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10CFR52.79
10CFR52.63
10CFR50.12

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

LEVY NUCLEAR PLANT, UNITS 1 AND 2
DOCKET NOS. 52-029 AND 52-030
REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 121 RELATED TO SRP SECTIONS 6.2.5 AND 6.4 FOR THE LEVY NUCLEAR PLANT UNITS 1 AND 2 COMBINED LICENSE APPLICATION

References:
1) Letter from Donald Habib (NRC) to Christopher M. Fallon (DEF), dated September 24, 2014, "Request for Additional Information Letter No. 121 Related to Standard Review Plan Sections 6.2.5 and 6.4 for the Levy Nuclear Plant, Units 1 and 2 Combined License Application" (ML14259A096).

2) Letter from Christopher M. Fallon (DEF) to U.S. Nuclear Regulatory Commision (NRC), dated February 6, 2015, "Partial Response to Request for Additional Information Letter No. 121 Related to SRP Sections 6.2.5 And 6.4 for The Levy Nuclear Plant Units 1 and 2 Combined License Application", Serial: NPD-NRC-2015-001 (ML15040A470).

3) Letter from Christopher M. Fallon (DEF) to U.S. Nuclear Regulatory Commision (NRC), dated June 5, 2015, "Partial Response to Request for Additional Information Letter No. 121 Related to SRP Sections 6.2.5 And 6.4 for The Levy Nuclear Plant Units 1 and 2 Combined License Application", Serial: NPD-NRC-2015-014 (ML15161A041).

Ladies and Gentlemen:

Duke Energy Florida, Inc. (DEF) hereby submits a revised response to the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) question 06.04-2 (eRAI 7661) provided in Reference 1. An update to question 06.04-2 (eRAI 7661) is addressed in Enclosure 1 to this letter and supersedes the partial response previously sent by DEF to the NRC in letter NPD-NRC-2015-014 (Reference 3). This update provides a complete redline version of Enclosure 3 and provides clarification on the use of core design margin on pages 9 and 10 of Enclosure 1 and pages 63 and 64 of Enclosure 4.

The response to this RAI question requires a site-specific departure from the AP1000 Design Control Document (DCD) Revision 19 information. The Levy Nuclear Plant (LNP) Combined License Application (COLA) incorporates the AP1000 DCD by reference. The response also includes a departure from a DCD Tier 1 design description and DCD Technical Specifications. Thus a request for exemption and associated change description is provided in Enclosure 2.

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The proposed site-specific revisions to Tier 1 and Tier 2 Licensing Basis Documents are identified in Enclosure 3. The changes to the Final Safety Analysis Report and COLA Parts 4, 7 and 10 are identified in Enclosure 4 and will be included in a future update of the COLA.

If you have any further questions, or need additional information, please contact Bob Kitchen at (704) 382-4046, or me at (704) 382-9248.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on July 01, 2015.

Sincerely,

Christopher M. Fallon

Christopher M. Fallon
Vice President - Nuclear Development

Enclosures:

1. Revised response to NRC Letter 121 RAI Question 06.04-2 (eRAI 7661)
2. Request for Exemption Regarding Main Control Room Dose
3. Tier 1 and Tier 2 Licensing Basis Documents - Proposed Changes
4. Levy Nuclear Plant Units 1 and 2 COLA Revisions

cc (w/o enclosures): U.S. NRC Region II, Regional Administrator
cc (w/ enclosures): Mr. Donald Habib, U.S. NRC Project Manager

Levy Nuclear Plant Units 1 and 2 (LNP)
Response to NRC Request for Additional Information Letter No. 121
Question 06.04-2 (eRAI 7661), dated September 24, 2014

NRC RAI #	Duke Energy RAI #	Duke Energy Response
06.04-2	L-1135	Revised response enclosed – see following pages

NRC Letter No.: LNP-RAI-LTR-121

NRC Letter Date: September 24, 2014

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 06.04-2

Text of NRC RAI:

1. At a meeting with the NRC staff on July 23, 2014 (See ADAMS Accession Nos. ML14220A110, ML14220A111, ML14220A113), Westinghouse Electric Company presented some self-identified discrepancies in underlying calculations supporting the AP1000 DCD, Rev. 19, design basis accident main control room (MCR) habitability dose analyses. Westinghouse identified the need to update the analyses in order to show compliance with GDC-19 because

    the analyses did not account for the MCR emergency ventilation system (VES) filter direct dose in the control room,
    the control room ventilation system actuation setpoints did not account for all design basis accident (DBA) release scenarios, and
    the MCR dose contribution from direct radiation and skyshine used methodology that is not up-to-date.

10 CFR Part 50, Appendix A, "General Design Criteria;" 10 CFR 52.63, "Finality of standard design certifications;" and 52.97, "Issuance of Combined Licenses" provide the regulatory basis for the following questions. GDC-19 sets out criteria for maintaining a control room to safely operate the plant in normal and accident conditions. Subsection 52.63(a)(1)(4) applies because additional information is needed to ensure that a plant referencing the DCD complies with GDC-19. Subsection 52.97(a)(1) applies because the Commission must have sufficient information to find that all NRC regulations have been met.

1a. Provide a site-specific departure from the DCD that includes control room dose analyses for all DBAs that account for the previously unanalyzed VES filter direct dose contribution to the MCR dose.

1b. Are the radiation monitor setpoints incorporated by reference from DCD Rev. 19 set such that GDC-19 is met for all DBAs for the COL? If not, propose a resolution to the issue. Describe how you determined the answer to this question.

1c. Do you propose to make site-specific revisions to the direct radiation and skyshine dose calculations to use a more detailed analysis methodology as proposed by Westinghouse? Would such revised calculations be necessary to show compliance with GDC-19 for the COL?

2. At the July 23, 2014 meeting, Westinghouse also proposed related changes to the plant design information to add shielding for the main control room filters, increase the VES filter efficiency for organic iodine to 90 percent, and revise the VES and the Nuclear Island Nonradioactive Ventilation System (VBS) actuation radiation monitor setpoints.

In your COL application, do you propose to also make the design changes proposed by Westinghouse, or any other changes related to the Westinghouse self-identified discrepancies in the MCR dose analyses? Are any of these design changes required for the COL in order to show compliance with GDC-19?

Duke RAI ID# L-1135

DEF Response to NRC RAI:

Initially, DEF intended to ensure conformance with GDC-19 requirements using site-specific data contained in FSAR Table 2.0-202 of the LNP COLA. DEF subsequently determined that a more comprehensive change is required to correct the errors in the certified design and that the design change being developed by Westinghouse must be fully implemented. Revised calculations that are required to support this change have been completed. Main control room (MCR) dose calculations for large break loss-of-coolant accident (LOCA), main steam line break (MSLB), fuel handling accident, rod ejection accident, locked rotor accident, small line break outside containment and steam generator tube rupture (SGTR) design basis accident analyses have been completed and are reported in this submittal. In addition, the contribution from spent fuel pool boiling has been revised. The LNP COL application will incorporate the AP1000 generic design changes issued to address the discrepancies in the underlying calculations supporting the AP1000 DCD, Rev. 19, design basis accident MCR habitability dose analyses.

1a – The exemption required to support the proposed design changes is provided in Enclosure 2. Changes to incorporate the departures associated with all DBAs are provided in Enclosure 4.

1b –To ensure that GDC-19 is met for all design basis accidents, site-specific revisions to the radiation monitor setpoints will be included in the LNP COL application. These revised setpoints for MCR emergency habitability system (VES) actuation will be based upon concentrations for any particular monitoring channel (particulate or iodine) not exceeding an operator dose of 1 rem - regardless of release or accident scenario. This methodology will allow for airborne radioactivity in the control room to reach concentrations in each of the three channels at the setpoint and maintain compliance with GDC-19.

1c – Site-specific revisions for direct radiation and skyshine dose will be included in the LNP COL application. These revisions include updated direct radiation and skyshine dose calculations to account for MCR penetrations shielding differences between the AP1000 and AP600 designs. Accounting for the updated direct radiation and skyshine dose maintains compliance with GDC-19.

2 – A summary of site-specific revisions to fully address the errors identified in the certified design is provided below. The changes to the VES filter design, the initial conditions assumed for the MSLB, and the Technical Specification change to limit allowed secondary iodine activity are required to ensure compliance with GDC-19.

Summary of design changes
If high levels of particulate or iodine radioactivity are detected in the main control room supply air duct that could lead to exceeding General Design Criterion (GDC) 19 operator dose limits (5 rem), the protection and safety monitoring system (PMS) automatically actuates the VES to ensure compliance. The VES design includes a passive filtration feature consisting of a HEPA filter in series with a charcoal adsorber and a postfilter which work to remove particulate and iodine from the air to reduce potential control room dose during VES operation.

Scope/Extent of Departure:

During AP1000 design finalization, a number of issues were identified challenging the ability of the certified design to limit operator dose to less than 5 rem. In order to address these issues, site-specific revisions to the AP1000 design and associated dose consequence analyses presented in DCD Revision 19 are made to ensure that operator dose following a DBA is maintained below the 5 rem GDC limit for the duration of the event. Some design changes apply to all MCR design basis accidents and ventilation system alignments evaluated in DCD Section 6.4, while others are design basis accident specific.

A. Changes Impacting All MCR Design Basis Events

AP1000 generic changes impacting all MCR operator dose evaluations presented in DCD Section 6.4 and Chapter 15 required to address MCR dose analysis errors include:

1. Radiation contributions from HVAC filters were not considered in MCR dose calculation results reported in DCD Revision 19 Section 6.4. Regulatory Guide 1.183 indicates that these contributions should be considered in plant design. The radiological dose analyses are therefore revised to include direct radiation contributions from radioactive material postulated to accumulate on filters in the VES and VBS HVAC systems during design basis events.

2. In order to reduce the MCR operator direct radiation dose contribution from radioactive material postulated to accumulate on VES filter media during design basis events, shielding is added around the filters and is accounted for in the revised radiation analysis model. Consequence analyses considering filter contributions assume that control room occupants are located below these filters, using the defined occupancy factors (DCD Revision 19, Table 15.6.5-2, sheet 2 of 3).

3. In order to partially offset increases in calculated MCR operator dose due to consideration of direct radiation from VES filter media and other corrections identified in this response, the VES filter efficiency for organic iodine is increased from 30% to 90% (DCD Revision 19 Table 15.6.5-2, sheet 2 of 3). DCD Revision 19 post accident dose analyses applied an organic iodine filter efficiency of 30% to VES filtration units based on Regulatory Guide 1.52 Revision 2 and a conservative assumption that relative humidity within the MCR could exceed 95% following an accident. As part of AP1000 detailed design, environmental conditions have been evaluated to show that the humidity within the MCR is not expected to

exceed 95%. Further, humidity is not expected to exceed 60% within the first 72 hours of an event, the time frame during which the filter would be operating, or exceed 95% at any time post accident. Thus, the higher filter efficiency can be credited in the MCR dose analyses consistent with Regulatory Guide 1.52 Revision 2. Additionally, it is noted that the analyses model an "overall" efficiency for each chemical form being filtered (elemental, organic, particulate). This overall efficiency accounts for filter media sizing (e.g. charcoal bed depth) and the potential for bypass around the filter.

4. During AP1000 detailed design and re-evaluation of MCR doses to include consideration of HVAC filter contributions (Item A.1.), it was determined that the VBS radiation monitor setpoints applied in MCR dose calculations supporting DCD Revision 19 were not selected in a manner that a) ensures compliance with the GDC-19 for all postulated accident conditions including Design Basis Accidents (DBAs) evaluated in DCD Revision 19 Chapter 15, or b) fully supports the AP1000 design objective to use VBS supplemental filtration mode (SFM) when available rather than VES actuation to provide the MCR radiological protection function.

For postulated accident conditions involving a reduced source term or release rate other than evaluated for DBAs as part of the certified design, there may not be sufficient radioactivity within the MCR Envelope to prompt actuation of VES, and yet, enough radioactivity could exist that would lead to operator doses in excess of 5 rem without manual actuation. The radiation monitor setpoint values are therefore updated to ensure VBS or VES filtration mode actuation occurs for any radiological release event that could result in MCR operator doses in excess of GDC-19.

One of the fundamental objectives of VBS as described in DCD Revision 19 Section 9.4.1 is to "...minimize the potential for actuation of the main control room emergency habitability system...". This change uses a non-safety High-1 signal to actuate VBS SFM and the existing safety-related signal (High-2) to actuate VES in a manner that ensures High-2 would only be reached if VBS SFM was not functioning properly or is insufficient. This change also addresses release scenarios where high concentrations of particulates or iodine may exist with low levels of noble gas. If such a release occurred without this VBS setpoint logic change, direct VES actuation could be induced without the opportunity for VBS SFM to be actuated.

B. <u>Large Break Loss of Coolant Accident (LOCA) Dose Consequence Changes</u>

AP1000 generic changes impacting the LOCA MCR operator dose evaluations presented in DCD Sections 6.4 and 15.6.5 required to address MCR dose analysis errors include:

1. Dose contributions from adjacent structure direct and skyshine radiation included MCR operator dose results for LOCA as reported in

DCD Revision 19 are based upon AP600 post-accident dose calculations and assume the presence of shielding that was not included in the AP1000 design. Post-accident radiological dose calculations are therefore changed to use updated AP1000 detailed design inputs and analyses for skyshine and direct radiation. The added dose incurred by this change is partially offset by other proposed changes.

2. In order to partially offset increases in calculated MCR operator dose due to consideration of direct radiation from VES filter media and other corrections identified in this response, changes are made to the containment elemental iodine removal coefficient and re-suspension models supporting the DCD Revision 19 LOCA dose analysis.

Changes are made to the IRWST iodine re-evolution model. The changes involve a) the water/vapor partition factor modeled for elemental iodine and b) the timing associated with the conversion of elemental iodine to organic iodine and its availability for release. These refinements and modeling changes define the production of organic iodine based on re-evolved elemental iodine.

The iodine source term applied in the LOCA dose analysis supporting DCD Revision 19 is based upon the NUREG-1465 source term described in Regulatory Guide 1.183. The analysis models a staged release of core activity (i.e. gap release and early in-vessel) to the containment atmosphere over the first ~2 hours following the start of the event. The chemical form of iodine released is assumed to be 95% particulate, 4.85% elemental, and 0.15% organic, consistent with Regulatory Guide 1.183. Particulate removal via passive processes (i.e. diffusiophoresis, thermophoresis, and sedimentation) and elemental iodine removal via deposition are modeled. Organic iodine removal via processes other than decay or leakage from containment is not modeled.

Particulates removed to the containment shell are assumed to be washed off the shell by the flow of water resulting from condensing steam (i.e. condensate flow). The particulates may be either washed into the sump, which is controlled to a pH ≥7 post-accident or into the IRWST, which is not pH controlled post-accident. Due to the assumed conditions in the IRWST, the particulate iodine washed into the IRWST may chemically convert to an elemental form and re-evolve, subject to partitioning, as airborne. A portion (3%) of that airborne elemental iodine is then assumed to convert to an organic form. This is consistent with elemental organic split assumed for the initial release from the core (4.85/0.15 = 97/3) and is consistent the Regulatory Guide 1.183 guidance for other events.

The calculational approach to account for the iodine that is assumed to re-evolve from the IRWST post-LOCA is overly conservative in the certified design analysis. The certified design analysis applies a water-steam partition factor of 5 for elemental iodine and neglects the time dependent formation of organic iodine from elemental iodine; the organic iodine that would be formed over time is assumed to be present at time zero.

NUREG-1465 states that "It is unduly conservative to assume that organic iodine is not removed at all from containment atmosphere, once generated, since such an assumption can result in an overestimate of the long-term doses to the thyroid." The revised analysis approach applies a conservative water/vapor elemental iodine partition factor of 10, selected to conservatively bound the time-dependent partition factors calculated using the NUREG/CR-5950 models and IRWST temperature and pH as a function of time. Additionally, the conversion of elemental iodine to organic iodine is modeled on a time-dependent basis in which 3% of the evolved elemental iodine is assumed to convert to an organic form upon its release to containment. It is noted that this does not impact the percentage of iodine assumed to convert to the organic form.

The passive containment elemental iodine deposition removal coefficient is also increased from the 1.7 hr^{-1} value applied in DCD Revision 19 LOCA dose calculations to 1.9 hr^{-1}. The larger elemental iodine removal rate constant is calculated based on a larger containment deposition surface area documented during the AP1000 detailed design. The DCD Revision 19 elemental iodine removal rate constant was based on an assumed 219,000 ft^2 deposition surface area. Updated detailed design calculations have documented a 251,000 ft^2 deposition surface area.

C. Main Steam Line Break (MSLB) Dose Consequence Changes

AP1000 generic changes impacting the MSLB MCR operator dose evaluations presented in DCD Sections 6.4 and 15.1.5 required to address MCR dose analysis errors include:

1. The AP1000 steam line break accident analysis described in DCD Revision 19 assumes a 10 minute faulted steam generator (SG) blowdown based on a Hot Zero Power (HZP) SG mass released at an average rate. This HZP case is conservative for offsite dose. It was determined, however, that a full power SG mass could lead to SG dry-out occurring at ~200 seconds. Earlier dry-out is more limiting for the purposes of operator post-accident dose calculations. To ensure a conservative dose for both offsite and MCR, the HZP initial mass was retained, a bounding release rate was modeled until 300 seconds, and any remaining activity was released thereafter.

2. In order to offset increases in calculated MCR operator dose for MSLB due to consideration of a bounding release rate and other corrections identified in this response, the Technical Specification limit for secondary iodine activity is reduced from 0.1 to 0.01 microcurie/gram dose equivalent (DE) I-131 (Limiting Condition for Operation (LCO) 3.7.4).

The current Technical Specification (TS) limit for secondary iodine activity is 0.1 μCi/g dose equivalent (DE) I-131 (LCO 3.7.4). This is a standard value, however the TS bases refer to the steam line break analysis; in other words, the steam line break analysis defines the level of secondary activity that is acceptable. The maximum secondary activity is also limited by other TS limits. Specifically, the primary coolant specific activity concentration limit of 1 μCi/g DE I-131 (based on the design basis fuel defect of 0.25%) and the TS primary to secondary leakage limit of 300 gallons per day.

Using these values, the secondary side coolant activity is calculated to be 8.3E-4 μCi/g DE I-131, which is orders of magnitude below the current TS limit. The TS limit for secondary iodine activity is therefore revised from 0.1 μCi/g DE I-131 to 0.01 μCi/g DE I-131. The change does not impact the operational margin, as the secondary side specific activity is limited to values lower than the new proposed TS limit by the TS primary to secondary leakage limit and the design basis fuel defect. The revised value of 0.01 μCi/g DE I-131 is within the detection capability of existing instrumentation and is significantly above the typical secondary coolant activities observed at operating plants. No additional sampling or modifications to the frequency of LCO 3.7.4 are needed.

D. Rod Ejection Accident (REA) Dose Consequence Changes

AP1000 generic changes impacting the REA MCR operator dose evaluations presented in DCD Sections 6.4 and 15.4.8 required to address MCR dose analysis errors include:

1. The method for performing the REA dose analysis has changed from that applied in DCD Revision 19. As stated in NUREG-1793, the NRC accepted the use of NUREG-0800 Section 4.2 Revision 2 for design certification of the AP1000 plant. However, in NUREG-1793 Supplement 2 it is stated that:

> "For COL applicants or licensees who reference the AP1000 or AP600 certified designs, the staff will review any change or departure from the certified design that requires prior NRC approval as specified in Section VIII of Appendices C and D to 10 CFR Part 52, respectively.
>
> The staff will evaluate the reactivity-initiated accidents such as rod ejection accidents based on the acceptance criteria in effect 6 months before docketing the amendment request, such as the interim acceptance criteria specified in Appendix B to NUREG-0800 Section 4.2, Revision 3, if a change or departure in fuel design or other aspects is proposed that requires a reevaluation of final safety evaluation report Chapter 4, "Reactor," or Chapter 15, "Transient and Accident Analysis."

Due to the need to incorporate other design changes in the REA MCR operator dose calculations, NUREG-0800 Section 4.2 Revision 3 is used for recalculation of the rod ejection dose analysis, which results in a significant impact to the rod ejection dose analysis. NUREG-0800

Section 4.2 Revision 3 precludes fuel melt, providing a dose benefit, but also connects the source term to the fuel enthalpy increase, which is a significant dose penalty. The dominant contributor to the increased dose is the increase by a factor of more than 5 in alkali metal releases.

2. The full-power moisture carryover from the steam generators used in the AP1000 REA dose analysis was increased from 0.1% to 0.35%. This input is used to calculate alkali metal releases from the SGs in the AP1000 REA dose analysis. This input was updated to be consistent with the updated AP1000 plant design.

3. The REA dose analysis results are updated to account for a reduction in the Technical Specification limit for secondary iodine activity from 0.1 to 0.01 microcurie/gram dose equivalent (DE) I-131 as described for the updated MSLB analysis in Item C.2., above.

4. The radial peaking factor has been adjusted to a value of 1.75. This provides a more conservative input than the DCD Revision 19 value and provides additional future core design margin.

5. The passive containment elemental iodine deposition removal coefficient is also increased from the 1.7 hr^{-1} value applied in DCD Revision 19 LOCA dose calculations to 1.9 hr^{-1}. The larger elemental iodine removal rate constant is calculated based on a larger containment deposition surface area documented during the AP1000 detailed design. The DCD Revision 19 elemental iodine removal rate constant was based on an assumed 219,000 ft^2 deposition surface area. Update detailed design calculations have documented a 251,000 ft^2 deposition surface area.

E. Steam Generator Tube Rupture (SGTR) Dose Consequence Changes

AP1000 generic changes impacting the SGTR MCR operator dose evaluations presented in DCD Sections 6.4 and 15.6.3 required to address MCR dose analysis errors include:

1. The full-power moisture carryover from the intact steam generator used in the AP1000 SGTR dose analysis was increased from 0.1% to 0.35%. This input is used to calculate alkali metal releases from non-faulted SG in the AP1000 SGTR dose analysis. This input was updated to be consistent with the updated AP1000 plant design.

2. The full-power moisture carryover from the ruptured loop steam generator used in the AP1000 SGTR dose analysis was increased from 0.1% to 0.35%. This input is used to calculate alkali metal releases from the faulted SG in the AP1000 SGTR dose analysis. This input was updated to be consistent with the updated AP1000 plant design.

3. The SGTR results are updated to account for a reduction in the Technical Specification limit for secondary iodine activity from 0.1 to 0.01

microcurie/gram dose equivalent (DE) I-131 as described for the updated MSLB analysis in Item C.2., above.

F. Locked Rotor Accident Dose Consequence Changes

AP1000 generic changes impacting the locked rotor MCR operator dose evaluations presented in DCD Sections 6.4 and 15.3.3 required to address MCR dose analysis errors include:

1. The full-power moisture carryover from the steam generators used in the AP1000 locked rotor dose analysis was increased from 0.1% to 0.35%. This input was updated to be consistent with the updated AP1000 plant design.

2. The locked rotor results are updated to account for a reduction in the Technical Specification limit for secondary iodine activity from 0.1 to 0.01 microcurie/gram dose equivalent (DE) I-131 as described for the updated MSLB analysis in Item C.2., above.

3. The radial peaking factor has been adjusted to a value of 1.75. This provides a more conservative input than the DCD Revision 19 value and provides additional future core design margin.

G. Small Line Break Outside Containment Dose Consequence Changes

AP1000 generic changes impacting the small line break outside containment MCR operator dose evaluations presented in DCD Sections 6.4 and 15.6.2 required to address MCR dose analysis errors include:

1. The fraction of reactor coolant flashed was increased from the value used in DCD Revision 19 supporting calculations of 0.41 to 0.47 based on the updated detailed design. The certified design analysis used vessel average temperature (Tavg) as the basis for the flashing fraction. It was determined that the sample lines draw from the hot leg, thus, a hot leg temperature (which is greater than Tavg) was used.

H. Fuel Handling Accident (FHA) Dose Consequence Changes

AP1000 generic changes impacting the FHA MCR operator dose evaluations presented in DCD Sections 6.4 and 15.7.4 required to address MCR dose analysis errors include:

1. The radial peaking factor has been adjusted to a value of 1.75. This provides a more conservative input than the DCD Revision 19 value and provides additional future core design margin.

2. No unique accident specific changes.

In addition to the required changes summarized above, other generic changes associated with AP1000 detailed design are incorporated in revised MCR dose calculations. These include:

a) The MCR pressure boundary consists of the main control area, operator work area, mezzanine, operator break room, shift manager's office, kitchen area, and restrooms. The vestibule to enter the MCR and stairwell to the remote shutdown room is outside of the MCR pressure boundary. The MCR and MCR HVAC volumes are recalculated based on updated detailed design data, and are used as input to revised post-accident operator dose analyses.

b) The VBS normal operation to VBS SFM switchover time and the response time to actuate VES used in DCD Revision 19 supporting analyses have been determined to be non-bounding. The certified design analyses used assumed/expected values that were ultimately not supportable by the updated detailed design. System-level requirements are developed for switch over and response times; these system-level requirements account for sample transport time, radiation detector response time, I&C response times, and VBS/VES equipment actuations (e.g. valves, dampers, etc.). The dose analyses for cases considering VBS SFM are revised to include a longer delay time between the point when airborne radioactivity in the control room reaches the High-1 setpoint concentration and when the VBS SFM is operational. The dose analyses for cases considering VES are revised to include a longer response time between the point when the High-2 setpoint is reached and when the VES is operational.

c) DCD Revision 19 post accident dose calculations model a normal VBS inflow rate of 1925 cfm until MCR isolation. This is the path for the released activity to enter the MCR. This value is based on an assumed preliminary design value of 1750 cfm and adding a 10% penalty to account for instrumentation uncertainty. A VBS outside air intake flow rate calculated as part of detailed design indicates a nominal outside air flow rate of 1320 cfm. The normal VBS outside air flow rate assumption used in the accident operator dose calculations is therefore decreased accordingly. It is noted that during plant start-up, the HVAC system is balanced and dampers that have specific criteria under certain modes of operation are adjusted to have a preset position which can then be controlled from the MCR. To address a potential inaccuracy of the damper positioning, a nominal value of 1500 cfm is established for the normal VBS outside air flow rate. For dose analyses, the assumed normal VBS outside air flow rate will therefore be 1650 cfm, which corresponds to 1500 cfm +10%.

d) The VBS ancillary fan MCR air intake flow rate is also increased to 1900 cfm. The previous assumption of 1700 cfm had been specified as a minimum as part of the detailed design. For conservatism, the 1700 cfm was increased by 10% and rounded up to 1900 cfm.

Although these changes are considered as part of the updated MCR dose calculations, they are being implemented as general detailed design updates and are not specifically implemented to offset impacts of errors otherwise being addressed as part of this RAI response.

References:

None

Associated LNP COL Application Revisions:

See Enclosure 4