = Oxygen level in air.

69.9 x 10^6 = Outside

(10,000 parts per million equals 1% by volume).

/10,000 = change in air. Air has approximately 21% Oxygen by volume. (change in total air volume) x .21 (percentage of Oxygen in Air) = change in oxygen from release of Nitrogen. 21% (original Oxygen Level) – (change in Oxygen Level from Nitrogen Release) = Oxygen level in air.

TEEL-1 = 210,000 ppm
TEEL-2 = 350,000 ppm
TEEL-3 = 500,000 ppm

Scenario C: Assume Nitrogen line break or leak inside building. Assume break/leak on the 3/8-inch stainless steel tubing. Per engineering information, the release rate would be 34.55 cfm, assuming nitrogen tank pressure is 75 psig.

Estimate Spill Duration

Multiply release rate in cfm x 5 min to estimate vaporization generation for a 5 minute exposure.

Calculations:

34.55 cfm x 5 min = 172.75 cubic feet

Estimate Exposure in ppm

Parameters:

$\frac{\text{Cubic feet of chemical}}{\text{Cubic feet of air}} \times 10^6$ = concentration in ppm

Calculations:

$\frac{172.75}{\quad} \times 10^6$ = HEU

(10,000 parts per million equals 1% by volume).

/10,000 = change in air. Air has approximately 21% Oxygen by volume. (change in total air volume) x .21 (percentage of Oxygen in Air) = change in oxygen from release of Nitrogen. 21% (original Oxygen Level) – (change in Oxygen Level from Nitrogen Release) = Oxygen level in air.

$\frac{172.75}{\quad} \times 10^6$ = SX

(10,000 parts per million equals 1% by volume).

/10,000 = change in air. Air has approximately 21% Oxygen by volume. (change in total air volume) x .21 (percentage of Oxygen in Air) = change in oxygen from release of Nitrogen. 21% (original Oxygen Level) – (change in Oxygen Level from Nitrogen Release) = Oxygen level in air.

172.75 $\times 10^6$ = Outside

(10,000 parts per million equals 1% by volume).

/10,000 = change in air. Air has approximately 21% Oxygen by volume. (change in total air volume) x .21 (percentage of Oxygen in Air) = change in oxygen from release of Nitrogen. 21% (original Oxygen Level) – (change in Oxygen Level from Nitrogen Release) = Oxygen level in air.

TEEL-1 = 210,000 ppm
TEEL-2 = 350,000 ppm
TEEL-3 = 500,000 ppm

These bounding calculations were performed without taking area ventilation into account and using TEELs for consequence levels. None of the referenced scenarios exceed TEEL limits resulting in an intermediate or high consequence. None of the referenced scenarios result in an oxygen deficient atmosphere.

Integrated Safety Analysis Consequence Evaluations are performed to identify scenarios that would result in high or intermediate levels as defined by Part 70 and to institute IROFS to prevent their occurrence. Other exposure limits provided by OSHA or other appropriate regulatory agencies are available to provide guidance for day to day operations.

NFS-GH-07, *Respiratory Protection*, Section 4.1.6, states that work shall not be performed in known IDLH or oxygen deficient atmospheres without the approval of the Industrial Safety Department and defines the required respiratory protection for known IDLH or oxygen deficient atmospheres. This section references 20 CFR 1910.134, which defines an oxygen deficient atmosphere as an atmosphere with an oxygen content below 19.5% by volume. 20 CFR 1910.134 also provides a table with approved oxygen levels corrected for altitude. These regulatory requirements will be consulted for routine operations.

For Scenario A, the event is defined as a nitrogen break or leak inside the building, assuming an open end break on the 1-inch schedule 40 pipe supplying the building. In this scenario, it would take approximately to reach the 19.5% oxygen level in the Solvent Extraction area, which is the smaller of the two work areas where nitrogen lines are present. Workers would hear the release due to the line being under pressure and process equipment would shut down due to the loss of nitrogen. Workers would notify their supervisor, and the problem would be investigated.

For Scenario B, the event is defined as a nitrogen break or leak inside the building, assuming a break/leak of the ¼-inch stainless steel tubing. It would take approximately to reach the 19.5% oxygen level in the Solvent Extraction area. This time period is nearly equal to one shift of work, and it is expected that workers will be moving in and out of the work areas and the building during that time period. Process equipment would also be affected by the drop in nitrogen levels, workers would notify their supervisor, and the problem would be investigated.

Upon discovery of a line leak or break, isolation valves would be closed, and Safety would be notified to conduct further investigations of the conditions of the work environment.

See the table below for the calculations associated with Scenarios A, B, and C.

Time calculations were performed as follows:

Original calculation took release rate times exposure time (5 min.) to calculate cubic footage of chemical.

Cubic Footage of chemical divided by cubic footage of room times 1,000,000 to calculate parts per million

To calculate time to 19.5% Oxygen:

Determine new Level of Concern (ppm to get to 19.5 % oxygen).
Assuming normal Oxygen Levels of 21%, a change of 1.5% would be needed to get to 19.5% Oxygen.

1.5% would be equivalent to 15,000 parts per million.

For 15,000 parts per million of Nitrogen to be available to effectively reduce the normal Oxygen content of 21% to 19.5%, how much total Nitrogen would have to be released?

If 15,000/x = 21/100, then x = 71,429, the new level of concern.

Back calculating,

Example: If 408.6 (known scenario A release rate) times 5 (original exposure time) = 2043 (original scenario A cubic footage) and

2043 (original scenario A cubic footage) divided by

and we want to know time to ; then

So, if flow rate times exposure time = cubic feet of chemical,

= 408.6 times x (unknown exposure time to get to 19.5%)

and x = (time to get to 19.5% Oxygen for Scenario A in HEU area.

Additional NFS Response to Questions #32 and #33

As requested in the November 26, 2003, NRC-NFS conference call, below are the new IROFS used to prevent or mitigate accidents sequences associated with soluble uranium and NO_x release in the BPF Downblending process. The new IROFS for soluble uranium are in response to NRC question #33 and the new IROFS for the NO_x release are in response to NRC question #32.

New soluble uranium IROFS (Soluble U)

- BUND-8 – Passive Engineering Control: Tanker fill line extends to the bottom of the Tanker preventing a waterfall effect when filling
- BUND-9 – Administrative Control: Tanker POG vent connected to Tank 4D04 and Valve BA-4E42 open during filling operations
- BUND-12 – Passive Engineering Control: POG is a stainless steel POG with a polypropylene steel wire helix hose

New NO_x release IROFS (NO_x)

- BUND-10 – Passive Engineering Control: Tank 4D04 WOG/POG line
- BUND-11 – Enhanced Administrative Control: NO_x Detection and Alarm System in LEU work area