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Use with LWP-18001

INL USQ PROCESS
REASONABILITY DETERMINATION/POTENTIAL INADEQUACY IN THE SAFETY ANALYSIS (PISA) FORM
(DO NOT USE FOR PROPOSED CHANGES)

mRe 12/19/07

Facility or Activity: NMIS

USQ Process No.: RTC-USQ-2007-843

Subject: Hazardous Material Inventory at NMIS

Describe the New Information/Discovery:
A recent assessment (IAS071289) was performed in an effort to validate certain assumptions in the facility safety analysis reports for several ATR Programs nuclear facilities. Included in that assessment was the verification of statements regarding the quantity of hazardous materials currently located in the Nuclear Materials Inspection and Storage (NMIS) Facility TRA-621. The results of that assessment determined that the quantities of cadmium and lead used in the hazard and accident analysis to determine the consequences of a lead and/or cadmium release as the result of a fire could not be validated. The consequence analysis engineering design file (EDF) referenced in Chapter 3 of SAR-154 states the amount of releasable material used in the calculation, but does not provide the documenation of the calculation or state all the assumptions used to arrive at the results. Safety analysts performing the assessment could not duplicate the EDF values using the information from facility drawings. The assessment makes the recommendation that a new analysis which calculates the amount of cadmium and lead available for release during a fire and documents all assumptions be completed.
Identify the applicable safety basis document(s) (e. g., DSA, SAR, BIO, TSRs, etc.):

SAR-154, "Safety Analysis Report for the Nuclear Material Inspection and Storage (NMIS) Facility TRA-621."
TSR-154, "Technical Safety Requirements for the Nuclear Material Inspection and Storage (NMIS) Facility TRA-621."

I. REASONABILITY DETERMINATION (Reasonability determinations made as part of the ATR Design Basis Reconstitution effort may be documented per SP-10.2.4.9)

Is it reasonable that the potential for an inadequate safety analysis exists based on the new information or discovery described above? ☒ Yes ☐ No

If "Yes," proceed to Sections II, III, and IV.
If "No," provide an explanation and basis for the reasonability determination.

USQ Evaluator Print/Type Name	USQ Evaluator Signature	Date
Nuclear Facility Manager Print/Type Name	Nuclear Facility Manager Signature	Date

If the answer to the question above is "No," file the completed form. Do not complete Section II, III, or IV.

If the answer to the question above is "Yes," complete Section II, III, and IV.

II. PISA DECLARATION

What is the basis for concern that the safety basis may not be bounding or may be otherwise inadequate? Provide an explanation.

EDF TRA-NMIS-1171, "Consequence Analysis Calculations For Cadmium And Lead Releases During A NMIS Fire" provides the calculation for hazardous material release due to a facility fire; however, the quantities of cadmium and lead used in the analysis may not be valid. The EDF states the amount of releasable material, but does not document the calculation or state the assumptions used to arrive at the values. In the recent assessment, safety analysts performing calculations based on information in facility drawings in order to verify the releasible inventory of both could not duplicate the the EDF values.

A PISA exists. Complete the following actions

- Nuclear Facility Manager document actions (below) including interim operating restrictions taken to place or maintain the facility in a safe condition.

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- Nuclear Facility Manager execute reporting process for PISA per LWP-9301 and LWP-13830.
- Qualified USQ evaluator proceed to Section **III**.

ACTIONS TAKEN TO PLACE OR MAINTAIN FACILITY IN A SAFE CONDITION AND THE BASIS FOR THE SELECTION OF ANY INTERIM CONTROLS.

The lead incorporated inside some of the facility walls and the cadmium contained within the structure of the fuel storage racks are passive design features. Hazardous material release of both would be possible from a major facility fire. Lead bricks used as shielding are not considered to be a form that is readily releasable in a fire. TSR level controls already require that the halon fire suppression system be operable when fuel is stored in the racks and already limit the transient combustible loading in the non-vault areas of the facility. In addition, safety analysis commitment limits the transient combustible loading in the vault. The possible failure of the wet pipe suppression system in the vault and non-vault areas of the facility is an assumption of the facility accident analysis so its operability is not a credited control as with the halon system. The safety analysis commitment for maintaining functionality is to assure that the failure rate assumed in the hazard analyses concerning inadvertent moderator addition is not compromised. Thus, an interim operating restriction to require an operable wet pipe suppression system to maintain the facility in a safe condition until the consequence of the hazardous material release can be verified is necessary.

Anne K. McCartin/Christine A. Satterwhite	per telecon / C Satterwhite	12/19/2007
Safety Analyst Print/Type Name	Safety Analyst Signature	Date
Max M. Heberling	M Heberling	12/19/07
Nuclear Facility Manager Print/Type Name	Nuclear Facility Manager Signature	Date

Is independent technical review required? Yes ☐ No ☒

MM
Nuclear Facility Manager Signature or Initials

Independent Reviewer Print/Type Name	Independent Reviewer Signature	Date

III. USQ DETERMINATION

Identify applicable section(s) of the safety basis document(s) (e.g., DSA, SAR, BIO, TSRs, etc.).

IIIa: POTENTIAL FOR AN INCREASE IN PROBABILITY OR CONSEQUENCE OF AN ACCIDENT OR MALFUNCTION EVALUATED IN THE SAFETY BASIS

1. Could the PISA increase probability of occurrence of an accident previously evaluated in the safety basis?
   Yes ☐ No ☐
   Explain:

2. Could the PISA increase the consequences of an accident previously evaluated in the safety basis?
   Yes ☐ No ☐
   Explain:

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TSR-154, "Technical Safety Requirements for the Nuclear Material Inspection and Storage (NMIS) Facility TRA-621."

I. REASONABILITY DETERMINATION (Reasonability determinations made as part of the ATR Design Basis Reconstitution effort may be documented per SP-10.2.4.9)

Is it reasonable that the potential for an inadequate safety analysis exists based on the new information or discovery described above? ☒ Yes ☐ No

If "Yes," proceed to Sections II, III, and IV.
If "No," provide an explanation and basis for the reasonability determination.

USQ Evaluator Print/Type Name	USQ Evaluator Signature	Date
Nuclear Facility Manager Print/Type Name	Nuclear Facility Manager Signature	Date

If the answer to the question above is "No," file the completed form. Do not complete Section II, III, or IV.

If the answer to the question above is "Yes," complete Section II, III, and IV.

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II. PISA DECLARATION

What is the basis for concern that the safety basis may not be bounding or may be otherwise inadequate? Provide an explanation.

EDF TRA-NMIS-1171, "Consequence Analysis Calculations For Cadmium And Lead Releases During A NMIS Fire" provides the calculation for hazardous material release due to a facility fire; however, the quantities of cadmium and lead used in the analysis may not be valid. The EDF states the amount of releasable material, but does not document the calculation or state the assumptions used to arrive at the values. In the recent assessment, safety analysts performing calculations based on information in facility drawings in order to verify the releasible inventory of both could not duplicate the the EDF values.

A PISA exists. Complete the following actions

- Nuclear Facility Manager document actions (below) including interim operating restrictions taken to place or maintain the facility in a safe condition.
- Nuclear Facility Manager execute reporting process for PISA per LWP-9301 and LWP-13830.
- Qualified USQ evaluator proceed to Section **III**.

ACTIONS TAKEN TO PLACE OR MAINTAIN FACILITY IN A SAFE CONDITION AND THE BASIS FOR THE SELECTION OF ANY INTERIM CONTROLS.

The lead incorporated inside some of the facility walls and the cadmium contained within the structure of the fuel storage racks are passive design features. Hazardous material release of both would be possible from a major facility fire. Lead bricks used as shielding are not considered to be a form that is readily releasable in a fire. TSR level controls already require that the halon fire suppression system be operable when fuel is stored in the racks and already limit the transient combustible loading in the non-vault areas of the facility. In addition, safety analysis commitment limit the transient combustible loading in the vault. The possible failure of the wet pipe suppression system in the vault and non-vault areas of the facility is an assumption in the facility accident analysis so its operability is not a credited control as with the halon system. The safety analysis commitment for maintaining functionality is to assure that the failure rate assumed in the hazard analysis concerning inadvertent moderator addition is not compromised. Thus, an interim operating restriction to require an operable wet pipe suppression system to maintain the facility in a safe condition until the consequence of the hazardous material release can be verified is necessary.

Anne K. McCartin/Christine A. Satterwhite		
Safety Analyst Print/Type Name	Safety Analyst Signature	Date

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Max M. Heberling		
Nuclear Facility Manager Print/Type Name	Nuclear Facility Manager Signature	Date

Is independent technical review required? Yes ☐ No ☐

Nuclear Facility Manager Signature or Initials

Independent Reviewer Print/Type Name	Independent Reviewer Signature	Date

III. USQ DETERMINATION

Identify applicable section(s) of the safety basis document(s) (e.g., DSA, SAR, BIO, TSRs, etc.).

SAR-154, Section ES-1.4.3, Risk of Postulated Accidents
SAR-154, Section 2.4, Facility Structure
SAR-154, Section 3.3.2.1.3, Hazardous Material
SAR-154, Table 3-11, The NMIS Facility Hazard Evaluation Results Summary
SAR-154, Section 3.3.2.3, Hazard Evaluation
SAR-154, Section 3.4.2.2.5, Summary of Safety SSCs and TSR Controls
SAR-154, Section 5.5.8, Maximum Transient combustible Loading (AC 5.154.6)
TSR-154, Section 5.154.6, Maximum Transient Combustible Loading

IIIa: POTENTIAL FOR AN INCREASE IN PROBABILITY OR CONSEQUENCE OF AN ACCIDENT OR MALFUNCTION EVALUATED IN THE SAFETY BASIS

1. Could the PISA increase probability of occurrence of an accident previously evaluated in the safety basis?
   Yes ☐ No ☒
   Explain:

   The probability of occurrence of a hazardous material release from the NMIS facility as the result of a fire evaluated in the safety basis is an anticipated event and remains unchanged as the result of this new information.

2. Could the PISA increase the consequences of an accident previously evaluated in the safety basis?
   Yes ☒ No ☐
   Explain:

   EDF TRA-NMIS-1171, "Consequence Analysis Calculations for Cadmium and Lead Releases During a NMIS Fire" provides the calculation for hazardous material release due to a facility fire; however, the quantities of cadmium and lead used in the analysis may not be valid. The EDF states the amount of releasable material, but does not

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document the calculation or state the assumptions used to arrive at the values. In the recent assessment, safety analysts performing calculations based on information in facility drawings in order to verify the releasable inventory of both could not duplicate the EDF values. Preliminary calculations indicate that the source term may be larger than what is documented in the EDF and the safety basis. Therefore, the consequence of an accident previously evaluated in the safety basis is increased as a result of this new information.

3. Could the PISA increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the safety basis? Yes ☐ No ☒

Explain:

The fuel storage racks and fresh fuel shipping containers are safety significant SSCs which have a functional requirement to provide neutron absorption. The cadmium sheeting contained within the structure of these SSCs are passive design features which allow the safety significant SSCs to meet their functional requirements. Criticality safety evaluations have determined that, per design, these items provide adequate neutron shielding for the current NMIS inventory. The lead incorporated inside some of the facility walls is a passive design feature for which no credit is taken in the safety basis. Because It is not the amount of cadmium or lead in an individual SSC which is a concern during a fire, but the total cadmium and lead inventory in the facility that has been underestimated, the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the safety basis remains unchanged as the result of this new information.

4. Could the PISA increase the consequences of a malfunction of equipment important to safety previously evaluated in the safety basis? Yes ☒ No ☒ AGH 1-8-08 AKM 1-8-08 AKM for MMH per telecon 1-8-08

Explain:

The safety basis does not take credit for any equipment to mitigate the consequence of a fire; therefore, the PISA does not increase the consequence of a malfunction of equipment important to safety.

IIIb: POTENTIAL FOR CREATION OF AN UNANALYZED ACCIDENT OR MALFUNCTION OF A DIFFERENT TYPE

5. Could the PISA create the possibility of an accident of a different type than previously evaluated in the safety basis? Yes ☐ No ☒

Explain:

The release of hazardous material from the NMIS facility as the result of a fire is an analyzed scenario in the safety basis. The amount of hazardous material available for release affects the consequence of the release but does not create a new accident of a different type.

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6. Could the PISA create the possibility of a malfunction of equipment important to safety of a different type than previously evaluated in the safety basis? Yes ☐ No ☒

   Explain:

   The safety basis evaluates an unmitigated release as the consequence of a fire; therefore, the PISA does not create the possibility of malfunction of any different type of equipment than previously evaluated in the safety basis.

IIIc: POTENTIAL FOR REDUCTION IN A MARGIN OF SAFETY

7. Could the PISA reduce a margin of safety as defined in the safety basis? Yes ☒ No ☐

   Explain:

   The evaluations completed in the safety basis to support the derivation of safety controls is impacted by the new information; therefore, the margin of safety is changed.

IIId: USQ DETERMINATION CONCLUSION

8. Based on the responses to questions 1 – 7 above, does the PISA constitute an Unreviewed Safety Question? Yes ☒ No ☐

   Explain:

   Because preliminary calculations indicate that the source term for a hazardous material release due to a fire in the NMIS facility has increased, the consequences of an accident is also increased. Thus, the margin of safety is reduced, and this PISA constitutes a positive USQ.

   If "No," is a Safety Basis document revision required at next annual update? ☐ Yes ☐ No

   NOTE: If USQ determination result is positive, additional notification for ORPS is required per LWP-9301.

IV. APPROVAL/CONCURRENCE SIGNATURES

APPROVAL:

Anne. K. McCartin / Christine. S. Satterwhite	Anne K McCartin / C Satterwhite	1-8-2008
USQ Evaluator Print/Type Name	USQ Evaluator Signature	Date
Max. M. Heberling	M Heberling	1/8/08
Nuclear Facility Manager Print/Type Name	Nuclear Facility Manager Signature	Date

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CONCURRENCE:

A. Hoskins or R. Metcalf	Alan G. Hoskins	1-8-08
Independent Review Committee Chair Print/Type Name	Independent Review Committee Chair Signature	Date