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March 31, 2009

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

Subject: Duke Energy Carolinas, LLC (Duke)
Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413, 414
2008 10CFR50.59 Summary Report

Attached please find a report containing a brief description of changes, test, and experiments, including a summary of the safety evaluation for each, for Catawba Nuclear Station, Units 1 and 2 for the year 2008. This report is submitted pursuant the provisions of 10CFR50.59(d)(2) and 10CFR50.4.

If there are any questions regarding this report, please contact A. Jones-Young at (803) 701-3051.

Sincerely,

James R. Morris

Attachments

IE47
NRR

xc (with attachment):

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CNS Date File	CN01SA

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NCMPA-1
NCEMC
RMPA

A/R Number: 00223475

Facility: CATAWBA NUCLEAR STATION

Unit(s): 1

Activity Title: Catawba Unit 1 Cycle 18 (C1C18) Reload Design

Summary

This activity installs the core designed for Catawba Nuclear Station Unit 1 Cycle 18. The C1C18 Reload Design Safety Analysis Review (REDSAR), performed in accordance with Engineering Directives Manual EDM-501, "Engineering Change Program for Nuclear Fuel", and the C1C18 Reload Safety Evaluation confirm the UFSAR accident analyses remain bounding with respect to predicted C1C18 safety analysis physics parameters (SAPP), and fuel thermal and mechanical performance limits. The SAPP method is described in topical report DPC-NE-3001-PA, "Multidimensional Reactor Transients and Safety Analysis Physics Parameters Methodology."

The C1C18 core reload is similar to past cycle core designs, with a design generated using NRC approved methods. The C1C18 Core Operating Limits Report (COLR) was prepared in accordance with Technical Specification 5.6.5. Additionally, applicable Technical Specifications and the UFSAR have been reviewed and no changes are required for the operation of C1C18. This 10CFR50.59 evaluation concluded that no prior NRC approval is necessary for C1C18 operation.

A/R Number: 00220632

Facility: CATAWBA NUCLEAR STATION

Unit(s): 1,2

Activity Title: Updates to UFSAR 1.8.1.19 and UFSAR 15.6.5.3 and Table 15-40 1) Updates to the Alternative Source Terms analysis of the design basis loss of coolant accident (LOCA) at Catawba Nuclear Station. 2) Update to the calculation of post LOCA control room radiation dose.

Summary

A set of updates to the Catawba UFSAR has been prepared to report a revised baseline Alternative Source Term (AST) analysis of the Catawba design basis LOCA. The updates primarily are made to Updated Final Safety Analysis Report (UFSAR) 15.6.5.3 (Environmental Consequences of the loss of coolant accident - LOCA) and Table 15-40. Some additional updates are made to UFSAR 1.8.1.19 and 6.2.3.3. The updates and revised supporting calculations incorporate several following changes:

1) A revision to the direct control room radiation dose from external sources (UFSAR 1.8.1.19).
2) Repartitioning containment leakage to 60% from the lower compartment and 40% from the upper compartment (UFSAR 15.6.5.3).
3) Revisions to the containment spray time constants based on a revision to the simulation of auxiliary containment spray (UFSAR Table 15-40).
4) Increased iodine partition fractions for Engineered Safety Features backleakage to the Refueling Water Storage Tank (RWST) based on resetting the RWST inventory at the initiation of backleakage of fission products to the low-low level setpoint (UFSAR Table 15-40).
5) Revised post LOCA radiation doses (UFSAR 15.6.5.3 and Table 15-40).

No modification or procedure change is associated with this set of updates.

All of these updates except Update 5 are associated with changes to the analysis input. Updates 1 and 5 involve revisions to the resultant post LOCA radiation doses. The updated post LOCA radiation doses are increased from the corresponding baseline values. However, it was found that the increase in each post LOCA radiation dose was not more than a minimal increase in the consequences of an accident previously evaluated in the UFSAR. Likewise, neither is the increase in each post LOCA radiation dose more than a minimal increase in the consequences of a malfunction of a system, structure, or component important to safety previously evaluated in the UFSAR. The set of updates meets these two criteria and (as can be shown in a straight forward manner) the remaining criteria of 10 CFR 50.59 for placement in the UFSAR without prior NRC approval.

A/R Number: 00220627

Facility: CATAWBA NUCLEAR STATION

Unit(s): 1,2

Activity Title: Updates to UFSAR 15.6.5.3 (Two updates - see below) Revise assumption pertaining to post LOCA containment leakage to the annulus Revise the assumption in UFSAR 15.6.5.3 pertaining to containment leakage to the annulus. Revise UFSAR 15.6.5.3 to add the direct radiation (shine) constituent (UFSAR 1.8.1.19) and effluent constituent (Table 15-40 to the post LOCA control room radiation dose.

Summary

The Alternative Source Terms (AST) analysis of the design basis loss of coolant accident (LOCA) at Catawba Nuclear Station is reported in UFSAR 15.6.5.3. A set of two updates to the text of UFSAR 15.6.5.3 have been prepared as follows:

1) The assumption concerning containment leakage to the annulus following a LOCA has been revised. Per the revision, it is assumed that containment leakage entering the annulus mixes with 50% of the air therein (UFSAR 15.6.5.3).

2) The "shine" constituent to the radiation dose in the control room following a LOCA is reported in UFSAR 1.8.1.19. This shine constituent is added to the effluent constituent reported in Table 15-40 to obtain the total radiation dose in the control room following the LOCA.

These are changes to the methodology of the AST analysis and as such were evaluated against the criterion of 10 CFR 50.59(c)(2)(viii). The assumption pertaining to containment leakage entering the annulus is a methodological element approved by the NRC. Adding the shine and effluent constituent to obtain the post LOCA control room radiation dose is conservative. It also conforms to the germane regulatory position in the NRC Staff guidelines for AST analyses. Neither results in a departure from a method of evaluation described in the UFSAR used in establishing the design basis or in the safety analysis.

A/R Number: 00220524

Facility: CATAWBA NUCLEAR STATION

Unit(s): 1,2

Activity Title: Update to UFSAR 6.2.3.3 percentile low — Reset the assumed outside air temperature from 95th percentile low to 99th

Summary

An update to UFSAR 6.2.3.3 has been prepared. This section of the UFSAR reports the analysis of post LOCA conditions in the annulus of a Catawba unit and the response of its Annulus Ventilation System. By this update, the outside air temperature was reset from the 95th low percentile to the 99th low percentile.

This update involves a revision in an evaluation methodology described in the UFSAR that is used in a safety analysis. As such, it was evaluated only against 10 CFR 50.59 (c)(2)(viii). Taking a low value for outside air temperature is conservative. Taking the 99th percentile low in place of the 95th percentile low is conservative. This update does not involve a departure from a method of evaluation described in the UFSAR used in establishing the design basis or in the safety analysis. The update may be inserted in the UFSAR without prior approval from the NRC.

A/R Number: 00225215

Facility: CATAWBA NUCLEAR STATION

Unit(s): 1,2

Activity Title: Update to UFSAR 15.3.3.3 and Tables 15-14 & 15-22 The updates report an Alternative Source Term (AST) analysis of the locked rotor accident (LRA) at Catawba with offsite power available and a Minimum Safeguards failure. The updates also report revised post LRA offsite radiation doses (based on a revised AST analysis of the LRA with loss of offsite power and a Minimum Safeguards failure).

Summary

A set of updates to UFSAR 15.3.3.3 has been prepared to report the Alternative Source Terms (AST) analysis of an additional locked rotor accident (LRA) scenario at Catawba Nuclear Station. This scenario is the Catawba LRA with offsite power available and a Minimum Safeguards failure. The AST analysis of this Catawba LRA scenario more completely accounts for the effects of this single failure following the Catawba LRA with offsite power available on the on-line Control Room Area Ventilation System pressurized filter train. The supporting transient thermal-hydraulics analysis also was revised to more fully account for the effects of a single failure of a motor driven Auxiliary Feedwater pump on the intervals of tube bundle uncovery in the steam generators. Finally, the assumed fraction of fuel pin clad failure (induced by departure from nucleate boiling) was revised from 0.5% for Unit 1 and 2 % for Unit 2 to 1% for each nuclear unit.

The UFSAR updates were classified as virtual plant modifications (no actual modifications were made in connection with these updates). Neither any change in the probability of any currently evaluated failure nor any new failure mode is implied. The revised post LRA radiation doses both at offsite locations and in the control room reported in the updates do not represent more than a minimal increase in the consequences of this design basis event. The updates may be inserted into the UFSAR without prior NRC approval.

A/R Number: 00244810

Facility: CATAWBA NUCLEAR STATION

Unit(s): 1/2

Activity Title: FUEL MANIPULATOR CRANE UPGRADES See PIP C-08-06774 CD100851CSF CD100851CRC CD200852CSF CD200852CRC

Summary:

This modification resolves reliability and obsolescence problems confronting the refueling machines (manipulator cranes) in the reactor containment and spent fuel building. The power and control systems are upgraded, including the position sensors, motor drives, control consoles, and wiring. The existing analog controls are replaced using a digital programmable logic controller (PLC) with a graphic user interface (GUI). The PLC can be programmed in advance with the refueling sequence, and the step-wise destinations of each fuel assembly.

The PLC controls allow multi-axial travel (in the x-y dimensions) within established safe operation zones. The maximum crane bridge and trolley speeds are increased, but the existing acceleration limits are retained. The hoist slow-speed zones are reduced, but an adequate distance has been retained for the safe insertion of a fuel assembly into a storage or core location.

The fuel handling system operation, as described in the UFSAR, is essentially unchanged. The mechanical travel stops are retained to provide diverse bridge, trolley, and hoist operating limits. The design functions, interlocks and other safety features of the fuel handling system are retained, and are not adversely impacted by the modification. The modification incorporates improvements in the man-machine interface and increased automation by the manipulator crane. Therefore, it is anticipated that the changes will result in a reduction in human errors and consequently an improvement in safety.

A failure modes and effects analysis (FMEA) has been performed for the replacement controls and variable speed drives, which concluded that the use of digital controls does not increase the probability or the consequences of any fuel handling accident currently described in the UFSAR, nor introduce the possibility of a new type of accident not previously considered. No more than one fuel assembly is moved at a time, in either building. Therefore, the assumptions and conclusions of the existing fuel handling accident analyses remain valid.

No reductions in the existing margins of safety are created by this modification. The existing shutdown margins during refueling operations are maintained. The existing submergence limits and radiation shielding margins are retained. The existing travel stops for the bridge, trolley, and hoist are retained. No changes are required in the Technical Specifications or their Bases. No changes are required in the Selected Licensing Commitments (SLC) Manual. Conforming changes in the UFSAR system description of the refueling machines will be included in the next regular update.

A/R Number: 00246408

Facility: CATAWBA NUCLEAR STATION

Unit(s): 1

Activity Title: CD100808 Add Vent Lines Upstream of 1NI-181 and 1NI-176

Summary

SUMMARY OF EVALUATION: CD-100808

Background
NI check valve leakage periodically causes pressurization of the ND pump discharge header. Discharge header pressurization results in decreased differential pressure (D/P) across the secondary NI check valves 1NI-175, 1NI-176, 1NI-180,1NI-181. The reduction in D/P tends to increase the leakage rate across these valves due to decreased valve seating force. The leakage may result in pressurization of the ND pump suction discharge header to the relief valve set point of 600 psig. Excessive leakage may require frequent venting to prevent the ND header relief valves from lifting. In addition, if the leakage is from the Cold Leg Accumulators (CLA's), nitrogen gas comes out of solution at the lower pressure. The accumulation of nitrogen gas requires increased ECCS venting in order to maintain piping water filled per Tech Spec SR 3.5.2.3. Efforts have been made to improve check valve seating. However a means of venting, including the option of continuous venting the ND discharge header, is desired in situations of excess check valve leakage. It is usually desired to maintain the highest differential pressure across the check valves to aid in seating and to periodically remove non-condensable gases from the ECCS piping prior to accumulation in piping outside of containment.

Generic Letter 2008-001, Managing Gas Accumulation In Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems is directly applicable to the basis for this modification.

Description
CD100808 will install a manual vent line, capable of being placed in a continuous venting mode, on the ND discharge headers in containment near check valves 1NI176 and 1NI181. Prior modification CN-11407, installed two vent lines (one on each train) near check valves 1NI175 and 1NI180. The purpose of the vent lines is to maintain the pressure upstream of the secondary NI check valves as low as possible in order to maintain high seating forces (D/P) on the secondary pressure boundary NI check valves. In addition the vent lines have a secondary function of continuous removal of non-condensable gases that may come out of solution in the lower pressure ND header. Per CD100808, all 4 Class B (QA-1) vent isolation valves, which includes those added per NSM CN-11407, will be maintained normally closed unless the line is being used as a venting option. It is assumed the Class E piping fails since it is non-seismic. Two new vent lines will be added to the A train and B train headers as shown on flow diagram CN-1562-1.3 as modified per CD100808. This design change includes the restriction that no more than two vents, of the 4 total (2 new per CD100808 plus 2 existing per NSM CN-11407) be configured in a continuous venting alignment. This is to minimize potential leakage to the Containment Floor and Equipment Sump (CFES) should Containment be inaccessible and the need for shutdown cooling via the ND System be desired. The ND operating procedure should attempt to isolate an open vent prior to placing ND in service in order to eliminate this leakage. A Class E isolation valve will be located in the Class E line to allow continuous venting. The venting effluent will be routed to the containment floor and equipment sump. Prior modification CN-11407 installed two vent lines; one on each train. CD100808 will install one more vent on each train. The flow diagrams and DBDs include the restriction that no more than two vents, of the 4 total (2 new per CD100808 plus 2 existing per NSM CN-11407) be configured in a continuous venting alignment. This is to minimize potential leakage to the Containment Floor and Equipment Sump (CFES) should Containment be inaccessible and the need for shutdown cooling via the ND System be desired. The ND operating procedure should attempt to isolate an open vent valve prior to placing ND in service in order to eliminate this leakage.

The NI System is nuclear safety related and the modification up to and including the flow restricting orifice is QA.1. Penetrations M307 and M336 are type B5 as shown on UFSAR Figure 6-113. UFSAR Table 6-77 is revised to reflect the addition of the new Class B Containment Penetration Check Valves 1NI-532 and 1NI-537 and associated vents 1NI-531 and 1NI-536 and drains 1NI-533 and 1NI-538.

The effluent input to the WL sump has no effect on the ability to perform reactor coolant system leakage surveillances during normal operation pursuant to Tech Spec 3.4.13 (Reactor Coolant System Operational Leakage). Also, Tech Spec 3.4.15 (Reactor Coolant System Leakage Detection Instrumentation) is not adversely affected. Input into this sump will increase background leakage but staying below the alarm setpoint assures no problems with surveillances.

CD100808 does not affect any system related to control, energy conversion or transmission. No plant transients can be imposed by the added components. The NI System is an accident mitigation system. The added components connect to the NI System between the ND header and the outboard check valve from the NC System. A reactor coolant leak cannot occur due to a break at the vent valves1NI-420 and 1NI-535 since two check valves in series are between the NC system and the associated vents. Therefore, a LOCA is not more likely to occur. The added Class B (QA-1) piping and valves are of the same Class and design conditions as the interfacing piping. A pipe break in the NI System is not more likely to occur since the same design conditions are invoked. CD100808 does not depart from design, fabrication, construction, testing and performance standards applicable to the NI and ND Systems and these Containment penetrations.

Consequences are measured in terms of radioactive dose as limited by 10CFR50.67 (offsite, 2 hr EAB and duration, LPZ) and 10CFR50 Appendix A GDC-19 (Control Room Operators and Actions outside the Control Room). The NI System is an accident mitigation system. All of the performance capabilities of the NI System are retained. The core bypass flow introduced through leakage to the CFES, should a vent be open (only possible if the Class B isolation valves are open) following a Safety Injection signal, has been accounted for in the Test Acceptance Criteria (TAC) sheets for ECCS flow balance.

GDC-55 requirements are maintained in the design features of CD100808. Therefore, no challenge to any fission product barriers will occur as a result of this modification. No analytical methods need to be changed in order to demonstrate that this facility continues to meet any required design basis. No methods of evaluation are impacted by this modification. ECCS flow testing is unaffected. Measuring and detecting reactor coolant system leakage is not adversely impacted. No methods of analysis related to the core or dose consequences are affected.

CD100608 does not require prior NRC approval. All of the 8, 50.59 evaluation questions are answered "no". No Technical Specification changes are required. UFSAR changes are required to Table 6.77.

A/R Number: 00216437

Facility: CATAWBA NUCLEAR STATION

Unit(s): 2

Activity Title: CD200809 Add vent lines upstream of 2NI-181 and 2NI-176

Summary

A/R Number: 00216437

SUMMARY OF EVALUATION CD-200809

Background
NI check valve leakage periodically causes pressurization of the ND pump discharge header. Discharge header pressurization results in decreased differential pressure (D/P) across the secondary NI check valves 2NI-175, 2NI-176, 2NI-180, 2NI-181. The reduction in D/P tends to increase the leakage rate across these valves due to decreased valve seating force. The leakage may result in pressurization of the ND pump suction discharge header to the relief valve set point of 600 psig. Excessive leakage may require frequent venting to prevent the ND header relief valves from lifting. In addition, if the leakage is from the Cold Leg Accumulators (CLAs), nitrogen gas comes out of solution at the lower pressure. The accumulation of nitrogen gas requires increased ECCS venting in order to maintain piping water filled per Tech Spec SR 3.5.2.3. Efforts have been made to improve check valve seating. However a means of venting, including the option of continuous venting the ND discharge header, is desired in situations of excess check valve leakage. It is usually desired to maintain the highest differential pressure across the check valves to aid in seating and to periodically remove non-condensable gases from the ECCS piping prior to accumulation in piping outside of containment.

Generic Letter 2008-001, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems is directly applicable to the basis for this modification.

Description
CD200809 will install a manual vent line, capable of being placed in a continuous venting mode, on the ND discharge headers in containment near check valves 2NI176 and 2NI181. Prior modification CN-21407, installed two vent lines (one on each train) near check valves 2NI175 and 2NI180. The purpose of the vent lines is to maintain the pressure upstream of the secondary NI check valves as low as possible in order to maintain high seating forces (D/P) on the secondary pressure boundary NI check valves. In addition, the vent lines have a secondary function of continuous removal of non-condensable gases that may come out of solution in the lower pressure ND header. Per CD200809, all Class B (QA-1) vent isolation valves, which includes those added per NSM CN-21407, will be maintained normally closed unless the line is being used as a venting option. It is assumed the Class E piping fails since it is non-seismic. Two new vent lines will be added to the A train and B train headers as shown on flow diagram CN-2562-1.3 as modified per CD200809. This design change includes the restriction that no more than two vents, of the 4 total (2 new per CD200809 plus 2 existing per NSM CN-21407) be configured in a continuous venting alignment. This is to minimize potential leakage to the Containment Floor and Equipment Sump (CFES) should Containment be inaccessible and the need for shutdown cooling via the ND System be desired. The ND operating procedure should attempt to isolate an open vent valve prior to placing ND in service in order to eliminate this leakage.

A Class E isolation valve will be located in the Class E line to allow continuous venting. The venting effluent will be routed to the containment floor and equipment sump. Prior modification CN-21407 installed two vent lines, one on each train. CD200809 will install one more vent on each train. The flow diagrams and DBDs include the restriction that no more than two vents, of the 4 total (2 new per CD200809 plus 2 existing per NSM CN-21407) be configured in a continuous venting alignment. This is to minimize potential leakage to the CFES should Containment be inaccessible and the need for shutdown cooling via the ND System be desired. The ND operating procedure should attempt to isolate an open vent valve prior to placing ND in service in order to eliminate this leakage.

The NI System is nuclear safety related and the modification up to and including the flow restricting orifice is QA-1. Penetrations M307 and M336 are type B5 as shown on UFSAR Figure 6-113. UFSAR Table 6-77 is revised to reflect the addition of the new Class B Containment Penetration Check Valves 2NI-532 (M307) and 2NI-537 (M336) and associated vents 2NI-531 (M307) and 2NI-536 (M336) and drains 2NI-533 (M307) and 2NI-538 (M336).

The effluent input to the WL sump has no effect on the ability to perform reactor coolant system leakage surveillances during normal operation pursuant to Tech Spec 3.4.13 (Reactor Coolant System Operational Leakage). Also, Tech Spec 3.4.15 (Reactor Coolant System Leakage Detection Instrumentation) is not adversely affected. Input into this sump will increase background leakage but staying below the alarm setpoint assures no problems with surveillances.

CD200809 does not affect any system related to control, energy conservation or transmission. No plant transients can be imposed by the added components. The NI System is an accident mitigation system. The added components connect to the NI System between the ND header and the outboard check valve from the NC System. A reactor coolant leak cannot occur due to a break at the vent valves 2NI-420 and 2NI-535 since two check valves in series are between the NC system and the associated vents. Therefore, a LOCA is not more likely to occur. The added Class B (QA-1) piping and valves are of the same Class and design conditions as the interfacing piping. A pipe break in the NI System is not more likely to occur since the same design conditions are invoked. CD200809 does not depart from design, fabrication, construction, testing and performance standards applicable to the NI and ND Systems and these Containment penetrations.

Consequences are measured in terms of radioactive dose as limited by 10CFR50.67 (offsite, 2 hr EAB and duration, LPZ) and 10CFR50 Appendix A GDC-19 (Control Room Operators and Actions outside the Control Room). The NI System is an accident mitigation system. All of the performance capabilities of the NI System are retained. The core bypass flow introduced through leakage to the CFES, should a vent be open (only possible if the Class B isolation valves are open) following a Safety Injection signal, has been accounted for in the Test Acceptance Criteria (TAC) sheets for ECCS flow balance.

A/R Number: 00216437

Facility: CATAWBA NUCLEAR STATION

Unit(s): 2

Activity Title: CD200809 Add vent lines upstream of 2NI-181 and 2NI-176

Summary

No fission product barriers are degraded since the QA-1 Type C leak rate tested check valve prevents communication of the containment atmosphere to the piping penetrating containment. GDC-55 requirements are maintained in the design features of CD200809. Therefore, no challenge to any fission product barriers will occur as a result of this modification. No analytical methods need to be changed in order to demonstrate that this facility continues to meet any required design basis. No methods of evaluation are impacted by this modification. ECCS flow testing is unaffected. Measuring and detecting reactor coolant system leakage is not adversely impacted. No methods of analysis related to the core or dose consequences are affected.

CD200809 does not require prior NRC approval. All of the 8, 50.59 evaluation questions are answered "no". No Technical Specification changes are required. UFSAR changes are required to Table 6-77.