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February 22, 2012

10 CFR 50.90

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

ATTENTION: Document Control Desk

Duke Energy Carolinas, LLC (Duke Energy)
McGuire Nuclear Station, Units 1 and 2
Docket Nos. 50-369 and 50-370

SUBJECT: License Amendment Request to Revise Technical Specification 3.7.7, Nuclear Service Water System.

Pursuant to 10 CFR 50.90, Duke Energy requests a license amendment to revise the McGuire Nuclear Station (MNS) Technical Specifications (TS) for Limiting Condition for Operation (LCO) 3.7.7, "Nuclear Service Water System" (NSWS). The License Amendment Request (LAR) will allow the use of the NSWS Pump discharge crossover valves and associated piping to cross tie Unit 1 and 2 NSWS Trains to mitigate a Loss of Service Water (LOSW) event at MNS Units 1 or 2. The proposed change is consistent with the intent of NRC Generic Letter 91-13, "Request for Information Related to the Resolution of Generic Issue 130, Essential Service Water System Failures at Multi-Unit Sites."

The Enclosure provides a description of the proposed change, technical justification, and an evaluation of significant hazards consideration pursuant to 10 CFR 50.92(c). Proposed TS and Bases page markups are included as attachments to the Enclosure. Attachment 1 provides the existing TS pages marked up to show the proposed changes. Attachment 2 provides existing TS Bases pages marked up to show the proposed changes and are included for information only.

Implementation of the approved amendment will require changes to the McGuire Updated Final Safety Analysis Report (UFSAR). Revisions to the UFSAR will be made in accordance with 10 CFR 50.71(e).

Duke Energy requests approval of this LAR within one calendar year of the submittal date. Duke Energy will implement the amendment within 90 days of NRC approval date.

This submittal contains no regulatory commitments.

A001
NRR

In accordance with Duke Energy's administrative procedures and Quality Assurance Program, this LAR has been reviewed and approved by the McGuire Plant Operations Review Committee.

Pursuant to 10 CFR 50.91, a copy of this LAR is being sent to the designated officials of the State of North Carolina.

If there are any questions or if additional information is needed, please contact Mr. R. E. Abbott at (980) 875-4685.

Sincerely,

Regis T. Repko

Enclosure

XC: with enclosure:

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Regis T. Repko affirms that he is the person who subscribed his name to the foregoing statement, and that all the matters and facts set forth herein are true and correct to the best of his knowledge.

Regis T. Repko, Vice President, McGuire Nuclear Station

Subscribed and sworn to me: Feb. 22, 2012
Date

Lori C. Gibby, Notary Public

My commission expires: July 1, 2012
Date

ENCLOSURE

Evaluation of the Proposed Change

Subject: License Amendment Request to Revise Technical Specification 3.7.7, "Nuclear Service Water System."

ATTACHMENTS:

1. McGuire Units 1 and 2 Technical Specification Page Markups
2. McGuire Units 1 and 2 Bases Page Markups (for information only)

1. SUMMARY DESCRIPTION

Pursuant to 10 CFR 50.90, Duke Energy is requesting an amendment to the Renewed Facility Operating Licenses NPF-9 and NPF-17 for McGuire Nuclear Station (MNS) Units 1 and 2, respectively.

The proposed amendment would revise MNS Technical Specification (TS) 3.7.7, "Nuclear Service Water System" (NSWS) to allow one of two available NSWS Trains on one unit to be aligned to the opposite unit for the purpose of mitigating a Loss of Service Water (LOSW) event.

The proposed changes are consistent with the intent of Nuclear Regulatory Commission (NRC) Generic Letter 91-13 (GL 91-13), "Essential Service Water System Failures at Multi-Unit Sites" which encouraged multi-unit sites having the capability to cross-connect NSWS between the units to develop the TS and emergency procedures necessary to enhance the availability of NSWS to mitigate LOSW events. As stated in GL 91-13, "The estimated benefit from the identified safety enhancements is a reduction in the core damage frequency and a reduction in the associated risk of offsite radioactive releases as a result of ESW (Essential Service Water) failure."

The proposed change incorporates insights from the NRC's "Final Response to Task Interface Agreement - McGuire Nuclear Station Service Water System Unit Crossties Relative to Sharing / Donating in Abnormal Procedures (TIA 2009-011)" (Reference 1) and NRC Inspection Reports (References 2, 3, and 4).

2. DETAILED DESCRIPTION

In GL 91-13, the NRC determined that failures associated with service water systems designed with one service water pump per safety-related train were a significant contributor to overall plant risk. Multi-unit sites with existing crossover piping and valves which provide the capability to share service water between units were asked to take actions necessary to enhance the availability of the crossover thus improving overall plant risk. The proposed change to TS 3.7.7 (NSWS) facilitates the use of NSWS pump discharge crossover valves and piping to share service water between units.

As used in this LAR, "Sharing" refers to opening the NSW pump discharge crossover valves such that a portion of the flow from one unit's NSWS train is provided to another unit's NSWS Train. This alignment is restricted to LOSW events; consequently, the unit providing service water flow to the unit that has lost all service water is referred to as the "shared unit." Likewise, the unit-specific service water train that is aligned to the unit with no service water is referred to as the "shared train." The unit with no service water may be referred to as the "affected", "faulted" or "LOSW" unit where a loss of service water event is a failure of both NSW trains to provide required flow(s) to the essential service water headers. "Shared" simply distinguishes the unit with service water from the unit with no service water and should not be viewed as a reflection of service water systems compliance to the minimum design criteria specified in 10 CFR 50 Appendix A, General Design Criteria 5 (GDC-5), "Sharing of Structures, Systems, and Components."

Consistent with the applicability of GL 91-13, the NSWS at MNS unit 1 and unit 2 were each designed with two redundant NSW trains and each train has one safety-related service water pump. The service water trains are unit-specific and each is designed to perform the safety function specified for service water systems. Therefore, the use of "redundant" train in this LAR means one of the two unit-specific service water trains. A redundant service water train may be operable or available. OPERABLE refers to a service water train that is capable of performing its specified safety function consistent with Technical Specifications (TS). "Available" is a term normally associated with 10 CFR 50.65 (Maintenance Rule) and Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guideline." In general, SSCs within the scope of these programs are "available" if they can perform the functions scoped into these programs.

The proposed LAR will allow one of the two available (redundant) unit-specific service water trains to be shared with a LOSW unit. The proposed LAR limits the shared configuration such that compliance with the Limiting Conditions for Operation (LCO), Conditions, Required Actions (RA) and Completion Times (CT) currently specified for the NSWS (TS 3.7.7) is maintained. An available train will only be shared to mitigate a LOSW when its redundant unit-specific service water train is available.

TS LCO 3.7.7 requires two OPERABLE service water trains in MODES 1, 2, 3, and 4. Condition "A" allows operation with one OPERABLE NSWS Train for up to 72 hours before action to restore the inoperable train to operable must be complete or unit shutdown is required. The proposed change modifies TS LCO 3.7.7 Condition A by adding a Note, "A NSWS train may be shared with another unit to mitigate a Loss of Service Water event." As described in the McGuire unit 1 and unit 2 TS 3.7.7 Bases, Figure B 3.7.7-1, the service water pump discharge crossover valves are unit-specific components and are not shared; therefore, the service water pump discharge crossover valves are normally closed to ensure compliance with GDC-5.

In order to align an available train of service water to the LOSW unit, the available service water pump's discharge crossover valve must be opened and the pump discharge crossover valve to a LOSW unit's train must be opened. Opening these service water pump discharge crossover valves cross-connects the available train to the LOSW unit's train and puts the trains in a configuration were the specified safety functions cannot be met for both units, and; therefore, the available train must be declared inoperable. The shared alignment will be procedurally controlled to ensure the NSWS train is operated within its design limitations.

The proposed amendment removes an available service water pump from service with intent to rely on the RAs and CTs associated with TS 3.7.7 Condition A. TS Bases for LCO 3.0.2 state:

> The Completion Times of the Required Actions are also applicable when a system or component is removed from service intentionally. The reasons for intentionally relying on the ACTIONS include, but are not limited to, performance of surveillances, preventive maintenance, corrective maintenance, modifications, or investigation of operational problems. Entering ACTIONS for these reasons must be done in a manner that does not compromise safety. Intentional entry into ACTIONS should not be made for operational convenience.

There is no allowance in the Bases to LCO 3.0.2 to use TS ACTIONS to mitigate beyond design basis events on another unit. Although opening the service water pump discharge crossover valves provide a nuclear safety benefit to the unit that is experiencing a LOSW, opening these valves to share service water under the application of TS LCO 3.0.2 is not allowed by the current TS. Therefore, the proposed Note to TS 3.7.7 Condition A is an exception to the Bases for TS LCO 3.0.2 and will allow use of the TS 3.7.7 Condition A Required Actions for an inoperable NSWS train to mitigate a LOSW.

The placement of the Note in TS 3.7.7 Condition A restricts the exception to the activities allowed in TS LCO 3.0.2 Bases and to a LOSW event. The location of the Note also limits the shared alignment to 72 hours consistent with the CT established for an inoperable NSWS system / train per unit. As indicated in the Bases for TS 3.7.7, the 72 hour CT is based on the redundant capabilities afforded by the operable train, and the low probability of a design basis accident (DBA) occurring during this time period. The shared/inoperable train will be returned to operable status within the specified CT or the shared unit will be shutdown and placed in a MODE or condition in which the specification is not applicable.

Abnormal Procedures will limit the flow rate that can be shared during a LOSW event to the surplus capacity existing after adequate cooling capacity is retained to support the availability of the train's dedicated unit emergency power (diesel generator) and long-term operation of shared NSWS pump (supplying cooling water to the pump motor cooler and strainer backwash loads). Essentially, the shared flow is a function of what is left after maintaining minimum loading on the shared unit and is not expressed as the design flow necessary to mitigate the LOSW event. In the event the shared unit does experience an event requiring additional service water, the shared train can be throttled back to restore flow capacity up to and including complete restoration of the alignment and flows, as necessary. If only one train is operable, procedures will preclude sharing the operable train to avoid intentional entry into TS LCO 3.0.3.

Consistent with TS LCO 3.0.2 Bases, abnormal procedures will ensure unit specific alternatives will be used to mitigate LOSW events. If these alternatives fail to protect the integrity of a fission product barrier, sharing one of a unit's two available NSWS trains will provide an additional mitigation alternative; albeit, at the expense of redundancy on the shared unit for up to 72 hours.

3. TECHNICAL EVALUATION

Compliance with TS LCO 3.7.7 (NSWS) ensures that the consequences of a design basis Loss of Coolant Accident (LOCA) remains within acceptable limits. The design basis of the NSWS is for one NSWS train, in conjunction with the Component Cooling Water (CCW) System and the Containment Spray system, to remove core decay heat following a design basis LOCA as discussed in the Updated Final Safety Analysis Report (UFSAR). This prevents the containment sump fluid from increasing in temperature during the recirculation phase following a LOCA and provides for a gradual reduction in the temperature of this fluid as it is supplied to the Reactor Coolant System by the Emergency Core Cooling System (ECCS) pumps. The NSWS is designed to perform its function with a single failure of any active component, assuming the loss of offsite power.

The NSWS, in conjunction with the CCW System, also removes heat from the residual heat

removal (RHR) system, as discussed in the UFSAR, from RHR entry conditions to MODE 5 during normal and post accident operations. The time required for this evolution is a function of the number of CCW and RHR System trains that are operating. One NSWS train is sufficient to remove decay heat during subsequent operations in MODES 5 and 6. This assumes a maximum NSWS inlet temperature of 95°F is not exceeded.

Each unit has two redundant NSWS essential headers serving two trains of equipment necessary for safe station shutdown, and a nonessential header serving equipment not required for safe shutdown. The NSWS is designed to meet single failure criteria, with two redundant trains per unit to serve the components essential for safe station shutdown.

The NSWS was designed with four (4) cross-connect locations (Attachment 2, Figure B 3.7.7-1). The NSWS pump discharge header crossover valves (1RN33, 1RN34, 1RN36 and 1RN38) are normally closed manual valves and the proposed change requests their use to align one of two available NSWS trains to the unit experiencing loss of nuclear service water event. The other cross-connect locations described in the UFSAR include the NSWS main supply crossover valves (0RN7A, 0RN9B, 0RN14A, 0RN15B), main discharge crossover valves (0RN149A, 0RN150A, 0RN151B, 0RN152B), and the NSWS train A and B Non-essential Header Isolation Valves (1RN40A, 1RN41B, 1RN43A for Unit 1; 2RN40A, 2RN41B, 2RN43A for Unit 2). The proposed amendment will develop the necessary licensing condition to use the NSWS pump discharge crossover valves (1RN33, 1RN34, 1RN36 and 1RN38) only, and does not affect the design or use of the other cross-connect schemes.

The NSWS pump discharge crossover valves are manually operated 30 inch butterfly valves and are configured in a cross pattern such that the discharge of any pump can supply the essential header of any Unit or Train. These valves are procedurally closed to maintain train separation and compliance to GDC-5. The valves are QA condition one (QA-1) for pressure boundary integrity and do not perform an accident mitigation function.

Existing procedures ensure the NSWS Pump Discharge Crossover Piping is periodically flushed to verify piping is free of debris and the NSWS pump discharge crossover valves are manually cycled to verify freedom of movement.

The proposed amendment will allow the service water pump discharge crossover valves (1RN33, 1RN34, 1RN36 and 1RN38) to be opened during a LOSW event such that an available service water train can be shared with a unit experiencing LOSW. A LOSW is beyond a unit's design basis; nevertheless, a LOSW scenario can challenge fuel design limits and integrity which warrants the development of all possible mitigation strategies. Cross-connecting service water trains between units will complement existing unit-specific actions currently specified for LOSW. Abnormal Procedure guidance will ensure compliance with the conditions of the facility operating license for the shared unit. Limits associated with sharing a NSWS train have been analyzed and support the limited use of one unit's NSWS Train to mitigate a postulated LOSW event. The following conditions must be satisfied to allow the shared NSWS train to provide essential service water to the LOSW unit:

1. The shared unit must have a minimum of two NSWS Trains available.

2. The supply and return shall be aligned such that Standby Nuclear Service Water Pond inventory is preserved.

3. The shared train shall be declared inoperable when in a Mode of Applicability.

The proposed amendment bounds the use of the NSWS pump discharge crossover valves to the LOSW and those activities allowed by TS LCO 3.0.2. An available service water train is only shared when its redundant train is capable of performing its safety function for the unit's Mode of Applicability. Consistent with station requirements, only trained and qualified personnel will perform the alignments in accordance with approved procedures.

4. REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria:

The following regulatory requirements and plant-specific design bases pertain to the nuclear service water system:

1) Regulatory requirements

10 CFR 50, Appendix A, General Design Criteria (GDC) Criterion 5, "Sharing of Structures, Systems, and Components," requires that SSCs important to safety shall not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units.

10 CFR 50, Appendix A, General Design Criteria (GDC) Criterion 44, "Cooling water," requires a system to transfer heat from structures, systems, and components (SSC) important to safety, to an ultimate heat sink shall be provided. The system safety function shall be to transfer the combined heat load of these structures, systems, and components under normal operating and accident conditions.

10 CFR 50, Appendix A, General Design Criteria (GDC) Criterion 45, "Inspection of cooling water system," requires that the cooling water system shall be designed to permit appropriate periodic inspection of important components, such as heat exchangers and piping, to assure the integrity and capability of the system.

10 CFR 50, Appendix A, General Design Criteria (GDC) Criterion 46, "Testing of cooling water system," requires the cooling water system shall be designed to permit appropriate periodic pressure and functional testing to assure (1) the structural and leak tight integrity of its components, (2) the operability and the performance of the active components of the system, and (3) the operability of the system as a whole and, under conditions as close to design as practical, the performance of the full operational sequence that brings the system into operation for reactor shutdown and for loss-of-coolant accidents, including operation of applicable portions of the protection system and the transfer between normal and emergency power sources.

In 1991, the NRC issued GL 91-13 in response to Generic Issue 130, "Essential Service Water failures at Multi-Unit Sites" to dual unit sites where NSWS failures were a significant contributor to overall plant risk. Multi-Unit Site Licensees with one service water pump per train were encouraged to improve the administrative controls and Technical Specifications as necessary to improve the reliability and control of the NSWS train cross-connection between units for the purpose of mitigating LOSW events. The improvements suggested in GL 91-13 were warranted in view of the safety benefit to be derived from crosstie between the units during a LOSW event. General Design Criteria 44, 45, and 46 of 10 CFR Part 50, Appendix A, in conjunction with the probabilistic risk assessment performed under GI-130, formed the technical bases for the TS and procedures improvements recommended in GL 91-13.

Duke Energy's initial response to GL 91-13 (Reference 5) indicated an Abnormal Procedure (AP) was in place to provide the guidance (including valve locations) for manipulating the service water pump discharge crossover valves during LOSW and no TS changes were required. Subsequent to the site's GL 91-13 response, it was determined (References 2, 3, 4) the applicability of GDC-5 was crucial to the unit crosstie promoted by GL 91-13. Consequently, Duke Energy determined the AP guidance to crosstie unit trains inappropriately specified the use of unit-specific components to place the unit's service water system in a shared configuration during a LOSW event. The service water pump discharge crossover valves are not designated as "shared" components on Figure B 3.7.7-1 of TS 3.7.7 Bases (Attachment 2). Therefore, opening the service water pump discharge crossover valves places a train in a configuration where it does not comply with GDC-5 and must be declared inoperable. For this reason, their use during a LOSW event requires prior NRC approval. The proposed amendment to TS 3.7.7 Condition A will allow a unit's redundant service water pump to be shared (i.e., pump discharge crossover valves opened) in the event a unit losses all service water.

The proposed change to TS 3.7.7 does not impact compliance to General Design Criteria 44, 45, or 46 referenced in GL 91-13. This amendment is contingent, in part, on NRC allowing use of TS 3.7.7 Condition A required actions in the event a unit loses service water and thereby allowing an exception to GDC-5 compliance for the 72 hour completion time associated with TS 3.7.7 Condition A.

Following NRC approval of the proposed amendment, the UFSAR will be revised to describe the safety implications of sharing a NSWS train and abnormal procedure guidance will provide the steps necessary to put one of the two available NSWS trains from one unit in a shared configuration with the LOSW unit. Abnormal procedure guidance will ensure the shared train pump is operated within the design flow limitations; thus, maintaining pump availability and reliability while it's aligned to the LOSW unit for the purpose of restoring cooling water for decay heat removal.

4.2 Significant Hazards Consideration

The proposed amendment would revise McGuire Nuclear Station (MNS) Technical Specification (TS) 3.7.7, "Nuclear Service Water System" (NSWS) to share a NSWS train between Unit 1 and Unit 2 in the event one unit losses all service water. The proposed change to TS 3.7.7 will add a Note to Condition A that allows one service water train to be shared between units to mitigate a

loss of service water (LOSW). Placement of the Note into Condition A limits the shared arrangement to ≤ 72 hours. NRC approval of the proposed TS change is required to share a service water train since the pump discharge crossover valves used to cross-connect unit's NSWS, as reflected in the Bases for TS 3.7.7 Figure B 3.7.7-1 (Attachment 2), do not meet 10 CFR 50, Appendix A, General Design Criteria (GDC) 5, "Sharing of Structures, Systems, and Components". Since MNS is not licensed to share NSWS between units and a NSWS train must be declared inoperable to do so (system redundancy) a license amendment is required.

As required by 10 CFR 50.91(a), the analysis of the issue of no significant hazards consideration is presented below:

Criterion 1:

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

Response: No

MNS' Final Safety Analysis Report (FSAR) conforms to the standard format and content of Revision 1 to Regulatory Guide (RG) 1.70 with exceptions described in the applicable sections of the FSAR. With regard to Chapter 15 "Accident Analysis", MNS committed to analyzing the anticipated operational occurrences and postulated design basis accidents listed in Chapter 15 on pages 15T-1, 15T-2 and 15T-3 of RG 1.70 Revision 1. MNS' FSAR Chapter 15 described an exception to a Loss of Service Water event (RG 1.70, Rev. 1, page 15T-3, item 30) and stated, in part, "Loss of the Nuclear Service Water System is not considered a credible accident because of the redundancy provided in the system." The FSAR was later updated (UFSAR) to conform to Chapter 15 accidents listed on pages 15-10, 15-11, and 15-12 of RG 1.70 Revision 3. The initial FSAR Chapter 15 exception to RG 1.70 Rev. 1 LOSW event was no longer required since LOSW events were no longer included in Chapter 15 of subsequent RG 1.70 revisions (revision 2 or 3). Based on the licensing history, the LOSW event is not an anticipated operational occurrence or postulated design basis accident and was not previously analyzed in Chapter 15 of the UFSAR. A failure of the NSWS does not initiate any of the accidents previously evaluated in Chapter 15 of the UFSAR; therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

Criterion 2:

Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

McGuire is a multi-unit site comprised of two nuclear stations, Unit 1 and Unit 2. Each unit has two NSWS trains and each train is designed to remove core decay heat following a design basis LOCA. Each train has a service water pump discharge crossover valve installed which allows the trains to be cross-connected in any combination. The NSWS pump discharge crossover

valves are described in the UFSAR as providing operational flexibility. Although designed to cross-connect unit NSWS trains, MNS has never licensed their use. The proposed change, consistent with the UFSAR description and GL 91-13, will provide the operational flexibility to allow one unit's NSWS to be aligned to another unit that has lost all service water.

During normal operation, only one pump, per unit, is in operation to supply NSWS flow to the essential and non-essential headers for each unit. Cross-connecting NSWS between units will require a unit's standby NSWS pump to be placed in service (operating), opening its respective discharge crossover valve, and opening a LOSW unit's NSWS pump discharge crossover valve to establish service water flow to a LOSW unit's NSWS train. With exception to the flow path, the shared train is operated as designed. If the proposed LAR is approved, the necessary site procedures will be revised to govern system operation and use of the crossover design feature to mitigate a LOSW event.

The use of the NSWS pump discharge crossover valves within their design limitations and maintaining compliance to TS 3.7.7 LCO does not create any credible new failure mechanisms, malfunctions, or accident initiators that will prevent the ability of the NSWS to perform its design function. Operating the NSWS within the allowances of TS 3.7.7, which allow a train to be removed from service for up to 72 hours, does not impact the redundant capabilities afforded by the other train or the "low probability of a design basis accident (DBA) occurring during this time period" as stated in TS 3.7.7 Bases. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

Criterion 3:

Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No.

Margin of safety is related to the confidence in the ability of the fission product barriers to perform their design functions during and following an accident situation. These barriers include the fuel cladding, the reactor coolant system, and the containment system. The performance of these barriers will not be impacted by the proposed change. The use of a NSWS pump discharge cross-over to cross-tie units is not a credited flow path in design basis and is not needed to perform the specified safety function. Cross-connecting the units is an additional strategy made available if a total LOSW should occur.

The proposed change will allow a unit to share a portion of an available service water train's capacity with a unit that has lost all service water. The shared alignment requires the use of service water pump discharge crossover valves which are not designated as shared components. Their use will improve the availability of service water and decreases the probability of core damage. Therefore the change will improve the margin of safety for each unit with respect to mitigating LOSW events.

Placing a NSWS train in a shared alignment prevents the train from automatically performing its safety function and the train does not comply with GDC-5 and is declared inoperable. Limiting

the time a train is inoperable to 72 hours manages the vulnerability to single failure consistent with current TS required actions and completion times. In accordance with TS LCO 3.0.2 allowances, TS 3.7.7 allows one train to be removed from service for up to 72 hours to perform surveillance testing, preventive maintenance, corrective maintenance, modifications, or investigation of operational problems. Although a NSWS train is declared inoperable for these activities, several can be accomplished while maintaining the train available while others, such as corrective maintenance, may also render the NSWS train unavailable. The 72 hour CT is bounded by the worst case allowed by TS LCO 3.0.2 which assumes a train is both inoperable and unavailable.

Sharing a unit's redundant NSW pump requires the shared unit's service water pump to be taken out of standby and placed in service (operating). Therefore, the shared train remains available to the shared unit in event it must be restored. The shared train will be supplying the service water necessary to support operation of the shared unit's diesel generator (emergency power) and to assure long term operation of the shared pump. Although redundancy is lost in terms of performing its specified safety function on the designated unit, availability and functionality is maintained by the proposed amendment.

The reason a redundant NSWS pump is inoperable and/or unavailable does not change the probability its redundant train will fail during the 72 hour CT or change the probability of a LOCA occurring during that time. In the event a train fails while its redundant train is shared, immediate action can be taken to restore the shared train from the shared alignment or the unit can be shutdown.

Since a unit's redundant service water train is placed in a shared configuration to mitigate a LOSW event, margin of safety is considered on each unit. Technical Specifications allows a nuclear service water train to be removed from service for up to 72 hours. The shared unit's margin of safety is maintained by limiting the shared alignment to ≤ 72 hour completion time consistent with current TS allowances. Implementation of this amendment will improve the margin of safety on a unit experiencing a LOSW event consistent with the intent of NRC Generic Letter 91-13. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, MNS concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92, paragraph c, and, accordingly, a finding of "no significant hazards consideration" is justified.

4.3 Conclusion

Duke Energy concludes that the proposed amendment does not involve a significant hazard consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of no significant hazards consideration is justified. 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. ENVIRONMENTAL CONSIDERATION

Duke Energy has evaluated the proposed changes and has determined that they do not involve: (1) a significant hazards consideration, (2) a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite, or (3) a significant increase in individual or cumulative occupational radiation exposures. 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. REFERENCES

1. March 4, 2011, Final Response to Task Interface Agreement - McGuire Nuclear Station Service Water System Unit Crossties Relative to Sharing/Donating in Abnormal Procedures (TIA 2009-011), Accession No. 093280025
2. June 24, 1987, NRC Inspection Report 50-369 / 85-38 and 50-370 / 85-39
3. April 24, 2008, NRC Integrated Inspection Report 05000369 / 2008002 and 05000370 / 2008002.
4. May 6, 2011, NRC Integrated Inspection Report 05000369 / 2011002 and 05000370 / 2011002
5. February 27, 1992, MNS Response to GL 91-13, Essential Service Water System Failures at Multi-Unit Sites.
6. Generic Letter 91-13, "Essential Service Water System Failures at Multi-Unit Sites".

TS 3.7.7
Mark-up

3.7 PLANT SYSTEMS

3.7.7 Nuclear Service Water System (NSWS)

LCO 3.7.7 Two NSWS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One NSWS train inoperable.	~~A.1~~ ----------NOTES---------- 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources— Operating," for emergency diesel generator made inoperable by NSWS. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops—MODE 4," for residual heat removal loops made inoperable by NSWS. ---------- Restore NSWS train to OPERABLE status.	72 hours

INSERT #1

INSERT #2

INSERT #3

INSERT #4

INSERT #5

(continued)

INSERT 1:

----------NOTE----------
A NSWS train may be shared with another unit to mitigate a Loss of Service Water event.

INSERT 2:

or a flow path is established between the units using the NSWS Pump Discharge Crossover Valves.

INSERT 3:

A.1

INSERT 4:

AND

A.2 Restore the NSWS Pump Discharge Crossover Valves to the closed position.

INSERT 5:

72 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.7.7.1	----------NOTE---------- Isolation of NSWS flow to individual components does not render the NSWS inoperable. ---------- Verify each NSWS manual, power operated, and automatic valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	In accordance with the Surveillance Frequency Control Program
SR 3.7.7.2	Verify each NSWS automatic valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program
SR 3.7.7.3	Verify each NSWS pump starts automatically on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program

TS Bases 3.7.7
Mark-up
(Information Only)

B 3.7 PLANT SYSTEMS

B 3.7.7 Nuclear Service Water System (NSWS)

BASES

BACKGROUND

The NSWS provides a transfer mechanism for the removal of process and operating heat from safety related components during a Design Basis Accident (DBA) or transient. During normal operation, and a normal shutdown, the NSWS also provides this function for various safety related and nonsafety related components. The safety related function is covered by this LCO.

The NSWS is normally supplied from Lake Norman as a non-seismic source, through a single supply line as shown in Figure B 3.7.7-1. An additional safety-related and seismic supply of water to the NSWS, in the event of a loss of Lake Norman, is the Standby Nuclear Service Water Pond (SNSWP). The supply line from Lake Norman separates into two supply headers, each header is capable of being isolated by two, independently powered, motor operated valves. The two supply headers feed into two separate supply trains. The "A" train supplies water to the "A" pump on each unit and the "B" train to the "B" pump on each unit. During normal operation, only one pump, per unit, is in operation to supply NSWS flow to the essential and non-essential headers for each unit. The "B" train supply is automatically realigned to the SNSWP and supplies the "B" header on an SI signal from either unit. The "A" train supply is automatically realigned to the low-level supply from Lake Norman and supplies the "A" header on an SI signal from either unit.

Essential headers provide flow to the following safety related components and systems:

1. Component Cooling (CCW) Heat Exchangers and Pump Motor Coolers,
2. Containment Spray Heat Exchangers and Pump Motor Coolers,
3. Control Room Area Chiller Condensers,
4. Diesel Generator Heat Exchangers,
5. Centrifugal Charging Pump Motor, Bearing Oil and Gear Oil Coolers,
6. Nuclear Service Water Pump Motor Coolers,
7. Auxiliary Feedwater Pump Motor Coolers,
8. Safety Injection Pump Motor and Bearing Oil Coolers,
9. Residual Heat Removal Pump Motor Coolers,
10. Fuel Pool Pump Motor Coolers,
11. Assured Auxiliary Feedwater Supply,
12. Assured Component Cooling System Makeup,
13. Assured Fuel Pool Cooling System makeup, and
14. Assured Diesel Generator Engine Cooling System makeup.

BASES

BACKGROUND (continued)

The non-essential channel supply comes from the "A" and "B" train crossover piping and isolates on an SI or Blackout signal.

The Reactor Coolant Pump Motor Air Coolers are not essential for safe shutdown, but are set up to receive cooling flow until the Containment High-High signal is received. The pumps and valves are remote and manually aligned, except in the unlikely event of a loss of coolant accident (LOCA). The pumps aligned to the critical loops are automatically started upon receipt of a safety injection or Station Blackout signal, and all essential valves are aligned to their post accident positions.

Additional information about the design and operation of the NSWS, along with a list of the components served, is presented in the UFSAR, Section 9.2 (Ref. 1). The principal safety related function of the NSWS is the removal of decay heat from the reactor via the CCW System.

APPLICABLE SAFETY ANALYSES

The design basis of the NSWS is for one NSWS train, in conjunction with the CCW System and the Containment Spray system, to remove core decay heat following a design basis LOCA as discussed in the UFSAR, Section 6.2 (Ref. 2). This prevents the containment sump fluid from increasing in temperature during the recirculation phase following a LOCA and provides for a gradual reduction in the temperature of this fluid as it is supplied to the Reactor Coolant System by the ECCS pumps. The NSWS is designed to perform its function with a single failure of any active component, assuming the loss of offsite power.

The NSWS, in conjunction with the CCW System, also removes heat from the residual heat removal (RHR) system, as discussed in the UFSAR, Section 5.4 (Ref. 3), from RHR entry conditions to MODE 5 during normal and post accident operations. The time required for this evolution is a function of the number of CCW and RHR System trains that are operating. One NSWS train is sufficient to remove decay heat during subsequent operations in MODES 5 and 6. This assumes a maximum NSWS inlet temperature of 95°F is not exceeded.

The NSWS satisfies Criterion 3 of 10 CFR 50.36 (Ref. 4).

LCO

Two NSWS trains are required to be OPERABLE to provide the required redundancy to ensure that the system functions to remove post accident

BASES

LCO (continued)

heat loads, assuming that the worst case single active failure occurs coincident with the loss of offsite power.

An NSWS train is considered OPERABLE during MODES 1, 2, 3, and 4 when:

a. The associated unit's pump is OPERABLE; and

b. The associated piping, valves, and instrumentation and controls required to perform the safety related function are OPERABLE.

INSERT #1

Portions of the NSWS system are shared between the two units (Figure B 3.7.7-1). The shared portions of the system must be OPERABLE for each unit when that unit is in the MODE of Applicability. Additionally, both normal and emergency power for shared components must also be OPERABLE. If a shared NSWS component becomes inoperable, or normal or emergency power to shared components becomes inoperable, then the Required Actions of this LCO must be entered independently for each unit that is in the MODE of applicability of the LCO.

INSERT #2

APPLICABILITY

In MODES 1, 2, 3, and 4, the NSWS is a normally operating system that is required to support the OPERABILITY of the equipment serviced by the NSWS and required to be OPERABLE in these MODES.

In MODES 5 and 6, the requirements of the NSWS are determined by the systems it supports.

ACTIONS

A.1

INSERT #3

If one NSWS train is inoperable, action must be taken to restore OPERABLE status within 72 hours. In this Condition, the remaining OPERABLE NSWS train is adequate to perform the heat removal function. However, the overall reliability is reduced because a single failure in the OPERABLE NSWS train could result in loss of NSWS function. Required Action A.1 is modified by two Notes. The first Note indicates that the applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources—Operating," should be entered if an inoperable NSWS train results in an inoperable emergency diesel generator. The second Note indicates that the applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops—MODE 4," should be entered if an inoperable NSWS train results in an inoperable decay heat removal train.

INSERT 1:

Portions of the NSWS that meet 10 CFR 50 Appendix A, General Design Criteria 5 (GDC-5), "Sharing of Structures, Systems and Components" (SSC) are identified on Figure B 3.7.7-1.

INSERT 2:

The physical design arrangement of the NSWS Pump Discharge Crossover Valves (1RN33, 1RN34, 1RN36 and 1RN38) and associated piping allow NSWS Trains to be cross-connected (shared) between units; however, the NSWS was not designed to meet minimum design requirements for sharing (Reference 5) such that one NSWS train is capable of simultaneous shutdown of one unit in an accident condition and complete an orderly shutdown and cooldown of the remaining unit. Compliance to GDC-5 is satisfied by maintaining the NSWS Pump Discharge Crossover Valves in the closed position.

In the event one unit experiences a Loss of Service Water (LOSW), where a LOSW is a failure of both NSW trains to provide required flow to the essential service water headers, backup cooling capability may be provided using one of the two available NSWS Trains from the other unit. Only one of the two redundant trains is in operation to supply NSWS flow to the essential and non-essential headers during normal operations; therefore the standby train may be started and one of the two redundant operating trains may be aligned to the LOSW unit (shared) to mitigate a LOSW event. Once the redundant train's NSWS Pump Discharge Crossover Valve is opened and the NSWS Pump Discharge Crossover Valve to the LOSW unit's NSWS Train is opened, a shared flow path is established; therefore, the shared NSWS train no longer meets GDC-5 and must be declared inoperable. The flow rate that can be diverted to the LOSW unit to mitigate a LOSW event is limited to the surplus capacity existing after maintaining adequate cooling capacity necessary to support the availability of the NSWS trains dedicated unit emergency power (diesel generator) and long-term operation of the shared NSWS pump (supplying cooling water to the pump motor cooler and strainer backwash loads).

INSERT 3:

The NSWS is designed to meet single failure criteria with two redundant trains per unit to serve components essential for safe station shutdown. As stated in the BACKGROUND section, "During normal operation, only one pump, per unit, is in operation to supply NSWS flow to the essential and non-essential headers for each unit." Condition A is modified by a Note allowing a NSWS train to be aligned to another unit ("shared") to mitigate a LOSW event. Generally, the train selected to share with a unit experiencing a LOSW will be the train that is not in service (standby); however, either Train may be selected provided the following conditions are met:

1. The shared unit must have a minimum of two NSWS Trains available.

2. The supply and return shall be aligned such that Standby Nuclear Service Water Pond inventory is preserved.

3. The shared Train shall be declared inoperable when in a Mode of Applicability.

Aligning a NSWS train to the LOSW unit requires the Pump Discharge Crossover Valves associated with each unit's NSWS cross tied Train to be opened (these are not designated as shared SSCs in Figure B 3.7.7-1). Once the alignment is established, such that service water from the shared unit is supplied to the LOSW unit, the shared NSWS train no longer meets GDC-5 and must be declared inoperable. The flow rate that can be diverted to the LOSW unit to mitigate a LOSW event is limited to the surplus capacity existing after adequate cooling capacity is retained to support the availability of the shared Train's dedicated unit emergency power (diesel generator) and maintain long-term operation of the shared NSWS pump / train by supplying cooling water to the NSWS pump motor cooler and strainer backwash load.

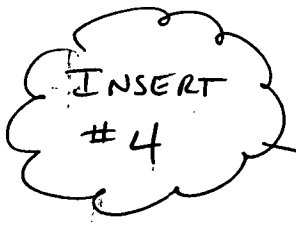
The TS 3.0.2 LCO Bases state:

> "The reasons for intentionally relying on the ACTIONS include, but are not limited to, performance of surveillances, preventive maintenance, corrective maintenance, modifications, or investigation of operational problems. Entering ACTIONS for these reasons must be done in a manner that does not compromise safety. Intentional entry into ACTIONS should not be made for operational convenience."

The additional allowance afforded by the Condition A Note pertaining to sharing a NSWS train for mitigation of a Loss of Service Water is warranted based on the nuclear safety benefit derived from the action and is not considered operational convenience. The train aligned to the LOSW unit must be restored to OPERABLE within 72 hours or Condition B must be entered on the shared (non-accident) unit.

BASES

ACTIONS (continued)



This is an exception to LCO 3.0.6 and ensures the proper actions are taken for these components. The 72 hour Completion Time is based on the redundant capabilities afforded by the OPERABLE train, and the low probability of a DBA occurring during this time period.

B.1 and B.2

If the NSWS train cannot be restored to OPERABLE status within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours and in MODE 5 within 36 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.7.1

This SR is modified by a Note indicating that the isolation of the NSWS components or systems may render those components inoperable, but does not affect the OPERABILITY of the NSWS.

Verifying the correct alignment for manual, power operated, and automatic valves in the NSWS flow path provides assurance that the proper flow paths exist for NSWS operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since they are verified to be in the correct position prior to being locked, sealed, or secured. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

INSERT 4:

A.2

If one NSWS train is inoperable because it was aligned to the LOSW unit to mitigate a LOSW event, action must be taken to restore OPERABLE status within 72 hours. In this Condition, the remaining NSWS train is adequate to perform the heat removal function; however, the overall reliability is reduced because a single failure in the OPERABLE NSWS train could result in loss of NSWS function.

Required Action A.2 is modified by the same two Notes as Required Action A.1. The first Note indicates that the applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources-Operating," should be entered if an inoperable NSWS train results in an inoperable emergency diesel generator. A NSWS train, declared inoperable due to alignment to the LOSW unit for the purpose of mitigating a LOSW event, impacts its associated DG operability. Although cooling water necessary to maintain the DG is available, the DG will be declared inoperable consistent with TS LCO 3.0.6.

The second Note indicates that the applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops-MODE 4," should be entered if an inoperable NSWS train results in an inoperable decay heat removal train. This condition will apply when NSWS Train inoperability is declared due to LOSW event mitigation while the shared Train is in Mode 4.

This is an exception to TS LCO 3.0.6 and ensures the proper actions are taken for these components. The 72 hour Completion Time is based on the redundant capabilities afforded by the OPERABLE train, and the low probability of a DBA occurring during this time period.

Required Action A.2 is necessary for a NSWS Train that was declared inoperable due to opening the Pump Discharge Crossover Valves to mitigate a LOSW event on the unit with no service water. Required Action A.2 ensures the Pump Discharge Crossover Valves are restored to the normal alignment within 72 hours; thus, restoring compliance to GDC-5 and Condition A. Required Action A.2 is connected to Required Action A.1 with "AND" to acknowledge additional actions may be necessary to restore operability of the shared Train.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.7.2

This SR verifies proper automatic operation of the NSWS valves on an actual or simulated actuation safety injection signal. The NSWS is a normally operating system that cannot be fully actuated as part of normal testing. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

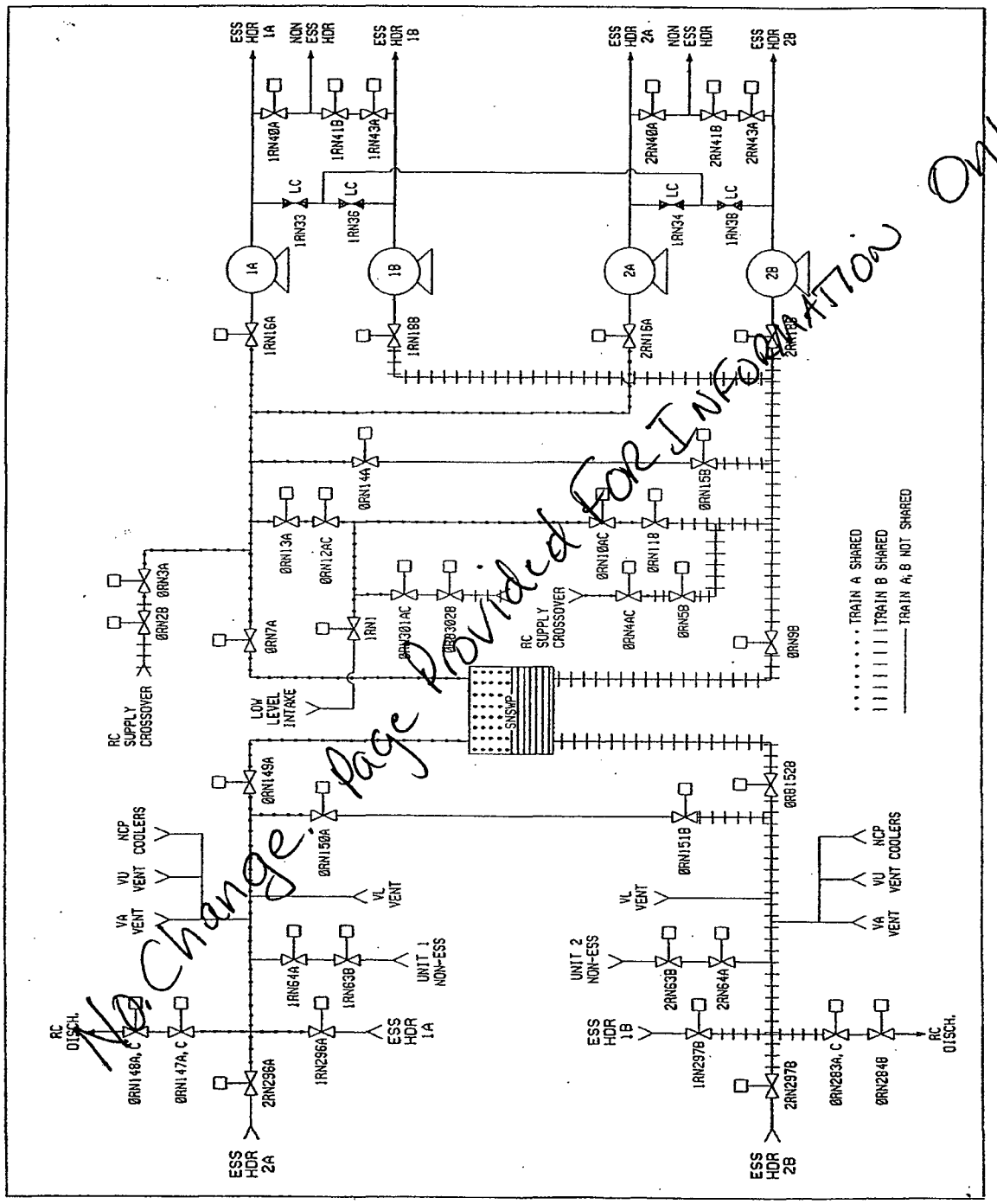
SR 3.7.7.3

This SR verifies proper automatic operation of the NSWS pumps on an actual or simulated actuation signal. The NSWS is a normally operating system that cannot be fully actuated as part of normal testing during normal operation. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. UFSAR, Section 9.2.
2. UFSAR, Section 6.2.
3. UFSAR, Section 5.4.
4. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
5. 10 CFR 50, Appendix A, GDC 5, "Sharing of Structures, Systems, and Components".

FIGURE B 3.7.7-1 NUCLEAR SERVICE WATER SYSTEM



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