UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 21, 2018

Mr. Bryan C. Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2 – REGULATORY AUDIT RE: RISK-INFORMED APPROACH TO LICENSE AMENDMENT REQUEST FOR CLOSURE OF GENERIC SAFETY ISSUE-191 (EPID L-2018-LLA-0222 AND EPID L-2018-LLE-0013)

Dear Mr. Hanson:

By application dated August 13, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18226A189), as supplemented by letter dated October 10, 2018 (ADAMS Accession No. ML18283A034), Exelon Generation Company, LLC (Exelon, the licensee) submitted a license amendment request (LAR), exemption request, and updated response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors," dated September 13, 2004 (ADAMS Accession No. ML042360586), for Calvert Cliffs Nuclear Power Plant, Units1 and 2 (Calvert Cliffs). The amendment would modify the Calvert Cliffs licensing bases, including the affected portions of the Technical Specifications and Updated Final Safety Analysis Report. Specifically, the amendment would allow the use of a risk-informed approach to address safety issues discussed in U.S. Nuclear Regulatory Commission (NRC) Generic Safety Issue-191, "Assessment of Debris Accumulation on PWR [Pressurized-Water Reactor] Sump Performance."

The NRC staff will perform a regulatory audit to support its review of the LAR in accordance with the enclosed audit plan. The audit will be conducted at Calvert Cliffs in Lusby, MD on January 29 – 31, 2019. A regulatory audit is a planned activity that includes the examination and evaluation of primarily non-docketed information. The audit will be conducted to increase the NRC staff's understanding of the LAR, verify information, and identify information that will require docketing to support the basis for the licensing decision regarding the LAR.

An online reference portal will be used by the NRC staff to prepare for the audit. The online reference portal will allow the NRC staff limited read-only access to licensee documents. Conditions for the online reference portal are described in the audit plan.

The enclosed audit plan identifies the documents that should uploaded to the portal. The NRC staff will request additional information that is needed to support the staff's regulatory decision using its normal process. If you have any questions, please contact me at Michael.Marshall@nrc.gov or 301-415-2871.

Sincerely,

Michael L. Marshall

Michael L. Marshall, Jr., Senior Project Manager
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-317 and 50-318

Enclosure:
Draft Audit Plan

cc: Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DRAFT AUDIT PLAN

RISK-INFORMED APPROACH TO LICENSE AMENDMENT REQUEST

FOR CLOSURE OF GENERIC SAFETY ISSUE-191

CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2

1.0 BACKGROUND

By application dated August 13, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18226A189), as supplemented by letter dated October 10, 2018 (ADAMS Accession No. ML18283A034), Exelon Generation Company, LLC (Exelon, the licensee) submitted a license amendment request (LAR), exemption request, and updated response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors," dated September 13, 2004 (ADAMS Accession No. ML042360586), for Calvert Cliffs Nuclear Power Plant, Units1 and 2 (Calvert Cliffs). The amendment would modify the Calvert Cliffs licensing bases, including the affected portions of the Technical Specifications (TSs) and Updated Final Safety Analysis Report. Specifically, the amendment would allow the use of a risk-informed approach to address safety issues discussed in U.S. Nuclear Regulatory Commission (NRC) Generic Safety Issue-191, "Assessment of Debris Accumulation on PWR [Pressurized-Water Reactor] Sump Performance."

2.0 REGULATORY AUDIT SCOPE

The scope of this audit includes the calculations, analysis, and supporting documentation described or referenced in the licensee's application, as supplemented. The intent of the audit is to gain an understanding of the licensee's application of the approach described in the application, as supplemented, including use of NRC staff guidance applicable to the resolution of Generic Letter 2004-02.

3.0 INFORMATION NEEDED

The appendix to this audit plan lists the specific topics and questions that the NRC staff plans to discuss with the licensee during the audit. The following is an initial list of documents or information that the NRC staff would like to have access to prior to, and during, the audit:

- Spreadsheet or database with the BADGER output of debris amounts and debris distribution for each postulated break for each weld

- Spreadsheet or database with the NARWHAL output of debris amounts and distributions, including chemical precipitates, after transport

Enclosure

- Spreadsheet or database of single-weld dynamic outputs for representative welds (e.g., welds and breaks that caused pump deaeration failure, and welds and breaks that caused limit exceedance failure)

- The document(s) that describe the different pump configurations analyzed in the risk-informed approach described in the application, as supplemented

The audit team will not remove non-docketed information from the audit site. NRC contractors will maintain control of proprietary materials in accordance with NRC procedures and non-disclosure agreements.

4.0 TEAM ASSIGNMENTS

The audit team will consist of:

- Steve Smith, Technical Reviewer
- Paul Klein, Technical Reviewer
- Matt Yoder, Technical Reviewer
- Dan Hoang, Technical Reviewer
- Victor Cusumano, Branch Chief
- Andrea Russell, Technical Reviewer
- Keith Tetter, Reliability and Risk Analyst
- Mehdi Reisi Fard, Team Leader
- Osvaldo Pensado, Contractor
- Stuart Stothoff, Contractor
- Michael Marshall, Project Manager

5.0 LOGISTICS AND AGENDA

The audit will be conducted at Calvert Cliffs in Lusby, Maryland, from Tuesday, January 29, 2019, to Thursday, January 31, 2019, with one exception: topics or questions concerning structural aspects of the application, as supplemented, will be audited remotely by telephone conference and online portal prior to January 29, 2018. Entrance and exit briefings will be held at the beginning and end of this audit, respectively.

The above initial list of documents should be made available to the NRC staff and its contractors via an online portal (or electronic reading room) at least 3 or 4 weeks prior to the start of the audit. During the audit, the NRC staff may request additional documents be made available via the online portal. NRC staff and contractor's access to the online portal should be terminated 2 weeks after the end of the audit.

Suggested Agenda

Tuesday, January 29

8:00 a.m.	Introductions and opening remarks
8:30 a.m.	Overview of audit questions and topics
10:00 a.m.	Break
10:15 a.m.	Review of information and discussions
12:00 p.m.	Lunch

1:00 p.m.	Continue review of information and discussions
2:00 p.m.	Break
2:15 p.m.	Continue review of information and discussions
4:00 p.m.	Wrap-up meeting

Wednesday, January 30

8:00 a.m.	Continue discussions
10:00 a.m.	Break
10:15 a.m.	Continue discussions
12:00 p.m.	Lunch
1:00 p.m.	List open questions
2:00 p.m.	Break
2:15 p.m.	Continue discussions
4:00 p.m.	Wrap-up meeting

Thursday, January 31

8:00 a.m.	Discussion of open questions
10:00 a.m.	Break
10:15 a.m.	Continue discussion of open questions
12:00 p.m.	Lunch
1:00 p.m.	Continue discussion of open questions
2:00 p.m.	Break and NRC break-out meeting
3:15 p.m.	Exit meeting
4:00 p.m.	Adjourn

The NRC project manager will coordinate any changes to the audit schedule, location, or agenda with the licensee.

6.0 SPECIAL REQUESTS

The NRC staff would like access to the following equipment and services during the audit:

- Enclosed conference room (or comparable work space) with a table, chairs, and white board
- Telephone with a speaker or speaker phone
- A projector and screen (or suitable blank wall)
- Access to wireless internet access (if available)
- A computer running the version of the NARWHAL and BADGER software used to support the approach described in the application, as supplemented

Exelon should establish an online portal that allows the NRC staff and contractors to access documents remotely. The following conditions associated with the online portal must be maintained throughout the duration that the NRC staff and contractors have access to the online portal:

- The online portal will be password-protected, and separate passwords will be assigned to the NRC staff and contractors who are participating in the audit on a need to know basis.

- The online portal will be sufficiently secure to prevent the NRC staff and contractors from printing, saving, or downloading any documents.
- Conditions of use of the online portal will be displayed on the login screen and will require acknowledgement by each user.

User name and password information should be provided directly to the NRC staff and contractors. The NRC project manager will provide Exelon the names and contact information of the NRC staff and contractors who will be participating in the audit. All other communications should be coordinated with the NRC project manager.

7.0 DELIVERABLES

Within 60 days of the exit of the audit, the NRC staff will prepare an audit summary documenting the information reviewed during the audit, and any significant observations. The audit summary may be made public after review of the submittal has been completed. If the NRC staff identifies information during the audit that is needed to support the staff's regulatory decision on the submittal, the NRC staff will issue request for additional information to the licensee after the audit.

Appendix – Topics and Questions for Discussion

General Information

(1) The delta core damage frequency (Δ CDF) is shown as 1.8 E-7/year (yr) in Attachment 1, Section 1.5, "Small Risk Increase," and Section 3 of Attachment 1-3. This is inconsistent with other places that show it to be 6.3 E-8/yr for the base case Δ CDF. (See Figure 3, Table 4, of Attachment 1-1, and Table 8 of Attachment 1-3.) Clarify which one is the actual base case value. Describe the difference between the two values, how each was developed, and the purpose of each.

(2) Explain the difference between base case and bounding strainer failure case in Attachment 1-1, Section 4.1, "Parametric Uncertainty." Why is the combined flow rate for the high pressure safety injection, low pressure safety injection, and containment spray system higher for the sensitivity cases? Why does the Δ CDF change? Is it solely due to the change in the loss-of-coolant accident (LOCA) frequency value used?

(3) Were any sensitivity cases performed to understand how the number of break orientations and break size increments affect the results? (See Attachment 1-1, Sections 4.2 and 4.3.) Justify that a finer resolution of jet angles would not result in a smaller critical break size or significantly affect Δ CDF. Provide the discrete break sizes considered in the debris generation analysis.

(4) Attachment 1-1, Section 8, "Reporting and Corrective Action," states that Calvert Cliffs must report conditions that would cause risk to enter Region 1 of Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis." The licensee states that any unacceptable changes in risk or reductions in defense-in-depth or safety margins that are identified will be reported to the NRC. However, the LAR does not describe the criteria used for this determination. Describe the criteria for identifying "unacceptable changes in risk or reductions in defense-in-depth or safety margins." Justify that other conditions like reduction of defense-in-depth or safety margin need not be reported. The exemption and submittal state that risk is very small, not small. The LAR also provides information regarding defense-in-depth and safety margins that will be considered by the NRC as the basis for its decision.

General Description of and Schedule for Corrective Actions

(5) Attachment 1-2, page 7 of 81, states a commitment to revise emergency operating procedures to limit flow to 2,900 gallons per minute (gpm). This change has not yet been completed by the plant. Provide the implementation schedule for this change.

Debris Generation/Zone of Influence (excluding coatings) (Attachment 1-2, Item 3b)

(6) The submittal lists the calcium silicate (Cal-Sil) zone of influence (ZOI) as 5.45 pipe diameter (D). This is inconsistent with the later centroid method that uses a 6.4D ZOI as shown in Table 5. Provide the ZOI used in the analysis.

(7) Cal-Sil is listed as a debris type and included in ZOI descriptions. However, no amount of Cal-Sil is listed as a LOCA-generated debris type. Discuss whether Cal-Sil is

generated by any break. If Cal-Sil may be generated, provide justification that it is unnecessary to consider it as a debris type that may affect long-term core cooling mitigation. The NRC staff notes that a discussion regarding removal and banding of Cal-Sil was included in the submittal. However, it appears that there is Cal-Sil remaining outside of 3.0D, but inside 5.45 or 6.4D, whichever is used in the analysis.

(8) The submittal states that mineral wool is assumed to have a ZOI of 4.0D. The NRC staff has concluded that this ZOI is acceptable for mineral wool encapsulated in Transco cassettes that are welded, not riveted. Confirm that the cassettes are of the welded type.

(9) Table 4 does not list any coatings as LOCA-generated debris. All other debris types (including latent debris), with the exception of chemical and those that contribute to sacrificial area, are included. The purpose of the table is not clear. Verify that coatings are appropriately accounted for in the debris source term.

Latent Debris (Attachment 1-2, Item 3d)

(10) Item 3d1 states that the latent debris load results used the maximum sample for each surface type with the exception of the non-stair grating where floor loading was used. Explain what is meant by this statement. Provide an overview of the methodology used to calculate the latent debris amount.

(11) Clarify that the latent debris calculation resulted in an amount of 150 pounds and that there is no margin included in the evaluation for latent debris.

Head Loss and Vortexing (Attachment 1-2, Item 3f)

(12) Item 3f1 states that the minimum calculated submergence occurs after the initiation of recirculation. Provide the minimum submergence at the start of recirculation. Provide the length of time it takes for the calculated submergence values to be attained. Justify that vortex formation or deaeration will not occur before the minimum submergence level is attained.

(13) Item 3f4 states that the second containment spray pump will be secured before the sump pool reaches 140 degrees Fahrenheit (°F). Describe how this action is assured. Describe the thermal hydraulic analyses that were used to ensure that the pump will be secured as described. How much time margin is there between reaching the pressure at which the pump is secured and reaching 140 °F? Also, see Attachment 1-3, Section 2.2, which states that the pump is secured when containment pressure reaches 4 pounds per square inch gauge (psig). How much time may elapse between reaching 4 psig in containment and the operator securing the pump?

(14) Attachment 1-3, Section 2.2, states that the strainer head loss is increased from the tested flow rate (2,400 gpm) to the anticipated flow rate (2,900 gpm) based on the difference in flow rate. Justify the method for performing this calculation considering that changes in the debris bed may also occur due to higher flow rates and differential pressures.

Net Positive Suction Head (Attachment 1-2, Item 3g)

(15) Item 3g5 shows that large break LOCA response appears to have a potential flow rate of 3,145 gpm if low pressure safety injection is running throttled at 800 gpm, high pressure safety injection is running at 620 gpm, and containment spray is running at 1,725 gpm (800+620+1,725=3,145). This is greater than the evaluated 2,900 gpm. Discuss the potential flow rates that may occur following the switch to recirculation and how it is ensured that the 2,900 gpm rate is not exceeded.

(16) Item 3g10 discusses the sump level calculation. Describe how the potential for holdup in the refueling canal was evaluated. Include a discussion of the potential for holdup due to resistance in the drain line or partial blockage of the drain line trash rack. Describe how it was determined that the trash rack would be effective in preventing blockage of the drain line and preventing holdup in the refueling canal. (Also, see Section 3.j.)

(17) For Item 3g10, provide the basis for the use of 7,500 gallons in accounting for moisture in the containment atmosphere plus spray droplets in transit from the spray nozzles to the pool. Provide the assumptions for the level calculations, including initial humidity in containment.

(18) Item 3g16 states deaeration is the limiting parameter for pump operation. However, Table 13 shows that net positive suction head (NPSH) margin for the containment spray pump is less than the deaeration limits listed in Table 12. Confirm that the potential for failure of a containment spray pump due to loss of NPSH margin is accounted for in the analysis.

Coatings (Attachment 1-2, Items 3c and 3h)

(19) According to Item 3c4, it appears that unqualified (never qualified) epoxy fails as 50 percent particulate, with the remainder in unknown form. It is possible that Calvert Cliffs can justify 50 percent failure of the unqualified epoxy based on the original equipment manufacturer testing referenced. The NRC staff disagrees that the coatings would fail as "strips or chips." The NRC staff guidance is that only "degraded qualified" epoxy should be credited as remaining in chip form after failure. The debris characteristics for degraded qualified coatings are based on the Comanche Peak Power Company LLC testing and represent robust epoxy coatings that remain in chip form after being subjected to simulated design basis accident testing in an autoclave. Filters analyzed during the original equipment manufacturer testing showed that unqualified coatings of any kind, including epoxy, fail as fine particulate.

(20) Item 3c4 cites Reference 8 (WCAP-16406), Table I-1, as the basis for the size distribution of unqualified coatings for downstream evaluations. Address the following issues with this assumption and provide the requested information:

a. The size distribution in Table I-1 of WCAP-16406 is based on testing of qualified coatings at Savannah River, not unqualified coatings.

b. The use of Table I-1 has not been accepted by the NRC staff, either in its safety evaluation on WCAP-16406, or in other coatings guidance. The NRC staff safety evaluation on WCAP-16406 states that debris generation and transport is outside the

scope of the safety evaluation and must be conducted on a plant-specific basis. Provide the basis for use of the reference.

c. In the downstream effects section of the Calvert Cliffs submittal, it is stated that all particulate is assumed to transport through the system and not deplete. Clarify whether the sizing from Table I-1 is used to justify any settling or filtering of coatings.

(21) Describe the treatment of the unqualified coatings in all aspects of the evaluation. Provide the assumed characteristics for each unqualified coating system or classification, and the amount of coating assumed to be in each size category. Provide the amounts assumed to remain on the substrate. Describe the transport and any filtering and settling assumptions for each size category

(22) Item 3h2 discusses the characteristics of failed coatings. It is not clear how degraded qualified epoxy is assumed to fail; 50 percent fails as chips, but it is not clear how the other 50 percent fails (or does not fail). Also, see Item 3h5, the last bullet, which does not state the characteristics of the failed coatings. The information from Section 3c4 is inconsistent with 3h2. The first statement in Item 3h2 would indicate that the 50 percent of unqualified epoxy that is assumed to fail will fail as fine particulate. If this is accurate, this can likely be justified. However, this contradicts the statement in Item 3c4 that the 50 percent of unqualified epoxy would fail as strips or chips. As stated above, regarding Item 3c4, it is unlikely that that the licensee could justify unqualified epoxy failing as chips.

(23) Item 3h4 states that the coatings surrogate for the test was scaled to ensure the same number of particles as the plant coating. Describe how this compares with scaling for volume.

Debris Source Term (Attachment 1-2, Item 3i)

(24) Item 3i3 states that an engineering standard for control of materials installed or left in containment is being prepared. Is this completed? Are other measures in place that would negate the need for this procedure?

(25) How are the amounts of aluminum in containment controlled?

Sump Structural Analysis (Attachment 1-2, Item 3k)

(26) Explain why some of the stress ratios are greater than 1 and why these are acceptable.

(27) Explain how the "Allowable MPa" was calculated in Tables 15 through 21 of Attachment 1-2.

(28) Describe how leak before break was determined to be applicable to eliminate the need to consider the dynamic effects of a LOCA.

(29) Explain why 3 hertz (Hz) was used for maximum horizontal acceleration vs. 4 and 5 Hz for operating basis earthquake and safe shutdown earthquake in Reference 3.

(30) Explain why the cartridge pocket bending stress (Level C) strain intensity for collapse load evaluations stress ratio equal to 1.56 is acceptable.

Downstream Effects – Components and Systems (Attachment 1-2, Item 3m)

(31) The application states that 10 micron coatings are assumed to transport through the system without depletion. How does this align with Section 3c that states that the coatings debris are sized per WCAP-16406?

Chemical Effects (Attachment 1-2, Item 3o and Attachment 1-2.2)

(32) Provide plant-specific attributes important to the chemical effects evaluations. For example, provide the pH ranges, aluminum amounts, and debris quantities considered in the analysis.

(33) Provide a discussion of Attachment 1-2.2 and its applicability to the Calvert Cliffs plant-specific conditions.

(34) Provide a discussion of the solubility credit taken in the Calvert Cliffs analysis and the basis for the temperature above which precipitation is not modeled.

(35) Discuss the sensitivity studies related to chemical effects.

Risk-Informed Basis (Attachment 1-3)

(36) The strainer acceptance criteria and methodology for determining whether the acceptance criteria are exceeded was not provided clearly. Describe how the data from the tests were used. Clarify which test(s) were used to determine head loss for the analysis. (See Attachment 1-2, Item 3f and Attachment 1-3, Sections 2.2 and 2.4.) Describe the process used to determine the head loss value used in the analysis, where the value is chosen from, and how this value is returned for use in the analysis. Discuss whether there are multiple modes of failure used in the analysis and how these are implemented. Refer to Table 5 of Attachment 1-3. Specifically, provide the following:

a. Explain the process to compute the head loss as a function of the various debris types and chemical precipitates in NARWHAL, focusing on relationship to strainer testing.

b. Explain contributions to head loss from various debris types.

c. Explain corrections related to approach flow velocity and temperature in relation to flow velocity and temperature used in testing.

d. Explain corrections related to testing strainer area and plant strainer area.

e. Provide a few examples of head loss vs. time curves to demonstrate the computation approach.

   i. The response by Southern Nuclear Operating Company to Request for Additional Information 16 regarding the Vogtle Electric Generating Plant – Units 1 and 2,dated February 12, 2018 (ADAMS Accession No. ML18045A094), is a good example to describe the approach to compute the head loss vs. time.

f. Define strainer test failure limits implemented in NARWHAL for all debris types.

(37) Provide a few examples of dynamic outputs by NARWHAL demonstrating the occurrence of deaeration failure (e.g., welds ISI 30-RC-11A-10, ISI 30-RC-11A-2, and ISI 30-RC-11A-3):

a. Provide examples of air flow rate foot (ft)3/minutes (min) vs. time.

b. Provide examples of void fraction vs. time.

c. Specify failure criteria to define strainer or pump failure by deaeration in NARWHAL.

(38) Attachment 1-3, Section 2.3, discusses the BADGER debris generation calculation. Describe how BADGER calculates latent debris amounts.

(39) Attachment 1-3, Section 2.4, discusses the NARWHAL risk quantification calculation. Describe the source for the NARWHAL calculation qualified coatings amounts that are stated to be added to the BADGER debris amounts.

(40) Attachment 1-3, Section 2.4, discusses the break locations that result in debris amounts sufficient to threaten strainer performance. Describe the 735 break locations in 72 welds that were identified as potentially able to challenge strainer performance. Discuss the parameters that define each location.

(41) Attachment 1-3, Table 5, lists the welds that may have breaks resulting in exceeding the strainer acceptance criteria. Describe the failure mechanism that results in failures of the breaks that do not list a debris exceedance criteria.

(42) Attachment 1-3, Table 8, provides the results of a fiber quantity sensitivity study. Provide the methodology used to determine debris operating margins in the sensitivity studies.

(43) Section 4 of Attachment 1-3 describes the sensitivity analysis.

a. Describe how the temperature pressure profiles affect risk. Describe whether the timing for securing a containment spray pump before reaching 140 °F is part of this sensitivity analysis.

b. Describe how the sensitivity for head loss determined that it is one of the five most risk-sensitive parameters.

c. Describe whether the sensitivity for precipitation temperature considers how changes to the temperature affect the ability to secure a containment spray pump prior to precipitation.

(44) The way the information is provided in Section 4 makes it difficult to understand and to determine the importance of each of the sensitivity studies. Describe each sensitivity study, the parameter(s) varied, and the name of the study as presented in the figures.

Provide the sensitivity study results using numerical values. Verify that all of the sensitivity studies are included in Figures 6 and 7.

Defense-In-Depth and Safety Margin (Attachments 1-1 and 1-4)

(45) Attachment 1-4, Section 3.6, provides a discussion regarding the number of breaks that could occur and the number of these that could result in strainer failure. Please discuss how the number of breaks that could occur and the number that could result in strainer failure are indicative of safety margin. Discuss how Figure 2 is indicative of safety margin, considering that the risk value is unaffected by breaks that are deterministically determined to be acceptable. Note that safety margin is the margin between the point at which failure is assumed to occur and the point at which failure would actually occur.

(46) Attachment 1-1, Section 8, states that defense-in-depth and safety margins are defined in Attachment 1-4 and that reductions in these will be reported to the NRC. What is the method used to ensure that there are no reductions in defense-in-depth and safety margins over time and to ensure that reductions are reported?

(47) Attachment 1-4, Section 4, Table 2, provides operating margins for unqualified epoxy and inorganic zinc. Describe how the margins, provided in square feet, are compared against a volume of coating that could deposit in the debris bed. The units do not appear to be applicable to a coatings or particulate acceptance criterion.

Probabilistic Risk Assessment (PRA) (Attachment 1-1)

(48) Section 1.3 states that sensitivity analysis for main steam and main feedwater pipe breaks is based on internal event PRA initiating events. Discuss whether seismic, internal fire, and internal flood-induced breaks were considered and how those breaks were evaluated in the sensitivity analysis. If seismic, internal fire, and internal flood breaks were not considered, justify their exclusion.

(49) Findings and Observation (F&O) 1-18 in Section 1.3 states, in part, that consideration of human-induced mechanisms as potential flood sources was not clear. Describe the human-induced mechanism considered in the Calvert Cliffs PRA that could be potential sources of flood inside containment.

(50) F&O IFFS-01 states, in part, that the internal flood-induced initiating events were not documented in a manner that facilitates PRA applications, upgrades, and peer review. Describe the sources of initiating event frequencies for floods inside containment.

(51) Section 2.7 states that the refueling water tank has a high confidence low probability of failure (HCLPF) of 0.15 grams (g), and the reactor coolant system (RCS) has a HCLPF of 0.4g, so core damage will be unpreventable, regardless of debris generation and strainer clogging. If the refueling water tank will be unavailable during seismically-induced LOCA due to failure prior to RCS break, has this been taken into account for the base core damage frequency (CDF) and base large early release frequency (LERF)? If seismic risk contribution was not included in total base risk, provide justification for exclusion, or update the total base risk to include the seismic risk contribution.

(52) Section 2.8 states that fire and other external events that contribute to CDF and LERF in the Calvert Cliffs PRA do not lead to large break LOCAs and were, therefore, screened. It is unclear whether the total risk reported in Section 1.5 includes the risk of internal fires. Clarify whether internal fire events were accounted for in the base CDF and base LERF. If internal fire risk contribution was not included in total base risk, provide

justification for exclusion, or update the total base risk to include the internal fire risk contribution.

Exemption Request (Attachment 2)

(53) The exemption request does not state that defense-in-depth and safety margin need to be maintained along with delta CDF.

License Amendment Request and Performance Monitoring Program (Attachment 3)

(54) In the TS changes, Action A includes the word "potential." This was removed from the Technical Specifications Task Force (TSTF) Traveler. This may be inconsistent with other similar TS changes.

(55) Section 4.1, Item 5, states that the surveillance requirements proposed in the new TSs provide adequate performance monitoring. Explain in detail the performance monitoring strategies that are met by the TSs. Is this intended to be monitoring to assure that the as-built plant and the Region I evaluation are consistent and the monitoring is done periodically? Attachment 1-1, Section 5, states that Calvert Cliffs has implemented procedures and programs related to GSI-191 concerns. What procedures and programs have been implemented and how do they specifically address GSI-191 concerns, both now and potential future concerns? Describe how this performance monitoring program meets the guidance in Regulatory Guide 1.174.

(56) Section 4.3 states that dose was considered in the assessment. Please identify sections of the submittal that discuss dose.

TS Bases Page Markups (Attachment 3-2)

(57) In the TS changes, there appears to be a typographical error in the proposed TS Bases for the containment sump (Applicability Section, first paragraph). It reads: "In MODEs 1 and 2, 3, and 4, containment emergency sump OPERABILITY requirements are dictated by the [emergency core cooling system] ECCS and containment spray OPERABILITY requirements. Containment spray has no OPERABILITY requirements in MODEs 3 with RCS pressure < 1750 psia, 4, 5, and 6." The numbers at the end (4, 5, and 6) do not make sense.

(58) In the proposed TS Bases changes, trash racks were not addressed in the definition of the sump (which conflicts with TSTF-567, Revision 1, "Add Containment Sump TS to Address GSI-191 Issues"). The licensee's definition is:

> The containment emergency sump is required to ensure a source of water to support ECCS and Containment Spray System OPERABILITY. A containment emergency sump consists of the containment drainage flow paths, the containment emergency sump strainer, and the inlet to the ECCS and containment spray system piping. An OPERABLE containment emergency sump has no structural damage or abnormal corrosion that could prevent recirculation of coolant and will not be restricted by containment accident generated and transported debris.

(59) In the proposed TS Bases changes, the Surveillance Requirement Bases include the word "strainers," which is inconsistent with TSTF-567, Revision 1. Revision 1 removed the word to make sure it reflects that ALL of the sump need to be inspected (all the sump is defined as the containment drainage flow paths, containment emergency sump strainer, and inlet to the ECCS and containment spray system piping).

Updated Final Safety Analysis Report Page Markups (Attachment 3-3)

(60) Table 6-12 in the Final Safety Analysis Report markup seems to be incorrect and missing some information. There is no row for qualified coatings. The values for fibrous debris appear to be much higher than the amounts tested. Explain how the values for the table were determined. Explain which debris types are intended to be included in the table. Explain how the units of square feet for coatings are applied to the strainer limits determined during testing that are based in volume.

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2 – REGULATORY AUDIT RE: RISK-INFORMED APPROACH TO LICENSE AMENDMENT REQUEST FOR CLOSURE OF GENERIC SAFETY ISSUE-191 (EPID L-2018-LLA-0222 AND EPID L-2018-LLE-0013) DATED DECEMBER 21, 2018

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