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NL-13-002

January 28, 2013

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Proposed Technical Specification Bases Changes to Credit Four Fan Cooler Units in Containment Integrity Analysis
Indian Point Unit Number 2
Docket No. 50-247
License No. DPR-26

Dear Sir or Madam:

Pursuant to 10 CFR 50.59, Entergy Nuclear Operations, Inc, (Entergy) hereby requests a change to the licensing basis for Indian Point Nuclear Generating Unit No. 2 (IP2). The proposed change will revise Technical Specification Bases to credit four rather than three fan cooler units in containment integrity analysis (the current analysis conservatively credits only three fan cooler units while four are available). A re-analysis of the Large Break Loss of Coolant Accident with credit for four fan cooler units for the limiting single failure was performed to address mass and energy release errors for containment integrity identified in Nuclear Safety Advisory Letter 11-5.

Entergy has evaluated the proposed change in accordance with 10 CFR 50.91(a)(1) using the criteria of 10 CFR 50.92(c) and determined that this proposed change involves no significant hazards as described in Attachment 1. The marked up Technical Specification Bases pages showing the proposed changes are provided in Attachment 2. The associated UFSAR changes will be made after approval using the 10 CFR 50.59 process. A copy of this application and the associated attachments are being submitted to the designated New York State official in accordance with 10 CFR 50.91.

Entergy requests approval of the proposed change within 12 months and an allowance of 30 days for implementation. There are no new commitments being made in this submittal. If you have any questions or require additional information, please contact Mr. Robert Walpole, Manager, Licensing at (914) 254-6710.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 28, 2013.

Sincerely,

JAV/ai

Attachments:
1. Analysis of Proposed Technical Specification Bases Changes to Credit Four Fan Cooler Units in Containment Integrity Analysis
2. Marked Up Technical Specification Bases Pages to Credit Four Fan Cooler Units in Containment Integrity Analysis

cc: Mr. Douglas Pickett, Senior Project Manager, NRC NRR DORL
Mr. William M. Dean, Regional Administrator, NRC Region 1
NRC Resident Inspectors
Mr. Francis J. Murray, Jr., President and CEO, NYSERDA
Ms. Bridget Frymire, New York State Dept. of Public Service

ATTACHMENT 1 TO NL-13-002

ANALYSIS OF PROPOSED TECHNICAL SPECIFICATION BASES CHANGES TO CREDIT FOUR FAN COOLER UNITS IN CONTAINMENT INTEGRITY ANALYSIS

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 2
DOCKET NO. 50-247

1.0 DESCRIPTION

Entergy Nuclear Operations, Inc (Entergy) is requesting a change to the licensing basis for Indian Point Nuclear Generating Unit No. 2 (IP2). The proposed change will revise the Technical Specification (TS) Bases to credit four rather than three fan cooler units (FCU) in containment integrity analysis. The current analysis of record credits only three fan cooler units as a conservatism - four fan cooler units are available for the limiting single failure.

A re-analysis of the large break loss-of-coolant accident (LOCA) was performed to correct methodology errors in the long-term mass and energy (M&E) releases for containment integrity analysis. Crediting four fan cooler units for the limiting single failure is necessary to maintain the peak containment pressure at about the same value as the current analysis of record.

The specific proposed changes are listed in the following section.

2.0 PROPOSED CHANGES

The proposed Bases changes are as follows:

Change page B 3.6.4-1 from:

> "This resulted in a maximum peak pressure from a LOCA of 45.82 psig."

To

> "This resulted in a maximum peak pressure from a LOCA of ≤ 45.82 psig."

and

> "The maximum containment pressure resulting from the worst case LOCA, 45.82 psig, does not exceed the containment design pressure, 47.0 psig."

To

> "The maximum containment pressure resulting from the worst case LOCA, does not exceed the containment design pressure, 47.0 psig."

Change page B 3.6.5-1 from:

> "The postulated DBAs are analyzed with regard to Engineered Safety Feature (ESF) systems, assuming the loss of one safeguards power train, which is the worst case single active failure, resulting in only one containment spray train and two fan cooler trains (i.e., at least three fan cooler units) being available to respond to the event."

To

> "The postulated DBAs are analyzed with regard to Engineered Safety Feature (ESF) systems, assuming the loss of one safeguards power train, which is

the worst case single active failure, resulting in only one containment spray train and two fan cooler trains (i.e., at least four fan cooler units) being available to respond to the event."

Change page B 3.6.6-4 from:

c) "One containment spray train and any two fan cooler trains (i.e., at least three fan cooler units).

This last configuration, one containment spray train and two fan cooler trains, is the minimum configuration available following the loss of any safeguards power train (e.g., diesel failure). One containment spray train is assumed to be available for iodine removal."

To

c) "One containment spray train and two fan cooler trains (i.e., four fan cooler units for the minimum safeguards, EDG 23 failure, and three fan cooler units for EDG 21/22 failure).

This last configuration, one containment spray train and two fan cooler trains, is the minimum configuration available following the loss of any safeguards power train (e.g., diesel failure). It should be noted that the case with EDG 23 failure, which has one more fan cooler unit than EDG 21/22 failure, is more limiting due to the availability of only one RHR pump and one containment spray train, which is assumed to be available for iodine removal."

Change page B 3.6.6-5 from:

c) "One containment spray train and any two fan cooler trains (i.e., at least three fan cooler units).

This last configuration, one containment spray train and two fan cooler trains, is the configuration minimum available following the loss of any safeguards power train (e.g., diesel failure and loss of offsite power). However, one containment spray train is assumed to function to improve iodine removal from the containment atmosphere (Ref. 7)."

To

c) "One containment spray train and two fan cooler trains (i.e., four fan cooler units for the minimum safeguards, EDG 23 failure, and three fan cooler units for EDG 21/22 failure).

This last configuration, one containment spray train and two fan cooler trains, is the minimum configuration available following the loss of any safeguards power train (e.g., diesel failure and loss of offsite power). It should be noted that the case with EDG 23 failure, which has one more fan cooler unit than EDG 21/22 failure, is more limiting due to the availability of only one RHR pump and one containment spray train, which is assumed to function to improve iodine removal from the containment atmosphere (Ref. 7)."

The marked up Technical Specification Bases pages showing these changes is in Attachment 2. The associated UFSAR changes will be made after approval using the 10 CFR 50.59 process.

3.0 BACKGROUND

Nuclear Safety Advisory Letter 11-05 (NSAL-11-05, Reference 1) identified Westinghouse methodology errors in the long-term mass and energy (M&E) releases during a large break loss-of-coolant accident (LOCA). These impacted containment integrity analysis for Indian Point Unit 2 (IP2).

The four issues listed below impact the IP2 long-term LOCA M&E release calculation utilizing the Westinghouse containment analysis methodology;

- The reactor vessel modeling did not include all the appropriate vessel metal mass available from the component drawings. This discrepancy results in an inaccurate vessel metal mass that affects the amount of reactor vessel stored energy initially available in the M&E model.

- The reactor vessel model did not include the appropriate amount of vessel metal mass in the reactor vessel barrel/baffle downcomer region. Differences were identified in the calculated metal mass and surface area input values. Increases in the barrel/baffle metal mass impact the initial energy stored within the reactor vessel.

- The long-term LOCA M&E release analysis was initialized at a non-conservative (low) steam generator (SG) secondary pressure condition. This input value determines the initial SG secondary side temperature and pressure used in the long-term LOCA M&E release calculations. The pressure at the exit of the SG outlet nozzle was incorrectly used as the SG secondary side pressure, as opposed to the correct, higher tube bundle pressure.

- An error was found in the EPITOME computer code that is used to determine the M&E release rate during the long-term (i.e., post-reflood) SG depressurization phase of the LOCA transient. The error results in an underestimated energy release in the long-term, post-reflood phase of the transient.

The analysis of record (AOR) peak containment pressure is 40.62 psig for the double-ended hot leg (DEHL) break and 45.71 psig for the double-ended pump suction (DEPS) break, respectively (Reference 2).

4.0 TECHNICAL ANALYSIS

Westinghouse re-analyzed the containment integrity analysis with the errors identified in Section 3.0 corrected in the long-term LOCA M&E model. Further, the re-analysis credited four FCU's rather than the 3 FCU's in the current analysis of record.

The analysis of record for containment integrity is based on the limiting single failure of 23 emergency diesel generator (EDG) coincident with loss of offsite power. As noted in FSAR Section 14.3.5.3.7 "For the minimum safeguards case, the single failure assumed is the loss of one emergency diesel generator, which results in the loss of the pumped safety injection (i.e., one residual heat removal pump and one safety injection pump) and the loss of the containment safeguards on that diesel. For further conservatism, an additional containment fan cooler unit is assumed to be unavailable, thus limiting the assumed available containment safeguards to three fan cooler [units] and one spray pump." Although four FCU's are available for this case only three fan cooler units have been credited historically.

The failure of the 23 EDG results in the failure of high head safety injection (HHSI) pump 23, residual heat removal (RHR) pump 22, Recirculation pump 22 , FCU 25 and containment spray (CS) pump 22. The single failure of EDG 21 or EDG 22 does not present a more limiting case. Failure of the 21 EDG results in failure of HHSI 21, Recirculation Pump 21, FCU 21 and 22 and CS pump 21. While only 3 FCU's are available for this case, it is less limiting than EDG 23 failure due to the availability of 2 RHR pumps. The failure of the 22 EDG results in the failure of HHSI pump 22, RHR pump 21, as well as FCU 23 and 24. This case is also less limiting than EDG 23 failure due to the availability of 2 CS pumps.

The Technical Specifications are based on trains and are adequate to ensure that the four FCU's remain operable. They are the same as Indian Point 3, which assumes 4 FCU's in the analysis.

The peak containment pressure after the error corrections and with credit for four FCU's, results in 40.72 psig for the DEHL break and 45.44 psig for the DEPS break (Reference 3). As shown in Table 1 below, the most limiting peak containment pressure is slightly lower than the AOR. There are no changes to design, no changes to operating procedures and the revised analysis is consistent with the plant configuration for equipment availability and the peak containment pressure remains well below the design pressure of 47 psig.

Table 1 - Comparison of Peak Containment Pressure

Peak Containment Pressure	Analysis of Record [psig]	Error Correction and credit for 4 FCU [psig]
Double-Ended Hot Leg (DEHL) Break	40.62	40.72
Double-Ended Pump Suction (DEPS) Break	45.71	45.44

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

Entergy has evaluated the safety significance of the proposed change to the Indian Point 2 Licensing Basis which revises portions of the Technical Specification Bases to credit four rather than three fan cooler units. The proposed changes have been evaluated according to the criteria of 10 CFR 50.92, "Issuance of Amendment". Entergy has determined that the subject changes do not involve a Significant Hazards Consideration as discussed below, but require prior NRC approval:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   No. The proposed change would not change the current limiting EDG failure but would credit four rather than three fan cooler units for containment heat removal. Four fan cooler units are available after the single failure. The fan cooler units are not accident initiators so the probability of an accident does not increase. Crediting all four fan cooler units will keep the post accident containment pressure within current limits and therefore does not increase the probability or consequences of a previously evaluated accident, but is a change from the analyses approved by the NRC during stretch power uprate.

   Therefore the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

   No. There are no changes to design, no changes to operating procedures, and the revised licensing basis change is consistent with the available equipment following the postulated worst case single failure.

   Therefore the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   No. The change reflects the credit for equipment that was always available but not previously credited (as a conservatism) in the licensing basis analyses. With credit for four fan cooler units, the post accident containment pressure remains within current limits and there is no reduction in a margin of safety.

   Therefore the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, Entergy concludes that the proposed amendment to the Indian Point 2 Licensing Basis presents no significant hazards consideration under the standards set forth in 10 CFR 50.92 (c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 <u>Applicable Regulatory Requirements / Criteria</u>

The plant will continue to meet Criterion 2 of 10 CFR 50.36 which says "A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." The plant will also remain in compliance with 10CFR 50, Appendix A, GDC 38, "Containment Heat Removal," as discussed in the FSAR. The current analysis of record is based on the license amendment request for power uprate (Reference 4) which was approved as Amendment 241 by the NRC in Reference 2. The same methods were used in the re-analysis as was done for Stretch Power Uprate in Reference 4, which contained a proprietary report, Reference 5, with the Licensing basis analysis. Section 6.5.3.7.2 of Reference 5 stated: "The minimum safeguards case was based upon a diesel train failure, DG23, (which leaves available as active heat removal systems: 1 containment spray pump and 4 RCFCs. However, only 3 RCFCs were credited for the DEPS break with minimum ECCS flows."

As discussed above, the revised analysis assumes four FCU's are available which is the number of FCU's that would be available for the minimum safeguards case.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.3 Environmental Considerations

The proposed changes to the IP2 Licensing Basis do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 PRECEDENCE

Indian Point 3 analysis of record which is analyzed with the worst single failure being EDG 32, has similar equipment available as Indian Point 2 with failure of EDG 23. The IP3 analysis as submitted in Reference 6 and approved by the NRC in Reference 7, credits four fan cooler units.

7.0 REFERENCES

1. Nuclear Safety Advisory Letter, "Westinghouse LOCA Mass and Energy Release Calculation Issues," NSAL-11-5, dated July 25, 2011.

2. NRC Letter to Entergy, Indian Point Nuclear Generating Unit No 2 - Issuance of Amendment Re: 3.26 percent Power Uprate (TAC No. MC1865), October 27, 2004.

3. Letter from Edward P. Shields (Westinghouse) to Nasser Nik (Entergy), "LOCA Mass and Energy Analysis," IPP-11-23, dated December 22, 2011.

4. Entergy Letter NL-04-005 to NRC, "Proposed Changes to Technical Specifications: Stretch Power Uprate Increase of Licensed Thermal Power (3.26%)," dated January 29, 2004.

5. Indian Point Nuclear Generating Unit No. 2 Stretch Power Uprate NSSS and BOP Licensing Report, WCAP-16157-P, dated January 2004 (Section 6.5.3).

6. Indian Point Nuclear Generating Unit No. 3 Stretch Power Uprate License Amendment Request Package, WCAP-16212-P, dated June 2004 (Section 6.5.3).

7. NRC Letter to Entergy, Indian Point Nuclear Generating Unit No 3 - Issuance of Amendment Re: 4.85 Percent Stretch Power Uprate and Relocation of Cycle-Specific Parameters (TAC No. MC3552), March 24, 2005.

ATTACHMENT 2 TO NL-13-002

MARKED UP TECHNICAL SPECIFICATION BASES PAGES TO CREDIT FOUR FAN COOLER UNITS IN CONTAINMENT INTEGRITY ANALYSIS

Changes indicated by lineout for deletion and Bold/Italics for additions

Unit 2 Affected Pages:
B 3.6.4-1
B 3.6.5-1
B 3.6.6-4
B 3.6.6-5

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 2
DOCKET NO. 50-247

B 3.6 CONTAINMENT SYSTEMS

B 3.6.4 Containment Pressure

BASES

BACKGROUND

The containment pressure is limited during normal operation to preserve the initial conditions assumed in the accident analyses for a loss of coolant accident (LOCA) or steam line break (SLB). The containment can withstand an internal vacuum of 3 psig. The 2.0 psig vacuum specified as an operating limit avoids any difficulties with RCP motor cooling.

Containment pressure is a process variable that is monitored and controlled. The containment pressure limits are derived from the input conditions used in the containment functional analyses and the containment structure external pressure analysis. Should operation occur outside these limits coincident with a Design Basis Accident (DBA), post accident containment pressures could exceed calculated values.

APPLICABLE SAFETY ANALYSES

Containment internal pressure is an initial condition used in the DBA analyses to establish the maximum peak containment internal pressure. The limiting DBAs considered, relative to containment pressure, are the LOCA and SLB, which are analyzed using computer pressure transients. The worst case LOCA generates larger mass and energy release than the worst case SLB. Thus, the LOCA event bounds the SLB event from the containment peak pressure standpoint (Ref. 1).

The initial pressure condition used in the containment analysis was 16.7 psia (2.0 psig). This resulted in a maximum peak pressure from a LOCA of ≤ 45.82 psig. The containment analysis (Ref. 1) shows that the maximum peak calculated containment pressure, P_a, results from the limiting LOCA. The maximum containment pressure resulting from the worst case LOCA, ~~45.82 psig,~~ does not exceed the containment design pressure, 47.0 psig.

The containment can withstand an internal vacuum of 3 psig. The 2.0 psig vacuum specified as an operating limit avoids any difficulties with RCP motor cooling.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.5 Containment Air Temperature

BASES

BACKGROUND

The containment structure serves to contain radioactive material that may be released from the reactor core following a Design Basis Accident (DBA). The containment average air temperature is limited during normal operation to preserve the initial conditions assumed in the accident analyses for a loss of coolant accident (LOCA) or steam line break (SLB).

The containment average air temperature upper limit is derived from the input conditions used in the containment functional analyses and the containment structure external pressure analyses. This LCO ensures that initial conditions assumed in the analysis of containment response to a DBA are not violated during unit operations. The total amount of energy to be removed from containment by the Containment Spray and Cooling systems during post accident conditions is dependent upon the energy released to the containment due to the event, as well as the initial containment temperature and pressure. The higher the initial temperature, the more energy that must be removed, resulting in higher peak containment pressure and temperature. Exceeding containment design pressure may result in leakage greater than that assumed in the accident analysis. Operation with containment temperature in excess of the LCO limit violates an initial condition assumed in the accident analysis.

APPLICABLE SAFETY ANALYSES

Containment average air temperature is an initial condition used in the DBA analyses that establishes the containment environmental qualification operating envelope for both pressure and temperature. The limit for containment average air temperature ensures that operation is maintained within the assumptions used in the DBA analyses for containment (Ref. 1).

The limiting DBAs considered relative to containment OPERABILITY are the LOCA and SLB. The DBA LOCA and SLB are analyzed using computer codes designed to predict the resultant containment pressure transients. No two DBAs are assumed to occur simultaneously or consecutively. The postulated DBAs are analyzed with regard to Engineered Safety Feature (ESF) systems, assuming the loss of one safeguards power train, which is the worst case single active failure, resulting in only one containment spray train and two fan cooler trains (i.e., at least ~~three~~ ***four*** fan cooler units) being available to respond to the event.

BASES

BACKGROUND (continued)

Requirements for the five fan cooler units are designated by grouping the 5 fan cooler units into three trains based on the safeguards power train needed to support OPERABILITY. This results in the following designations:

Fan Cooler Train 5A consists of FCU 21 and FCU 22;

Fan Cooler Train 2A/3A consists of FCU 23 and FCU 24; and

Fan Cooler Train 6A consists of FCU 25.

Design assumptions regarding containment air cooling are met by any of the following configurations:

a) Two containment spray trains; or,

b) Three fan cooler trains (i.e., five fan cooler units); or,

c) One containment spray train and ~~any~~ two fan cooler trains (i.e., ~~at least three fan cooler units~~ ***four fan cooler units for the minimum safeguards, EDG 23 failure, and three fan cooler units for EDG 21/22 failure***).

This last configuration, one containment spray train and two fan cooler trains, is the minimum configuration available following the loss of any safeguards power train (e.g., diesel failure). ***It should be noted that the case with EDG 23 failure, which has one more fan cooler unit than EDG 21/22 failure, is more limiting due to the availability of only one RHR pump and*** ~~O~~one containment spray train***, which*** is assumed to be available for iodine removal.

APPLICABLE SAFETY ANALYSES

The Containment Spray System and FCUs limit the temperature and pressure that could be experienced following a DBA. The limiting DBAs considered are the loss of coolant accident (LOCA) and the steam line break (SLB). The LOCA and SLB are analyzed using computer codes designed to predict the resultant containment pressure and temperature transients. No DBAs are assumed to occur simultaneously or consecutively. The postulated DBAs are analyzed with regard to containment ESF systems, assuming the loss of one safeguards power train, which is the worst case single active failure and results in one train of the Containment Spray System and one train of FCUs being rendered inoperable.

BASES

APPLICABLE SAFETY ANALYSES (continued)

Bases for LCO 3.6.4, "Containment Pressure," and LCO 3.6.5, "Containment Air Temperature," for a detailed discussion.) The analyses and evaluations including assumptions and methodologies are contained in References 3, 4 and 5. The analyses also assume a response time delayed initiation to provide conservative peak calculated containment pressure and temperature responses.

For certain aspects of transient accident analyses, maximizing the calculated containment pressure is not conservative. In particular, the effectiveness of the Emergency Core Cooling System during the core reflood phase of a LOCA analysis increases with increasing containment backpressure. For these calculations, the containment backpressure is calculated in a manner designed to conservatively minimize, rather than maximize, the calculated transient containment pressures in accordance with 10 CFR 50, Appendix K (Ref. 2).

The modeled Containment Spray System actuation from the containment analysis is based on a response time associated with exceeding the containment High-High pressure setpoint to achieving full flow through the containment spray nozzles. The Containment Spray System total response time includes diesel generator (DG) startup (for loss of offsite power), block loading of equipment, containment spray pump startup, and spray line filling.

Containment cooling train performance for post accident conditions is given in References 3, 4 and 5. The result of the analysis is that Containment air cooling requirements are met by any of the following configurations:

a) Two containment spray trains; or,

b) Three fan cooler trains (i.e., five fan cooler units); or,

c) One containment spray train and ~~any~~ two fan cooler trains (i.e., ~~at least three fan cooler units~~ ***four fan cooler units for the minimum safeguards, EDG 23 failure, and three fan cooler units for EDG 21/22 failure***).

This last configuration, one containment spray train and two fan cooler trains, is the ~~configuration~~ minimum ***configuration*** available following the loss of any safeguards power train (e.g., diesel failure and loss of offsite power). ***It should be noted that the case with EDG 23 failure, which has one more fan cooler unit than EDG 21/22 failure, is more limiting due to the availability of only one RHR pump and*** ~~However,~~ one containment spray train, ***which*** is assumed to function to improve iodine removal from the containment atmosphere (Ref. 7).