

**Surry ISFSI License Renewal Application
RAI Response Meeting 9/4/03**

Meeting Agenda

- Introductions
- Purpose of Meeting
- Discussion of Responses
- Schedule

Surry ISFSI License Renewal Application RAI Response Meeting 9/4/03

Materials RAI-1

Part (A)

RAI: *Justify why the performance of polymeric materials is not a concern. Discuss any Time Limited Aging Analysis (TLAA) or monitoring to ensure that the performance of the polymeric materials.*

- 1. Polymeric materials used for shielding and seals. Both are addressed.**
- 2. Change in Material Properties not a problem since configuration remains intact (materials confined/encapsulated).**
- 3. No TLAA's performed for seals or polymeric shielding materials.**
- 4. Assuming hydrogen content reduction does occur, there may be a potential for reduction in neutron shielding effectiveness. Therefore, aging management is required.**
- 5. Shielding effectiveness managed by ISFSI facility boundary radiation monitoring program.**

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Materials RAI-1 (Continued)

Part (B)

RAI: *Explain "These elastomeric O-rings were not credited in the aging management review of the cask; therefore, the potential for loss of material of the carbon steel components below the closure is managed." (Page 3-18, para 1).*

1. Refers to elastomer O-ring seals for MC-10 closure cover.
2. Closure nuts are hand-tightened against seals, therefore, no credit taken.
3. Water intrusion is assumed. A visual inspection of this area on the MC-10 cask will be performed.

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Materials RAI-1 (Continued)

Part (C)

RAI: *Justify why an AMR was not performed for nonmetallic seals.*

- 1. Only metallic seals are credited as leakage barriers.**
- 2. Always a minimum of two metallic seals between the fuel and the outside atmosphere.**

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Materials RAI-2

RAI: *Justify why "lead slumping" is not a concern for a license renewal period of 40 years in the NAC I-28 gamma shield.*

- 1. Lead used in the NAC I-28 casks only.**
- 2. NAC I-28 TSAR accident analysis addresses lead slumping for cask drop accident. Results were acceptable.**
- 3. There are no relevant aging mechanisms which would change the physical properties of lead. Therefore, accident analysis remains valid over time.**
- 4. Lead slumping (non-accident) not credible since lead is cast into the outer shell of the cask and is supported by cask shell structure.**

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Materials RAI-3

RAI: *Justify the use of EPRI references (6 and 8) in Section 3 of the license renewal application. These documents generalize the maximum temperatures and their duration for the five DCSSs at Surry, based on information (experiences gained) from only the CASTOR V21 cask.*

- 1. EPRI Report No. 1003010 (Dry Cask Characterization Project-Interim Report) and EPRI NP-4887 (CASTOR V/21 PWR Spent Fuel Storage Cask: Testing and Analysis, Interim Report) used to determine maximum expected fuel clad temperatures for use in AMRs.**
- 2. The CASTOR V/21 measured maximum fuel clad temperature exceeds all other cask predicted temperatures, and therefore bounds the other four designs.**

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Materials RAI-4

RAI: *Provide an evaluation or data that demonstrates that the properties of zirconium fuel cladding continue to be sufficient to satisfy the safety requirements for the proposed 40- year license renewal period.*

- 1. Request discussed during 7/29/03 teleconference.**
- 2. Per Interim Staff Guidance (ISG-11), Revision 2 clad creep is the dominant mechanism for cladding deformation under conditions of storage.**
- 3. NRC has established a maximum fuel clad temperature limit of 400°C. This limit is consistent with the program and studies identified in the Appendix to ISG-11, Revision 2.**
- 4. The fuel temperatures in the casks at the Surry ISFSI are all below this limit. (Refer to Material RAI-3 Response.)**

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Materials RAI-5

RAI: *Justify the continued use of the thermal neutron absorber materials during the license renewal period for the following casks: MC-10, TN-32, and NAC I-28. The applicant did not identify the absorber material (if any) used in the CASTOR V/21 and X/33 systems.*

In Section B2.2, TLAA for the depletion of boron used for criticality control is discussed for the MC-10 only.

- 1. All casks used at the Surry ISFSI have borated material in the fuel baskets as identified in the LRA Section 3.3 tables with the exception of 3 CASTOR V/21 casks that do not.**
- 2. Evaluations show that the depletion of boron in the neutron absorbing material is negligible.**
- 3. Only Westinghouse identified the depletion of Boron in the poison plates as a TLAA.**

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Materials RAI-6

RAI: *Clarify statement in footnote 3 to Table 3.2-4: "Small gaps may exist where metal-to-metal or metal-to-polymer sub-components interface. These gapsnot required."*

- 1. Refers to gaps that exist between surface interfaces due to manufacturing tolerances.**
- 2. Conservatively identified and applicable to all cask types.**
- 3. They are sealed from outside atmosphere/weather environment.**

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Materials RAI-7

RAI: *Clarify the term "none" in Table 3.2.1 under the heading of intended function. If there is an elastomeric seal, its function and continued safety should be addressed.*

- 1. Elastomer seals do not provide any of the safety functions identified in Section III.B of the Preliminary Staff Guidance document.**
- 2. Only metallic seals are credited as leakage barriers.**

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Materials RAI-8

RAI: *Provide additional discussion on when a cask bottom will be inspected prior to the issuance of the renewed license.*

- 1. Visual inspection of CASTOR V/21 cask will be performed prior to end of current ISFSI license period (July 31, 2006).**
- 2. CASTOR V/21 cask bottom is representative of all cask types.**
 - Age**
 - Materials**
 - Bolts**
- 3. Per plant procedures, any future lift of an in-service cask will be used as an opportunity to inspect the cask bottom.**

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Materials RAI-9

RAI: *Provide details and a discussion of those parts of the cask systems (except the bottom and the interior portion containing the fuel) that are considered "normally inaccessible" and provide a justification for not performing a special one-time inspection of a representative area.*

Normally inaccessible areas are:

- Cask bottom (Previously discussed)
- Cask interior (Not subject of question)
- Area under an Impact limiter
- Area under environmental covers

IMPACT LIMITERS

1. Impact limiters only used on 1 CASTOR X/33 cask and 2 NAC I-28 casks.
2. During quarterly inspection of the CASTOR X/33 cask, corrosion would be evident by rust stains.
3. During quarterly inspection of the NAC I-28 casks, significant pitting or crevice corrosion would be evident in the adjacent areas of the impact limiter (same material/environmental conditions).
4. Special inspections not warranted.

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Materials RAI-9 (Continued)

ENVIRONMENTAL COVERS

- 1. Environmental covers on all casks except NAC I-28s.**
- 2. Visual inspection of the seal lid area of the MC-10 is planned prior to end of current ISFSI license period. (Refer to Materials RAI-1B response.)**
- 3. TN-32s have been examined since design modifications were implemented. Enclosed area was dry with no signs of active corrosion. Additional inspections not warranted.**
- 4. As part of CASTOR V/21 bottom inspection performed prior to the end of the current ISFSI license period, the environmental cover will be removed and the area inspected.**
- 5. CASTOR V/21 and CASTOR X/33 casks have same materials and conditions under environmental cover. CASTOR V/21 inspection will bound the CASTOR X/33 cask.**
- 6. Per plant procedures, any future removal of an environmental cover of an in-service cask will be used as an opportunity to inspect the area under the cover.**

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Materials RAI-10

RAI: *Provide a discussion and details of the plan and schedule for inspecting the bottom of the CASTOR V/21 cask.*

- 1. Visual inspection of CASTOR V/21 cask will be performed prior to the end of the Current ISFSI license period (July 31, 2006).**
- 2. Bottom of cask and breach plate bolts will be inspected.**

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Materials RAI-11

RAI: *Ensure that all age-related degradation mechanisms experienced by the five different storage cask designs at the ISFSI have been identified.*

Further discussion of the engineering evaluations/judgements and operating experience with respect to age-related degradation of each cask currently in use at the Surry ISFSI would clarify that no component important to AMR is overlooked.

- 1. Preliminary Staff Guidance (PSG) provides listing of aging mechanisms for consideration.**
- 2. Dominion independently identified potential aging mechanisms based on various industry documents (EPRI, NRC) and utilized the lessons learned for the Surry License Renewal (10CFR Part 54) effort.**
- 3. Aging Management Reviews were then performed on components identified as in-scope of license renewal.**
- 4. Site specific operating experience identified on CASTOR V/21 and TN-32 cask types. All cask types were considered in operating experience review.**
- 5. The age related degradation identified by the operating experience would have been identified as applicable aging mechanisms in the evaluation process used regardless of whether or not they had been observed.**

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Materials RAI-12

RAI: *Clarify the criteria used for determining when corrective actions should be implemented for components identified in the AMR.*

- 1. "Acceptance criteria for visual inspection is the absence of anomalous indication that are signs of degradation."**
- 2. Personnel performing inspection to determine the difference between a routine "maintenance" item and a "deviating" condition.**
- 3. Examples of Deviating Conditions:**
 - Pressure alarms**
 - Large dent vs. nick**
 - General coating problem**
- 4. A "Deviating" condition initiates a Plant Issue which, in turn, initiates the plant Corrective Action System.**
- 5. Visual inspections and any future "opportunity" inspections will have same criteria.**

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Materials RAI-13

RAI: Clarify how the maximum Cumulative Usage Factor (CUF) for fatigue was calculated for CASTOR V/21 casks and CASTOR X/33 casks.

It is not clear why the CUFs are different, since both casks are in the same location and exposed to the same temperature range.

- 1. The external environment is the same for the CASTOR V/21 and CASTOR X/33 casks.**
- 2. Differences in the CUF values are due to cask design differences.**
- 3. Stresses are different between the two cask types. Stress concentration factors are also different.**
- 4. Major Differences:**
 - V/21 cask holds fewer assemblies, but each has a higher heat load. Surface fins on cask for heat removal.**
 - X/33 cask is larger and more rigid.**
- 5. TSAR's provide additional analysis detail.**

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Scoping Methodology RAI-1

RAI: Clarify how the site-characteristics addressed in Chapter 2 of the FSAR will change (or have changed) in the next 40 years. Specify how the scoping evaluation in the license renewal application considered external factors (such as site characteristics) that are outside the direct control of Dominion Power.

- 1. The environmental review performed for the Surry plant license renewal effort under 10CFR Part 54 was incorporated by reference into App. E of the ISFSI LRA.**
- 2. No new or significant information on site characteristics.**
- 3. No changes to characteristics, no impact on scoping.**

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Scoping Methodology RAI-1 (Continued)

RAI: *It is not clear if the current licensing basis considered the realized and predicted changes in site-specific characteristics over long periods of time such as 60 years.*

- 1. Population distribution is of significance to the ER.**
- 2. Changes expected over duration of license renewal period. Updated information is used to assess the radiological impacts of the ISFSI.**
- 3. Nearest resident is determined on an annual basis; Emergency evacuation times re-evaluated every 10 years following updated census data.**
- 4. The assessment of radiological impacts on the surrounding population are part of the Current Licensing Basis for the station and the ISFSI. As such, these activities are carried forward into the license renewal period.**

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Scoping Methodology RAI-2

RAI: *Discuss Dominion Power's plan to maintain the spent fuel pool for the proposed license life up to 2046.*

- 1. ISFSI Technical Specifications require the capability to remove fuel from a cask.**
- 2. ISFSI FSAR states the spent fuel pool will remain functional until the ISFSI is decommissioned.**
- 3. This is a current licensing commitment regardless of license renewal.**
- 4. Any alternate approach must be brought to NRC via the licensing process.**

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Scoping Methodology RAI-3

RAI: *Clarify whether the casks loaded with spent fuel will only be used to store its original contents, or whether they may be reused to store different fuel during the renewed license period. Provide a table of fuel parameters in the currently loaded casks, including the burnup, cooling time, decay heat, fuel type, and fuel condition prior to loading.*

- 1. There are no current plans to re-use storage casks.**
- 2. Current license, however, does not prohibit this activity.**
- 3. AMRs have indicated that the casks will continue to perform their intended functions for the duration of the license renewal period.**
- 4. The AMRs did not rely on fuel or storage conditions to be anything less than those described in the Technical Specifications.**

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Scoping Methodology RAI-3 (Continued)

- 5. If a cask were re-loaded;**
 - The fuel load would have to meet the Technical Specification limitations for that cask.**
 - The cask would be thoroughly inspected prior to re-load. Lid and seal surfaces would be inspected. New seals would be installed.**
 - Fuel basket condition would be determined from fuel inspection and removal force monitoring.**
 - Surface dose rates would be verified to be within Technical Specification limits prior to placement at the ISFSI pad.**
- 6. Fuel in the currently loaded casks are characterized by the Technical Specifications for each cask type.**

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Aging Management Reviews RAI-1

RAI: Clarify whether the aging management evaluation of the TN-32 poison plates considered the analysis in Appendix A.5 of the Surry SAR, which addresses the criticality evaluation for a period of only 20 years

- 1. The Surry ISFSI FSAR Appendix A.5 concludes criticality safety was demonstrated for a "minimum of 20 years."**
- 2. Boron depletion was identified as insignificant in Chapter 6 of the TN-32 FSAR over a much longer time period.**
- 3. Therefore, no TLAA was identified for the poison plates in the TN-32 casks.**

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Aging Management Reviews RAI-2

RAI: *Justify why the fuel pellet is not within the scope of license renewal as stated in Table 3.3-1. The physical properties of the pellet are factors that impact the criticality analysis and are considered in the criticality safety design of the casks.*

- 1. Per the criteria of the Preliminary Staff Guidance Section III.B, #1, the fuel pellets are not in scope because they do not perform any of the five intended safety functions.**
- 2. Fuel pellet configuration (per criticality assumptions) is maintained by cladding. Cladding is in license renewal scope.**
- 3. Degradation of fuel pellet characteristics do not reduce criticality safety.**
- 4. Per the criteria of the Preliminary Staff Guidance Section III.B, #2, the fuel pellets are not in scope because fuel pellet degradation does not prohibit the fuel cladding from performing its safety function.**
- 5. Degradation due to oxidation of fuel pellet does not occur in helium environment.**
- 6. Cask environment (Helium) is managed.**

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Aging Management Activities RAI-1

RAI: *Discuss how cask seals are inspected under the inspection activities as stated in Table 3.2-4 for aging management.*

- 1. Cask seals are not visually inspected. Seal integrity is managed by the continuous pressure monitoring of the casks.**

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Aging Management Activities RAI-1 (Continued)

RAI: *Clarify if the corrective actions and resolution of the TN- 32 seal lid failures have addressed an additional 40-year service life for protection against normal conditions, anticipated occurrences, credible accidents, and natural phenomena events within the current licensing basis.*

- 1. The corrective action for the TN-32 seal failure involved a “root cause” evaluation.**
- 2. Seal failure was due to galvanic corrosion resulting from water intrusion. Source of water intrusion identified and a “fix” was implemented.**
- 3. “Fix” did not alter the design conditions of the area under the environmental cover, but ensured that the design conditions were met.**
- 4. Subsequent examination of the area under the environmental cover have shown the area to be dry.**
- 5. AMR acknowledged that aging management was required in the area underneath the TN-32 environmental covers. The “fix” did not alter this conclusion.**
- 6. The application of aging management to this area ensures that the seal integrity is maintained for the additional service life of the license renewal period.**

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Aging Management Activities RAI-1 (Continued)

RAI: *Specify whether the cask seals could be in an undetected degraded state that meets normal operating conditions, but not in the required state of integrity to withstand credible accidents.*

- 1. There is a potential for undetected metallic seal degradation during normal operation.**
- 2. Accordingly, 10CFR72.236(e) requires seal system redundancy.**
- 3. Any seal failure would most likely affect the outboard metallic lid seals that are potentially subject to atmosphere/weather environment.**
- 4. Seals associated with the removal of a cask lid to replace a failed seal would be replaced as part of the corrective action.**

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Environmental Review RAI-1

RAI: *Provide information for all reportable spills, releases, and accidental discharges to the environment since the previous Environmental Report (ER), if applicable.*

Provide a summary of the measured radiological dose impacts during the entire current license period for ISFSI operations, as reported under 10 CFR 72.44(d)(3).

- 1. Annual reports, per 10CFR72.44(d)(3), indicate no effluent releases have occurred from the ISFSI.**
- 2. No non-radiological releases have occurred.**
- 3. No unexpected trends have occurred and none are anticipated.**

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Environmental Review RAI-2

RAI: *Revise the environmental report to only address the requested licensing actions in the application. The ER provides assessments for modifications of the design with a fourth storage pad.*

- 1. Fourth pad no longer an option for the Surry site-specific ISFSI license.**
- 2. RAI responses combine with the LRA to supplement or supercede LRA information. Pages showing strikeout of fourth pad information included in RAI response to ensure identification of all text that no longer applies.**

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Environmental Review RAI-3

RAI: *Delete the line in Appendix E, Table 1-2 regarding the Benefit-Cost Analysis. There is no benefit-cost analysis in Section 4.5 of the Environmental Report. In accordance with 10 CFR 51.45(c), one is not required*

- 1. Dominion agrees that no Cost-Benefit Analysis is addressed in Section 4.5 of the License Renewal Application and that none is required.**
- 2. Page showing strikeout of table reference to Cost-Benefit Analysis is included in RAI response.**

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Environmental Review RAI-4

RAI: *Modify Appendix E, Section 4.0, Dose to the Public, to provide the most current population data. The annual collective dose to the public is based on 1980s population data assuming a 20 percent growth in the number of residents.*

- 1. The environmental review performed for the Surry plant license renewal effort under 10CFR Part 54 was incorporated by reference into App. E of the ISFSI LRA.**
- 2. The collective dose to public was determined based on population and nearest resident location from 1980 data.**
- 3. Per the 2000 census, population within 2 miles of Surry has decreased.**
- 4. Nearest resident location remains unchanged.**
- 5. Re-evaluation of collective dose to public results in value 3 times lower than in original Environmental Report.**
- 6. LRA values are conservative and, therefore, have not been revised.**

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Environmental Review RAI-5

RAI: *Verify the location of the nearest permanent resident is valid as presented in Appendix E, Figure 4-1, Dose Rate for 84 Base-case Casks versus Distance.*

- 1. Nearest resident location verified on an annual basis.**
- 2. LRA and FSAR figures are correct.**

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Environmental Review RAI-6

RAI: *Provide an analysis for residual impacts or unavoidable adverse impacts which remain after mitigation measures have been applied in Section 6.2, Appendix E.*

- 1. Monitoring the site during license renewal period would be an on-going mitigation activity to assess potential impacts.**
- 2. Monitoring includes: Radiation monitoring, cask pressure monitoring, and fuel oil monitoring.**
- 3. To date, no effluent releases (radiological or non-radiological) since ISFSI began operation.**
- 4. There are no residual or unavoidable adverse impacts remaining after the mitigation measures of LRA Appendix E, Section 6.2 have been applied.**

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Environmental Review RAI-7

RAI: *Provide a description of the environmental impacts expected from the alternative actions which were considered in Chapter 7.0 Alternatives of Appendix E and complete Table 8-1 of Appendix E, where applicable.*

- 1. Dominion's understanding is that analysis of alternatives determined to be unreasonable is not required.**
- 2. This position is based on the wording in Regulatory Guide 4.2, 10CFR Part 51, and the Council of Environmental Quality (CEQ) requirements.**
- 3. A brief summary of why an alternative is not reasonable is provided in LRA Appendix E, Section 7. LRA Appendix E, Table 8-1 has been modified to include the brief statement to the same effect.**
- 4. A revised LRA Appendix E, Table 8-1 showing the added brief summary statements are included in the RAI response.**