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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 the Oxide Conversion Building and Effluent Processing Building at the BLEU Complex, dated October 23, 2003 (21G-03-0277)
3) NRC Licensing Review to Support License Amendment Request for the Oxide Conversion Building and Effluent Processing Building, conducted on February 10-11, 2004

Subject: **Commitment Letter to Address NRC Licensing Review Questions Pertaining to Fire Safety for the OCB and EPB**

Dear Sir:

Nuclear Fuel Services, Inc. (NFS) hereby submits responses to questions raised during the licensing review that was conducted in Rockville, Maryland (Reference 3). These responses reflect the discussions with your staff during the licensing review that was conducted in the referenced meeting.

As noted in the attached responses, safety basis documents supporting this licensing review for the Oxide Conversion Building (OCB) and Effluent Processing Building (EPB) will be updated as necessary. As such, this submittal contains commitments that will be incorporated into the Integrated Safety Analysis Summary for the OCB and EPB located at the BLEU Complex.

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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-04-0046) in any correspondence concerning this letter.

Sincerely,

NUCLEAR FUEL SERVICES, INC.

for B. Marie Moore
Vice President
Safety and Regulatory

JSK/lsn
Attachment

cc:
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Attachment

NRC Licensing Review Questions Pertaining to Fire Safety for the OCB and EPB

NRC Fire Safety Question #1

Discussion of the risk assessments related to FHA scenarios described in Table 4-10 (Chemical Safety Risk Assessment), 4-11 (Radiological Safety Risk Assessment), and 4-12 (Environmental Chemical Risk Assessment) to improve understanding FHA sequences #4 through #10. Specific concern is the identified IROFS are administrative control of combustibles and administrative inspection activities of control of combustibles. These IROFS identified do not provide sufficiently robustness protection to achieve the desired likelihood and they do not provide mitigative safety function for risk reduction.

(Reference: pages 266-268 and 285-287)

NFS RESPONSE:

The design of the OCB/EPB incorporates numerous engineered fire protection systems. We are in agreement that those features providing higher levels of protection than those currently identified in the ISA Summary should be the ones credited in the risk tables and designated as IROFS. The following modifications will be made to fire related high consequence events identified as "FHA#4" through "FHA#10" on pages 266-268 and 285-287 of the ISA summary:

- Item FHA#4 ([redacted] fire results in release of chemical fumes from area storage tanks): Existing IROFS #OCB-10 will be replaced with an active engineered control IROFS relating to the sprinkler system located in the [redacted]. This and several other scenarios also rely on controlling combustibles to decrease the risk and extent of a fire. The combustible control program for the OCB is proceduralized and will be carefully monitored to ensure its effectiveness.

- Item FHA#5 ([redacted] fire results in release of chemical fumes from area storage tanks): Existing IROFS #OCB-10 will be replaced with an active engineered control IROFS relating to the fire detection system located in the [redacted]

- Item FHA#6 (Effluent building fire results in release of chemical fumes from area storage tanks): Existing IROFS #OCB-10 will be replaced with an active engineered control IROFS relating to the sprinkler system located in the EPB.

- Item FHA#7 (Explosion results in [redacted] fire with release of chemical fumes from area storage tanks): This scenario relates to the potential for air in-leakage to the calciner, which could allow hydrogen to move into the explosive range. The "Cause" column in the table on page 267 of the ISA Summary will be revised to clarify this item and to differentiate this event from those listed as FHA#8 and FHA#9. The associated IROFS HYD-1 includes both the detector and associated valve interlock.

- Item FHA#8 (Explosion results in [redacted] fire with release of chemical

fumes from areas storage tanks): This scenario relates to the potential of hydrogen gas escaping from the calciner which could form an unacceptable concentration of hydrogen at the ceiling of the [redacted] The "Cause" column in the table on page 267 of the ISA Summary will be revised to clarify this item and to differentiate this event from those listed as FHA#7 and FHA#9. Additionally, the ceiling level hydrogen detectors which are interlocked to shut down the double hydrogen safety shutoff valves on the exterior of the building will be identified as IROFS for this event.

- Item FHA#9 (Explosion results in [redacted] fire with release of chemical fumes from area storage tanks): This scenario relates to insufficient air dilution within the exhaust system, allowing hydrogen concentrations within the explosive range. The "Cause" column in the table on page 268 of the ISA Summary will be revised to clarify this item. The IROFS currently identified in the table are appropriate for this item.

- Item FHA#10 (Hydrogen torch fire results in [redacted] fire with release of chemical fumes from area storage tanks): Line type heat detection cable is installed along hydrogen piping and at points where hydrogen release potential exists. Activation of this detection will shut down the hydrogen gas supply. The heat detection cable and associated interlock to the gas supply will be identified as an IROFS for this event.

Changes to incorporate newly selected IROFS necessary to reflect the discussions noted above are provided at the end of this Attachment.

<u>NRC Fire Safety Question #2</u>

Clarification on whether FHA sequences #4 through #10 were analyzed in the Radiological Safety Risk Assessment. What were the resulting consequences? Similarly, were Explosion Scenario 1 through 4 considered in Chemical Safety and Environmental Chemical risk assessments. What were the resulting consequences?

NFS RESPONSE:

FHA sequences #1 through #6 were analyzed in the Radiological Accident Consequence Evaluation for the Oxide Conversion Building Fire Hazards Analysis (21T-03-0979). This document can be found in the Radiological Safety Analysis notebook in the NFS Rockville office. The resulting consequences were low for both the worker and the public; therefore, these accident scenarios were not carried forward to the Radiological Safety Risk Assessment.

A detailed analysis was not performed for Explosion Scenarios 1 through 4 in either the Radiological or the Chemical consequence analyses. Due to the severity of the potential consequence, these scenarios were assumed to be high, and risk assessment was then performed to meet the performance requirements.

During the preparation of this response, it was discovered that FHA Scenarios 7 thru 10 are the same as Explosion Scenarios 1 thru 4. The scenario numbering will be reconciled in the next

revision of the ISA Summary to reference only one set of numbers for these scenarios.

NRC Fire Safety Question #3

Clarification on where the IROFS identified on Pages 274-275 are listed in Section 6 (i.e., List of IROFS in Section 6).

NFS RESPONSE:

The IROFS identified on pages 274-275 are listed on pages 337 and 338 in Section 6. It is recognized that there is no direct cross-reference between the Risk Assessment and the IROFS tables, and we will include a means for cross-reference in the next revision of the ISA Summary.

NRC Fire Safety Question #4

Clarification of the baseline assumptions regarding onsite emergency facilities and services for the OCB in the area of firefighting. Specifically, are operators sufficiently trained to be credited in mitigation of incipient (i.e., small fires)?

NFS RESPONSE:

There are locations where we rely on a detection system to identify the presence of a fire and operator response to control the fire while it is still in the incipient stage. Operators receive training in basic fire theory, classes of fires, fire reporting, and methods of fire extinguisher use. They also gain practice by discharging a fire extinguisher. This training is documented in our Training and Qualification (T&Q) system. Operators are expected to utilize this training to recognize the types of fires they can safely extinguish as well as recognizing when to evacuate in favor of more qualified resources.

NRC Fire Safety Question #5

Section 4.2.4, paragraph 2 (page 191), stated that structural support remains intact such that the equipment remains in their analyzed configuration. Did the analysis credit the fire-rated enclosure withstands the expected fire scenarios? If not does a non-rated construction provide the same conclusion that equipment remains in their analyzed configuration (i.e., no criticality risk). Currently, the only IROFS identified in the list of IROFS are ID #OBS-6 and ID #OBS-2. IROFS ID #OBS-6 is an administrative control for posting to restrict combustibles and IROFS ID #OBS-2 does not appear to be related to maintaining integrity of enclosure under fire conditions.

NFS RESPONSE:

The IROFS addressing a fire originating within the [redacted] due to combustible materials will be modified to include the combustible control program and smoke detection located on the 1st and 2nd floors. Based on these controls, it is expected that the risk of a fire within the [redacted] due to excess combustibles will be minimized and that early detection will allow for a rapid response by operators in the area who are trained in the use of fire extinguishers. Therefore, the structural support of the equipment will remain intact under the expected fire conditions. More discussion regarding fire wall and roof construction is contained in the response to question #6.

NRC Fire Safety Question #6

Clarification on fire-rated enclosure of the moderation exclusion area. Design drawings may provide clarification of design and location of the enclosure (wall, floor, ceiling, and locations of penetrations such as ventilation or door openings).

NFS RESPONSE:

The moderation exclusion areas on the first and second floor are separated from the balance of the building by three-hour fire walls constructed of pre-cast concrete. The ceiling consists of pre-cast concrete tee panels and the roof has a UL Class A rating. The roof structure in this area is supported entirely off of the concrete walls, so there are no steel support columns or beams present. There is one [redacted] concrete support pier located on the 1st floor of the [redacted] which helps support the concrete 2nd floor structure. It is important to note that the 1st and 2nd floors of the [redacted] are a common fire area since there are process and stairway openings between the two floors. However, the [redacted] as a whole (1st and 2nd floors) is separated from the balance of the facility by [redacted] thick pre-stressed concrete walls as a component of the [redacted] fire rated construction assembly. This serves to protect against the potential of fire spread to adjacent areas or fire entering from the outside. The Fire Hazards Analysis considered the potential impact of a fire on both the 1st and 2nd floors of the [redacted] and bounding fire models were constructed. The modeling concluded that ceiling flame impingement would not occur, and that structural failure is not expected. More detailed information regarding the fire models is located on page B-2 (first floor) and B-10 (second floor) of the FHA.

The potential for water intrusion from outside the fire barrier into the moderator control area was also considered. In addition to the concrete firewalls themselves, other controls include:

- Discussion of water exclusion areas is included as part of annual briefings provided to local fire response organizations. Additionally, moderation control areas are posted to remind employees and outside responders of the water restriction.
- Flooring in sprinklered areas is sloped to channel water away from doorways leading to the moderation-controlled area. Personnel doors leading into the moderation-controlled

area are fire doors and are therefore required to remain in the closed position.

- The roll up door (which is fire rated) leading from the [redacted] to the [redacted] is required to remain closed except when operators are working in the immediate [redacted] area. This door is also equipped with a fusible link.

NRC Fire Safety Question #7

Incorporate OCB and EPB into Table 10.1, Fixed Suppression and Detection System Location Summary, of Part II, Chapter 10 of License.

NFS RESPONSE:

NFS has incorporated the OCB and EPB into Table 10.1, of Part II, Chapter 10 of SNM-124. As discussed with your staff, this change will be provided as part of NFS' response to a Request for Additional Information expected to be issued in the near future.

Item	Scenario	Controls (Defense In Depth)	Cause	Event Failure Frequency Index Number	Mitigative / Preventive IROFS$_1$ and IROFS failure	Mitigative/ Preventive IROFS$_2$ and IROFS failure	IROFS1 Failure Frequency Index	IROFS2 Failure Frequency Index		Likelihood Index T	Likelihood Category	Consequence Category	Risk Index
High Consequence Events													
FHA #4	[redacted] fire results in release of chemical fumes from area storage tanks	Operator awareness during routine rounds prevents buildup of combustibles	[redacted] fire due to general combustibles	-1	Active Engineering Control – Sprinkler system in [redacted] activates and extinguishes fire – IROFS # OCB-10	Administrative Control – Combustible loading program restricts combustible loading in the area – IROFS # OCB-9	-2	-2	U C	-1 -5	3 1	3 3	9 3
IROFS failure	Sprinkler system fails to actuate		Mechanical Failure		Sprinkler system fails to actuate	Administrative Control – Combustible loading program restricts combustible loading in the area	-2 dur= 0	-2	U C	-2 -4	3 1	3 3	9 3
IROFS failure	Failure of combustible loading program to restrict combustibles in area		Human Error		Failure of combustible loading program to restrict combustibles in area	Active Engineering Control – Sprinkler system in [redacted] activates and extinguishes fire	-2 dur= -2	-2	U C	-2 -6	3 1	3 3	9 3
FHA #5	[redacted] fire results in release of chemical fumes from area storage tanks	Operator awareness during routine rounds prevents buildup of combustibles	[redacted] fire due to general combustibles	-1	Enhanced Administrative Control – Fire detection activates annunciating alarm locally and at an attended location – IROFS # OCB-14	Administrative Control – Combustible loading program restricts combustible loading in the area - IROFS # OCB-9	-2	-2	U C	-1 -5	3 1	3 3	9 3
IROFS failure	Failure of detection system to activate		Mechanical Failure		Failure of detection system to activate	Administrative Control – Combustible loading program restricts combustible loading in the area	-2 dur= 0	-2	U C	-2 -4	3 1	3 3	9 3
IROFS failure	Failure of combustible loading program to restrict combustibles in area		Human Error		Failure of combustible loading program to restrict combustibles in area	Enhanced Administrative Control – Fire detection activates annunciating alarm locally and at an attended location	-2 dur= -2	-2	U C	-2 -6	3 1	3 3	9 3

Item	Scenario	Controls (Defense in Depth)	Cause	Event Failure Frequency Index Number	Mitigative / Preventive IROFS$_1$ and IROFS failure	Mitigative/ Preventive IROFS$_2$ and IROFS failure	IROFS1 Failure Frequency Index	IROFS2 Failure Frequency Index		Likelihood Index T	Likelihood Category	Consequence Category	Risk Index
High Consequence Events													
FHA #6	Effluent building fire results in release of chemical fumes from area storage tanks	Operator awareness during routine rounds prevents buildup of combustibles	Effluent building fire due to general combustibles	-1	Active Engineering Control – Sprinkler system in EPB activates and extinguishes fire – IROFS # OCB-10	Administrative Control – Combustible loading program restricts combustible loading in the area – IROFS # OCB-9	-2	-2	U C	-1 -5	3 1	3 3	9 3
IROFS failure	Sprinkler system fails to actuate		Mechanical Failure		Sprinkler system fails to actuate	Administrative Control – Combustible loading program restricts combustible loading in the area	-2 dur= 0	-2	U C	-2 -4	3 1	3 3	9 3
IROFS failure	Failure of combustible loading program to restrict combustibles in area		Human Error		Failure of combustible loading program to restrict combustibles in area	Active Engineering Control – Sprinkler system in EPB activates and extinguishes fire	-2 dur= -2	-2	U C	-2 -6	3 1	3 3	9 3
FHA #7	Hydrogen explosion results in [redacted] fire with release of chemical fumes from area storage tanks	Calciner temperature instrumentation on CCS alerts operator to oxygen in-leakage	Hydrogen explosion in calciner or off gas scrubber due to air in-leakage creating concentration within explosive range	-1	Active Engineering Control – Hydrogen supply interlocked closed on high oxygen concentration - IROFS # HYD-1	Enhanced Administrative Control – Calciner high pressure alarm on CCS - IROFS # ODC-3	-2	-2	U C	-1 -5	3 1	3 3	9 3
IROFS failure	Failure of oxygen sensor to interlock hydrogen supply		Instrumentation failure		Failure of oxygen sensor to interlock hydrogen supply	Enhanced Administrative Control – Calciner high pressure alarm on CCS	-2 dur= 0	-2	U C	-2 -4	3 1	3 3	9 3
IROFS failure	Failure of calciner high pressure alarm on CCS		Instrumentation failure		Failure of calciner high pressure alarm on CCS	Active Engineering Control – Hydrogen supply interlocked closed on high oxygen concentration	-2 dur= 0	-2	U C	-2 -4	3 1	3 3	9 3

Item	Scenario	Controls (Defense in Depth)	Cause	Event Failure Frequency Index Number	Mitigative / Preventive IROFS$_1$ and IROFS failure	Mitigative/ Preventive IROFS$_2$ and IROFS failure	IROFS1 Failure Frequency Index	IROFS2 Failure Frequency Index		Likelihood Index T	Likelihood Category	Consequence Category	Risk Index
High Consequence Events													
FIIA #8	Explosion results in [redacted] fire with release of chemical fumes from area storage tanks	Differential pressure indicator and calciner high pressure alarm on CCS provide indication of off-normal condition	Hydrogen leak from calciner into [redacted] creates explosive atmosphere	-1	Active Engineering Control – Ceiling level hydrogen detection interlocked to shut down hydrogen supply – IROFS # IIYD-6	Active Engineered Control – Calciner high pressure switch interlock shuts down calciner – IROFS # ODC-4	-2	-2	U C	-1 -5	3 1	3 3	9 3
IROFS failure	Failure of ceiling level hydrogen detection to shut off hydrogen valves		Instrumentation failure		Failure of ceiling level hydrogen detection to shut off hydrogen valves	Active Engineered Control – Calciner high pressure switch interlock shuts down calciner	-2 dur=0	-2	U C	-2 -4	3 1	3 3	9 3
IROFS failure	Failure of calciner high pressure switch interlock to shut down calciner		Instrumentation failure		Failure of calciner high pressure switch interlock to shut down calciner	Active Engineering Control – Ceiling level hydrogen detection interlocked to shut down hydrogen supply	-2 dur=0	-2	U C	-2 -4	3 1	3 3	9 3
FIIA #9	Explosion results in [redacted] with release of chemical fumes from area storage tanks	Differential pressure indicator provides indication of off-normal condition	Hydrogen explosion due to insufficient air dilution within the hydrogen exhaust system	-1	Active Engineering Control – Hydrogen supply interlocked closed on high hydrogen concentration – IROFS # IIYD-2	Active Engineering Control – Hydrogen supply interlocked closed on low dilution air flow - IROFS # IIYD-3	-2	-2	U C	-1 -5	3 1	3 3	9 3
IROFS failure	Failure of hydrogen supply valve to interlock closed on high oxygen concentration		Instrumentation failure		Failure of hydrogen supply valve to interlock closed on high hydrogen concentration	Active Engineering Control – Hydrogen supply interlocked closed on low dilution air flow	-2 dur=0	-2	U C	-2 -4	3 1	3 3	9 3

Item	Scenario	Controls (Defense in Depth)	Cause	Event Failure Frequency Index Number	Mitigative / Preventive IROFS$_1$ and IROFS failure	Mitigative/ Preventive IROFS$_2$ and IROFS failure	IROFS1 Failure Frequency Index	IROFS2 Failure Frequency Index		Likelihood Index T	Likelihood Category	Consequence Category	Risk Index
High Consequence Events													
IROFS failure	Failure of hydrogen supply valve to interlock closed on low dilution air flow		Instrumentation failure		Failure of hydrogen supply valve to interlock closed on low dilution air flow	Active Engineering Control – Hydrogen supply interlocked closed on high hydrogen concentration	-2 dur= 0	-2	U C	-2 -4	3 1	3 3	9 3
FIIA #10	Hydrogen torch fire results in [redacted] fire with release of chemical fumes from area storage tanks	Differential pressure indicator provides indication of off-normal condition	Torch fire results due to leakage at hydrogen piping	-1	Active Engineered Control – Linear heat detection cable installed around hydrogen piping interlocked to gas supply – IROFS # HYD-7	Active Engineered Control – Calciner high pressure switch interlock shuts down calciner - IROFS # ODC-4	-2	-2	U C	-1 -5	3 1	3 3	9 3
IROFS failure	Failure of linear detection cable to detect fire and shut off gas supply valve		Instrumentation failure		Failure of linear detection cable to detect fire and shut off gas supply valve	Active Engineered Control – Calciner high pressure switch interlock shuts down calciner	-2 dur= 0	-2	U C	-2 -4	3 1	3 3	9 3
IROFS failure	Failure of calciner high pressure switch interlock to shut down calciner		Instrumentation failure		Failure of calciner high pressure switch interlock to shut down calciner	Active Engineered Control – Linear heat detection cable installed around hydrogen piping interlocked to gas supply	-2 dur= 0	-2	U C	-2 -4	3 1	3 3	9 3