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ADD1
NRR

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 102°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.

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.

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

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.

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.

A onetime change to TS 3.7.7 extends Action A.1 completion time (CT) from 72 hours to 14 days in order to address an 'A' Train Operable but Degraded Non-Conforming (OBDN) condition that affects the 'A' Train NSWS pump NPSH. The change also affects TS 3.5.2, Emergency Core Cooling System (ECCS) - Operating; TS 3.6.6, Containment Spray System (CSS); TS 3.7.5, Auxiliary Feedwater (AFW) System; TS 3.7.6, Component Cooling Water (CCW) System; TS 3.7.7, Nuclear Service Water System (NSWS); TS 3.7.9, Control Room Area Ventilation System (CRAVS); TS 3.7.11, Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), and TS 3.8.1, AC Sources- Operating.

A Note similar to the following is placed in each of the above listed TS:
"* 'A' Train NSWS is allowed to be inoperable for a total of 14 days for the correction of a degraded condition on the 'A' Train supply piping from the Standby Nuclear Service Water Pond (SNSWP). The 14 days may be taken consecutively or in parts until completion of the activity, or by March 1, 2017, whichever occurs first. During the period in which the 'A' Train NSWS supply piping from the SNSWP is not available, the 'A' Train NSWS will remain aligned to Lake Norman until the system is ready for post maintenance testing. Any maintenance that is performed on the remaining portions of 'A' Train NSWS during the period in which the 'A' NSWS from the SNSWP supply piping is not available will be limited to a 72 hour completion time. The latter will not count against the 14 day completion time. Allowance of the extended Completion Time is contingent on meeting the Compensatory Measures and Commitments described in MNS LAR submittal correspondence letter MNS-16-005."

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.

BASES

The following table identifies those actions committed to by Duke Energy in letter MNS-16-005, dated February 10, 2016 for the approval of License Amendments 282 and 261 for Units 1 and 2 respectively.

#	REGULATORY COMMITMENTS
1	The 'A' Train NSWS pumps will remain aligned to Lake Norman during the extended CT until the system is ready for post maintenance testing.
2	Any maintenance that is performed on the remaining portions of 'A' Train NSWS during the period in which the 'A' NSWS piping from the SNSWP is not available will be evaluated for impact on the ability of the system to operate while taking suction from the Lake Norman Low Level Intake (LLI) and will be limited to a 72 hour completion time.
3	The 'B' Train NSWS will be placed in its ESFAS alignment to the SNSWP water source with the 'B' Train pumps in standby prior to starting the LAR activity and remain in this alignment until the 'A' Train NSWS SNSWP water source is restored and ready for post maintenance testing.
4	Procedures will be established to provide an additional defense in depth contingency that could be used in the event of an extremely low probability of a loss of the Lake Norman water source due to a seismic event. The procedures will ensure that system operation is maintained within design limits (less than or equal to 2 NSWS pumps running on a header), control of maximum system flow, and that system configuration prevents interaction of the degraded equipment with the functional equipment.
5	Fukushima Response FLEX modifications will be installed and the FLEX strategies will be available for implementation as additional defense-in-depth on both units.
6	During the period in which the 'A' NSWS suction path from the SNSWP is non-functional, no discretionary maintenance or discretionary testing will be planned on the following: • 1A EDG • 2A EDG • The 'A' Train of NSWS excluding the activities described in the LAR for the 'A' Train NSWS piping to the SNSWP. • The 'B' Train of NSWS, ECCS, CSS, AFW, CCW, CRAVS, ABFVES or the EDGs • The switchyard and other offsite power sources • The SSF

7	A condition in which repairs could impact the ability of an SSC to perform its Safety Function would result in termination of activities. The inspection may identify a condition that cannot be resolved within the 14 day completion time. Should such a condition be identified then the system will be restored to its current OBDN condition. If the ROV survey presents any opportunities for a less intrusive or less time consuming solution for addressing the OBDN condition, then these opportunities will be pursued, as appropriate.
8	In an activity planned to be performed separate from the 14 day completion time repair activity, 0RN-7A will be tested for leakage and adjusted if necessary to minimize leakage.
9	In an activity planned to be performed separate from the 14 day completion time repair activity the SNSWP isolation flange will be test fitted to the 'A' SNSWP pipe.
10	Procedure guidance will establish controls to limit evacuation air pressure to less than a predetermined value in order to prevent air intrusion into the operating NSWS.
11	Dedicated personnel with procedure guidance will be provided to close the NSWS access manway in the auxiliary building in the event of any of the following: • An Engineered Safety Feature (ESF) actuation • Entry into RP/0/A/5700/006 Natural Disasters • Entry into RP/0/A/5700/007 Earthquake
12	This activity will be controlled under the Infrequently Performed Test or Evolution (IPTE) process defined in Fleet Directive AD-OP-ALL-106, "Conduct of Infrequently Performed Tests or Evolutions", and Duke Energy's Work Management and Execution procedures.

13	During periods when the auxiliary building NSWS piping manway is open, dedicated personnel having communication to the main control room with procedures to continuously monitor and respond to 0RN-7A leakage will be in place. If leakage increases and reaches the pre-determined leak rate limit, the repair activity will be stopped, and the manway will be closed. If conditions prevent the prompt closure of the manway, then operations will place the 'B' NSWS train in operation, secure 'A' NSWS operations and isolate the 'A' NSWS train to stop the leakage as follows: If the manway cannot be immediately closed then perform the following actions to isolate the flowpath from Lake Norman within 15 minutes: • Stop the A NSWS pumps from the control room • Close 0RN-12AC and 0RN-13A from the control room to isolate the flowpath from Lake Norman • Start B Train NSWS pumps
14	If the NSWS piping manway in the auxiliary building is opened then prior to the breach of the NSWS piping an evaluation of 0RN-7A leakage will be performed to validate proper isolation and that leakage is within acceptable limits.
15	McGuire will communicate with the Transmission Control Center (TCC) to ensure that the McGuire Control Room is notified in the event of potential grid disturbances in order that an appropriate plant response can be formulated.
16	The Work Control Center or OCC will monitor weather forecasts and radar during the activities that require the NSWS piping personnel access points to be open to assess the potential for severe weather conditions (tornado, thunderstorms).
17	Training will be provided in accordance with the Systematic Approach to Training (SAT) process to Operations personnel on this TS change and the associated evolution to inspect and correct the degraded condition in the 'A' NSWS supply piping from the SNSWP.
18	Operations will review applicable abnormal operating procedures related to the response to an earthquake, the loss of the Lake Norman and the loss of NSWS prior to making 'A' NSWS suction path from the SNSWP inoperable and each shift until 'A' Train NSWS operability is restored.

BASES

19	The repair work on the NSWS 'A' Train suction from the SNSWP will be scheduled during a period in which hurricanes and tornadoes have a lower likelihood of occurrence.
20	The Outage Command Center (OCC) will be manned while performing the activities authorized by this amendment.
21	The following list of equipment will be protected: • 'B' Train NSWS • 1B EDG • 2B EDG • 1B ECCS • 2B ECCS • 1B CSS • 2B CSS • 1B AFW • 2B AFW • 1B CCW • 2B CCW • B CRAVS • B ABFVES • Auxiliary Building WZ Sump and equipment supporting function of sump • SSF including Standby Makeup pumps for Unit 1 and Unit 2 • Unit 1 TDCAP • Unit 2 TDCAP • Unit 1 Containment Ventilation Cooling Water System (RV) • Unit 2 Containment Ventilation Cooling Water System (RV)
22	If required to be installed the new personnel access opening to be located on the 'A' Train NSWS piping in the auxiliary building will be designed and installed in accordance with the Engineering Change Process.

BASES

23	Foreign Material Exclusion (FME) will be controlled during the proposed activities in accordance with AD-MN-ALL-0002, Foreign Material Exclusion (FME). Any debris resulting from the obstruction removal activity will be mechanically cleaned out before the system is closed for return to service per FME plan developed in accordance with the above procedure. The system will be video inspected and reversed flushed from the LLI to the SNSWP with isolation to downstream components to force any sediment back to the SNSWP.
24	Following 'A' Train NSWS restoration, testing will be performed to verify that the as left NSWS performance meets or exceeds pre-activity performance including 'A' Train NSW pump NPSH conditions.
25	Prior to entering the 14 day CT perform an evaluation to ensure that there will be no anticipated impact to 'A' NSWS water supply from the LLI from Alewife fish during 14 day CT.
26	The new personnel access piping opening (in the auxiliary building) will be controlled by using procedures developed or revised for this purpose to maintain positive control of the opening and to prevent an unmonitored release.
27	The ERAT program includes the option to use a SSA (Safety Significant Activity) code which will cause the risk condition color to be "YELLOW". MNS will use this code during the activities described in this LAR.
28	Designated operators will be available to execute the manual actions associated with aligning the affected unit's 'A' Train NSWS pump to the 'B' NSWS SNSWP via the Main Supply Crossover piping.
29	If the contingency personnel access opening is installed, then Security personnel will establish the proper controls and compensatory measures prescribed by security procedures and the security plan.

BASES

30	In support of the contingency the following conditions will be established before the start of activities in the LAR: • The 'A' valve (0RN-14A) will be opened prior to the evolution and power will be removed from the valve operator. • The 'B' valve (0RN-15B) will be maintained closed with the ESFAS signal from each unit blocked prior to the evolution. Maintaining 0RN-15B closed with power removed satisfies operability requirements for the 'B' Train NSWS. The 'B' valve (0RN-15B) can be opened from the control room after power is restored if conditions warrant the use of this contingency.
31	Operations will utilize the concurrent dual verification process when operating 0RN-7A.
32	In order to prevent inadvertent operation of 0RN-7A, MNS will perform the following actions to ensure that the position of this valve is physically restrained with several barriers in place to prevent operation or movement of the valve while the NSWS piping access manway in the auxiliary building is open: • The operating hand wheel for 0RN-7A will be in the closed position and restrained with a lock and tag. • A mechanical stem locking device will be installed on 0RN-7A to prevent ANY movement of the valve disk. • Electrical isolation of the 0RN-7A motor operator will be established by removing its electrical supply breaker from its MCC cubical, and the cubicle door tagged to prevent installation of the breaker while the auxiliary building manway is open. • A dedicated person with no other duties will be stationed in the room where 0RN-7A and the access manway are located to monitor for 0RN-7A leakage and to prevent anyone from operating 0RN-7A while the NSWS piping manway is open.

BASES

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.

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.

BASES

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