June 26, 2009

Mr. Dealis W. Gwyn, Licensing Manager
Shaw AREVA MOX Services
P.O. Box 7097
Aiken, SC 29804-7097

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING THE REVIEW OF THE SAFETY EVALUATION OF THE POSTULATED INABILITY TO TRANSFER HIGH ALPHA WASTE AT THE MIXED OXIDE FUEL FABRICATION FACILITY

Dear Mr. Gwyn:

We have reviewed the document entitled "Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the Mixed Oxide Fuel Fabrication Facility and the Short, Intermediate, and Long-Term Storage of High Alpha Waste in the High Alpha Waste Unit (KWD)," dated April 29, 2009.

We have enclosed a list of additional information that is needed by the staff in order to complete the review of the Safety Evaluation (Enclosure 1). Please provide us with a response describing how our questions were addressed and any other changes to licensing documents that were necessary to incorporate the responses. The response should be provided within 30 days of the date of this letter.

In accordance with Title 10 of the Code of Federal Regulations 2.390, of the U. S. Nuclear Regulatory Commission's (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 component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Please contact me at (301) 492-3229, if you have any questions.

Sincerely,

/RA/

David Tiktinsky, Senior Project Manager
Mixed Oxide and Uranium
Deconversion Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3098

Enclosure: As stated

cc w/enclosure:

S. Glenn, NNSA/SRS	A.J. Eggenberger, DNFSB
J. Olencz, DOE	L. Zeller, BREDL
S. Jenkins, SC Dept. of HEC	G. Carroll, NWS
D. Curran, Esq., NWS	D. Silverman, Esq.

Please contact me at (301) 492-3229, if you have any questions.

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Requests for Additional Information
Safety Evaluation of Postulated Inability to Transfer High Alpha Waste from the MFFF

HAW 1

Revise "Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the MOX Fuel Fabrication Facility and the Short, Intermediate, and Long-term Storage of High Alpha Waste in the KWD Unit," (DCS01-RRJ-DS-ANS-H-38426-1); the License Application (LA); and the Integrated Safety Analysis (ISA) Summary/ISA documentation, as appropriate, to clearly provide the criteria or process limits at which, "a...Operations will commence shutdown operations…so no additional high alpha waste (HAW) is generated than required for this shutdown.'' The current evaluation implies that, even in the event of interruption in waste transfers to the waste solidification building (WSB), Operations will continue to operate Mixed Oxide Fuel Fabrication Facility (MFFF) right up to the items relied for safety (IROFS) buffer limit. This course of action may challenge the safety function of the proposed IROFS buffer volume limit and reduce the margin for any other unanticipated HAW that may be generated during plant shut down and decontamination activities.

Title 10 of the *Code of Federal Regulations* (10 CFR) 70.64(b)(2) requires that facility and system design must incorporate, to the extent practicable, features that enhance safety by reducing challenges to IROFS.

HAW 2

Revise "Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the MOX Fuel Fabrication Facility and the Short, Intermediate, and Long-term Storage of High Alpha Waste in the KWD Unit," (DCS01-RRJ-DS-ANS-H-38426-1); the LA; and the ISA Summary/ISA documentation, as appropriate, to include a complete and concise description of the safety strategy for addressing short-term, intermediate-term and long-term hazards posed by unplanned interruptions in the transfer of radioactive waste.

10 CFR 70.22(a)(8) requires that each application for a license contain proposed procedures to protect health and minimize danger to life or property (such as procedures to avoid accidental criticality, procedures for personnel monitoring and waste disposal, post-criticality accident emergency procedures, etc.).

HAW 3

Provide a clear technical basis and the bounding assumptions used to determine the required HAW buffer volume; and provide a proposed license application commitment to assure that the buffer volume is continuously maintained. The technical basis discussion should include the bounding limits on the volume (including potential dilution of off-specification batches) and characteristics of the HAW stream to be transferred from the MFFF to the WSB. The referenced supporting calculation, "Calculation of the Volume Sent to KWD High Alpha Tanks During a Pu Flushout in KPA," (DCS01-KWD-DS-CAL-F-12160-0) provides no defensible technical basis. The calculation assumes 24 hours as the basis for "Pu flush-out" operations. However, this value is an approximate time given in "AP – Unit KPA- Purification Process Description Note," (DCS01-KPA-CG-NTF-F-00358-J). The actual criterion for determining adequacy of flush-out is a Pu concentration of less than 50 mg/L, as determined by sampling, at the aqueous phase outlet. It is quite conceivable that significantly longer flush-out times, and thus significantly more volume, may be necessary to meet the less than 50 mg/L criterion. Additionally, the documents

do not discuss the levels of conservatism or margin in the estimated buffer volume. The calculation also provides a circular reference back to an earlier revision (Revision 0) of DCS01-RRJ-DS-ANS-H-38426-1, in which the calculation, itself, is a reference.

Section 11.2.1.3.11 of NUREG-1821, "Final Safety Evaluation Report on the Construction Authorization Request for the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina," (p 11-48) identifies the following commitment on the part of the applicant: "The applicant indicated that the facility will shut down before exceeding the liquid waste storage capacity. The staff interprets this to mean active waste generating operations would be curtailed at some setpoint before the tankage is completely full, until potential backlog of waste at the facility is cleared."

10 CFR 70.65(b)(3) requires the ISA Summary to contain a description of each process analyzed in the ISA in sufficient detail to understand the theory of operation; and the hazards that were identified in the ISA; and a general description of the types of accident sequences.

10 CFR 70.62(c)(iv) requires each applicant to conduct an ISA that is of appropriate detail for the complexity of the process, that identifies potential accident sequences caused by process deviations or other events internal to the facility and credible external events.

10 CFR 70.22(f) requires that each application for a license to possess and use special nuclear material in a plutonium processing and fuel fabrication facility will provide a description and safety assessment of the design bases of the principal structures, systems, and components of the plant.

HAW 4

Provide an estimate of the volume, and accompanying technical basis, in the safety analysis of all of the tanks and equipment in the facility that would likely have to be emptied and their contents dispositioned, in the event of a "long term" shut down (12 months through the 20 year life of the facility). The safety evaluation presented in Section 5.0 of "Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the MOX Fuel Fabrication Facility and the Short, Intermediate, and Long-term Storage of High Alpha Waste in the KWD Unit," (DCS01-RRJ-DS-ANS-H-38426-1) only considers the annual expected volume of HAW generated under normal operations, and an "anticipated" volume of alkaline waste from solvent disposition after shut down. All other tanks and equipment, such as the dissolvers, that would need to be emptied for a long term shut down should be accounted for in the estimate.

10 CFR 70.65(b)(3) requires the ISA Summary to contain a description of each process analyzed in the ISA in sufficient detail to understand the theory of operation; and the hazards that were identified in the ISA; and a general description of the types of accident sequences.

HAW 5

Provide the technical basis for excluding liquid "tank heels" and piping "dead volume" in the estimation of the volume available in tank KWD*TK4050. The safety evaluation presented in Section 5.0 of "Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the MOX Fuel Fabrication Facility and the Short, Intermediate, and Long-term Storage of High Alpha Waste in the KWD Unit," (DCS01-RRJ-DS-ANS-H-38426-1) builds the safety case by considering the nominal batch volume to be transferred to WSB in a single batch (7,700 L) against the nominal volume of tank KWD*TK4050 (10,500 L) to arrive at the conclusion that only

73% of the tank volume will be occupied by HAW immediately prior to any transfer. This evaluation does not appear to make any allowances, for 'liquid heel' left in the tank from previous transfer operations (which can be a significant percentage of the tank volume), volume occupied by tank internals (e.g., sparger rings), and any extra liquid volume from piping and break-pot dead volumes, etc.

10 CFR 70.62(c)(iv) requires each applicant to conduct an ISA that is of appropriate detail for the complexity of the process, that identifies potential accident sequences caused by process deviations or other events internal to the facility and credible external events.

HAW 6

Revise "Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the MOX Fuel Fabrication Facility and the Short, Intermediate, and Long-term Storage of High Alpha Waste in the KWD Unit," (DCS01-RRJ-DS-ANS-H-38426-1); the LA; and the ISA Summary/ISA documentation, as appropriate, to provide a discussion of the uncertainty analysis pertaining to the maintenance of the required HAW buffer volume. For example, liquid level measurement in the tanks is to be performed using differential pressure transmitters, with solution density as a fixed parameter. The discussion should provide quantification of the expected variations in solution density over the time periods considered in the safety evaluation and its resulting effects on level measurements. Provide a discussion of the amount of margin introduced into the required buffer volume due to measurement uncertainty.

Section 11.2.1.3.11 of NUREG-1821, "Final Safety Evaluation Report on the Construction Authorization Request for the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina," (p 11-48) identifies the following commitment on the part of the applicant: "The applicant indicated that the facility will shut down before exceeding the liquid waste storage capacity. The staff interprets this to mean active waste generating operations would be curtailed at some setpoint before the tankage is completely full, until potential backlog of waste at the facility is cleared."

10 CFR 70.65(b)(3) requires the ISA Summary to contain a description of each process analyzed in the integrated safety analysis in sufficient detail to understand the theory of operation; and the hazards that were identified in the ISA; and a general description of the types of accident sequences.

10 CFR 70.62(c)(iv) requires each applicant to conduct an ISA that is of appropriate detail for the complexity of the process, that identifies potential accident sequences caused by process deviations or other events internal to the facility and credible external events.

HAW 7

Revise "Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the MOX Fuel Fabrication Facility and the Short, Intermediate, and Long-term Storage of High Alpha Waste in the KWD Unit," (DCS01-RRJ-DS-ANS-H-38426-1) to correct the statement (p. 26), "the percent of TBP in solvent will not drop over time and, in fact, may increase due to it larger vapor pressure relative to the diluent." TBP is less volatile than the HTP diluent. The normal boiling point of TBP is 289 ^{0}C. The normal boiling point for n-dodecane (roughly similar to HTP) is 216 ^{0}C. Therefore, by definition, TBP possesses a lower vapor pressure at a given temperature.

10 CFR 70.65(b)(3) requires the ISA Summary to contain a description of each process

analyzed in the ISA in sufficient detail to understand the theory of operation; and the hazards that were identified in the ISA; and a general description of the types of accident sequences.

HAW 8

Revise "Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the MOX Fuel Fabrication Facility and the Short, Intermediate, and Long-term Storage of High Alpha Waste in the KWD Unit," (DCS01-RRJ-DS-ANS-H-38426-1) to provide the technical basis for the statement in Section 2.0 of the reference document, "Calculation of the Volume Sent to KWD High Alpha Tanks During a Pu Flush-out in KPA," (DCS01-KWD-DS-CAL-F-12160-0) that indicates that, "once the operations are stopped in KPA, the downstream units are safe to be shut down as is, and just stop their operation."

10 CFR 70.62(c)(iv) requires each applicant to conduct an ISA that is of appropriate detail for the complexity of the process, that identifies potential accident sequences caused by process deviations or other events internal to the facility and credible external events.

HAW 9

Revise "Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the MOX Fuel Fabrication Facility and the Short, Intermediate, and Long-term Storage of High Alpha Waste in the KWD Unit," (DCS01-RRJ-DS-ANS-H-38426-1) to provide the technical basis for the assumption in Section 5.0 of the reference document, "Calculation of the Volume Sent to KWD High Alpha Tanks During a Pu Flushout in KPA," (DCS01-KWD-DS-CAL-F-12160-0) that indicate that "minimized" operation of the KWG system will not adversely affect "long term" (12 months through the 20 year life of the facility) storage of HAW and provide a discussion of the effects of "minimized" KWG operations on the defense-in-depth functions provided in the prevention and mitigation of radiolytic hydrogen explosion events.

10 CFR 70.62(c)(iv) requires each applicant to conduct an integrated safety analysis that is of appropriate detail for the complexity of the process, that identifies potential accident sequences caused by process deviations or other events internal to the facility and credible external events.

10 CFR 70.64(b)(2) requires that facility and system design must incorporate, to the extent practicable, features that enhance safety by reducing challenges to IROFS.

HAW 10

Revise "Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the MOX Fuel Fabrication Facility and the Short, Intermediate, and Long-term Storage of High Alpha Waste in the KWD Unit," (DCS01-RRJ-DS-ANS-H-38426-1); the LA; and the ISA Summary/ISA documentation, as appropriate, to clearly define over the short, intermediate and long-term, respectively, which controls are IROFS; which controls are normal process controls; which are credited in the safety analysis (ISA Summary); and which are not.

10 CFR 70.65(b)(6) states that the ISA summary must contain… "a list briefly describing each item relied on for safety which is identified pursuant to §70.61(e) in sufficient detail to understand their functions in relation to the performance requirements of §70.61."

HAW 11

Revise “Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the MOX Fuel Fabrication Facility and the Short, Intermediate, and Long-term Storage of High Alpha Waste in the KWD Unit,” (DCS01-RRJ-DS-ANS-H-38426-1); the LA; and the ISA Summary/ISA documentation, as appropriate, to provide the safety analysis and strategy, with supporting technical basis, to describe how specific materials in the rest of the MFFF (e.g., Pu oxide powder in opened 3013 cans, dissolver solutions, dilution tank solutions, and buffer tank solutions) will be dispositioned in a safe condition in the event of a “long term” (12 months through the 20 year life of the facility) interruption of operations.

10 CFR 70.62(c)(iv) requires each applicant to conduct an ISA that is of appropriate detail for the complexity of the process, that identifies potential accident sequences caused by process deviations or other events internal to the facility and credible external events.

HAW 12

Revise “Safety Evaluation of the Postulated Inability to Transfer High Alpha Waste from the MOX Fuel Fabrication Facility and the Short, Intermediate, and Long-term Storage of High Alpha Waste in the KWD Unit,” (DCS01-RRJ-DS-ANS-H-38426-1); the LA; and the ISA Summary/ISA documentation, as appropriate, to demonstrate that maintaining materials in tanks and equipment not equipped with dilution (scavenging) air does not present an unanalyzed accident sequence in the event the MFFF must be shut down for longer than the 11 days assumed in the ISA.

10 CFR 70.62(c)(iv) requires each applicant to conduct an ISA that is of appropriate detail for the complexity of the process, that identifies potential accident sequences caused by process deviations or other events internal to the facility and credible external events.