UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos: 50-369/85-40 and 50-370/85-41

Licensee: Duke Power Company
422 South Church Street
Charlotte, NC 28242

Facility Name: McGuire Nuclear Station

Docket Nos: 50-369 and 50-370 License Nos: NPF-9 and NPF-17

Inspection at McGuire Nuclear Station near Huntersville, North Carolina.

Inspectors: H C Dance /for 12/13/85
W. Orders, Senior Resident Inspector Date Signed

H C Dance /for 12/13/85
R. Pierson, Resident Inspector Date Signed

Approved by: Hugh C Dance 12/13/85
Hugh C. Dance, Section Chief Date Signed
Division of Reactor Projects

SUMMARY

Inspection on October 29, 1985 through November 20, 1985.

Scope: This routine unannounced inspection involved 200 hours onsite in the areas of operations, surveillance testing and maintenance activities.

Results: Of the areas inspected, one violation was identified in the area of surveillance testing.

REPORT DETAILS

1. Persons Contacted

   Licensee Employees

   *T. McConnell, Plant Manager
   *B. Travis, Superintendent of Operations
   *D. Rains, Superintendent of Maintenance
   *B. Hamilton, Superintendent of Technical Services
   *L. Weaver, Superintendent of Administration
   *M. Sample, Superintendent of Integrated Scheduling
   *E. McCraw, License and Compliance Engineer
    D. Mendezoff, License and Compliance Engineer
    D. Marquis, Performance Engineer
    R. White, IAE Engineer
    R. Branch, Site QA Supervisor

   Other licensee employees contacted included construction craftsmen, technicians, operators, mechanics, security force members, and office personnel.

   *Attenced exit interview.

2. Exit Interview

   The inspection scope and findings were summarized on November 26, 1985, with those persons indicated in paragraph 1 above. The violation discussed in paragraph 12 was acknowledged. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

3. Licensee Action on Previous Enforcement Matters

   No previous enforcement items were closed.

4. Unresolved Items*

   Two unresolved items were identified during this report period and are discussed in paragraphs 11 and 13.

5. Plant Operations

   The inspection staff reviewed plant operations during the report period, to verify conformance with applicable regulatory requirements. Control operator logs, shift supervisors logs, shift turnover records and equipment removal and restoration records were routinely perused. Interviews were

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*An Unresolved Item is a matter about which more information is required to determine whether it is acceptable or may involve a violation or deviation.

conducted with plant operations, maintenance, chemistry, health physics, and performance personnel. Activities within the control room were monitored during shifts and at shift changes. Actions and/or activities observed were conducted as prescribed in applicable station administrative directives.

The complement of licensed personnel on each shift met or exceeded the minimum required by technical specifications (TS).

Plant tours taken during the reporting period included but were not limited to the turbine buildings, auxiliary building, Units 1 and 2 electrical equipment rooms, Units 1 and 2 cable spreading rooms, and the station yard zone inside the protected area. During the plant tours, ongoing activities, housekeeping, security, equipment status and radiation control practices were observed.

Unit 1 Operations Summary

Unit 1 began the reporting period in Mode 1 operating at 100% power and remained at that power level until November 2, 1985. At 6:40 a.m. that morning, with both units operating at 100% power, the flexible discharge line of Instrument Air Compressor B failed resulting in the loss of instrument air on both McGuire units. The loss of instrument air resulted among other things in the pneumatic main feedwater regulator valves drifting closed on both units, ultimately resulting in reactor trips on both units due to lo-lo steam generator level. A safety injection occurred on Unit 1 but did not occur on Unit 2 as system pressure did not decrease to the initiating setpoint.

The safety injection on Unit 1 required the declaration of an Unusual Event. The declaration was made at 7:25 a.m., that morning and was terminated at 9:04 a.m. The unit was restarted later that day and remained in Mode 2 pending repair of a severed instrument fitting on the secondary side of the "A" Steam Generator. Efforts to repair the instrument fitting in Mode 2 were futile. It was decided to place the unit in a status more conducive to the repair, thus the unit was placed in Mode 3 at 12:55 p.m., on November 3 and was subsequently cooled down to 360 degrees F and 1600 psig.

On Monday, November 4, 1985, the instrument fitting was repaired but a through wall leak on the "D" Steam Generator feedwater check valve was detected. The unit was cooled down and placed in Mode 5 at 8:08 a.m., on November 6, 1985, to facilitate the necessary valve repairs. Following the completion of the repairs, the unit was returned to the grid at 10:34 a.m., on November 9. That afternoon power ascention was terminated due to high containment temperature which resulted when 1 of 3 operable Containment Cooling units was lost. Power was reduced to 10% to facilitate repairs to the cooling unit and was subsequently increased to 100%.

The unit remained at full power until November 20, when a unit runback occurred due to a main feedwater pump trip. The remaining main feedwater pump was unable to maintain the required flow, began to oscillate, and ultimately tripped on high discharge pressure. The trip of the remaining feed pump caused a turbine trip and reactor trip. All systems responded normally following the trip. The unit completed the reporting period in preparation for unit startup.

Unit 2 Operations Summary

Unit 2 began the reporting period in Mode 1 operating at 100% power and remained at that power level until November 2 when the reactor tripped as discussed in the Unit 1 Operations section. A unit fast recovery was initiated with the unit reaching 100% power at 4:05 p.m., on November 3. The unit remained at 100% power for the duration of the reporting period.

6. Surveillance Testing

The surveillance tests below were analyzed and/or witnessed by the inspector to ascertain procedural and performance adequacy and conformance with applicable Technical Specifications. The selected tests witnessed were examined to ascertain that current written approved procedures were available and in use, that test equipment in use was calibrated, that test prerequisites were met, system restoration completed and test results were adequate.

PT/1/A/4204/01A	Residual Heat Removal Pump 1A Performance Test
TT/1/A/9100/102	Service Water Train 1A Flowrate Comparision
PT/1/A/4209/03P	NV Valve Stroke Timing-shutdown
PT/2/A/4600/03E	Refueling Canal Drain Operability Checklist
PT/2/A/4252/01	Auxiliary Feedwater Performance Pump Test #2
PT/2/A/4252/01A	Motor Driven Auxiliary Feedwater Performance Test 2A
PT/2/A/4252/01B	Motor Driven Auxiliary Feedwater Performance Test 2B

7. Maintenance Observations

The maintenance activities below were analyzed and/or witnessed by the resident inspection staff to ascertain procedural and performance adequacy and conformance with applicable Technical Specifications. The selected activities witnessed were examined to ascertain that where applicable, current written approved procedures were available and in use, that prerequisites were met, equipment restoration completed and maintenance results were adequate.

042811	PM/PT Channel Source Checks on all EMF's
56944	Boroscope Containment Heat Exchanger Tubes
126002	SSF Diesel
048176	#2 Auxiliary Feedwater Motor Driven Pump

8. Vital Battery Technical Specification

On October 3, 1985, Operations personnel determined that the method in which they performed OP/O/A/6350/01A (125 VDC/120 VAC Instrument and Control Power) did not meet the intent of TS 3.8.3.1 as follows. To remove a battery from service for the purpose of an equalizing charge, Operations personnel performed OP/O/A/6350/01A, Enclosure 4.11. The procedure requires placing the 120 VAC power on regulated power supply, removing the associated static inverter from service, closing the tie breakers between the DC distribution centers and then opening the breaker between the battery and the DC distribution center. The battery is then logged in the Technical Specification Action Item Logbook as a 72-hour action item.

The 120 VAC Vital Instrumentation and Control Power System receives its normal power from separate independent inverters. A regulated power supply is provided as an alternate non-essential source for one AC vital load for a maximum of 24 hours per TS 3.8.2.1.

Consequently, unless the provisions of Action b. of TS 3.8.2.1 are met, in that the associated bus is energized with an operable battery bank via an operable tie breaker within two hours, the TS allow the use of a regulated power supply as an alternate non-essential source for only 24 hours versus the 72 hours as implemented by procedure OP/O/A/6350/01A. Since OP/O/A/6350/01A allowed up to 72 hours without specifying the provisions of Action b. of TS 3.8.2.1, this does not meet the intent of TS 3.8.3.1. Inasmuch as this was licensee identified, was a Severity Level IV, was reported and corrected promptly and was not a violation that could reasonably be expected to have been prevented by the licensee's corrective action for a previous violation, a notice of violation will not be issued.

9. Valve Mislabeled

On August 12, 1985, it was discovered that valve 2RN-886 was listed as 2RN-866 in procedure PT/2/A/4200/02A (Monthly Containment Integrity Verification) and PT/2/A/4200/02C (Containment Integrity verification During Core Alterations). The error was discovered during a review of PT/O/B/4700/23 (Semi-Annual Outside of Containment Locked Valve Verification). Upon discovery, 2RN-886 was verified to be locked closed as required. Valve 2RN-886 is located on the Nuclear Service Water (RN) non-essential header containment penetration (M307). This valve is also capped when not in use. Although this incident is indicative of an inadequate procedure, the NRC encourages licensee self-identification and correction of problems through systematic reviews such as those conducted to find this error. Pursuant to the stipulations of 10 CFR Part 2 Appendix C Section V.A., a notice of violation for an inadequate procedure will not be issued.

10. Lost Work Request

On October 14, 1985, it was determined that the TS required monthly source check surveillance on all Unit 2 EMF's (Process and Area Radiation Monitoring Device) performed on May 19, 1985, would have to be classified as missed surveillance due to the loss of the documentation. The monthly surveillance performed prior to and after this event showed that the EMFs met the functional specifications. To prevent this type incident from re-occurring, the licensee plans to implement a Maintenance Management Procedure 4.3 (Lost Work Request), to address this issue. In addition, the planning section will reevaluate the work request routing system, looking for improvements for control and transfer between groups and will evaluate the method of keeping work requests and all associated documentation together. Although the event qualifies as a missed surveillance, pursuant to the stipulations of 10 CFR 2, Appendix C, Section V.A., a notice of violation for failure to meet the surveillance interval specified in TS 4.3.3.8 and 4.3.3.9 will not be issued.

11. Evaluation of Delta T Incident

Background

During the course of Cycle 2, McGuire Unit 2 has experienced a gradual decrease in the indicated value of the full-power Delta T across the core. In the latter part of June, approximately six weeks after power escalation commenced for Cycle 2, station personnel performed a precision heat balance to verify RCS (Reactor Coolant System) flow. During this six-week time frame, the indicated Delta T had decreased by approximately 1 degree F. The precision heat balance indicated an increase in RCS flow from Cycle 1 and a corresponding decrease in the measured full-power Delta T's for the four loops. Because the Delta T channels for the overtemperature Delta T and overpower Delta T setpoints were scaled to the full-power Delta T's obtained during the Cycle 1 precision heat balance, the Delta T channels were underpredicting core power by as much as 5% RTP (Reactor Thermal Power).

Station personnel contacted the Safety Analysis Unit to determine whether the allowable values for the overtemperature Delta T and overpower Delta T setpoints had been exceeded. In addition, they requested guidance as to what corrective actions should be taken related to the apparent non-conservative indication of power in the Delta T channels. It was mutually agreed upon that the Delta T channels should be rescaled to the Delta T values obtained from the most recent precision heat balance. On June 27, 1985, station personnel rescaled the Delta T channels to the more conservative, lower values of Delta T obtained from the June precision heat balance. However, because of some peculiarities related to the drift of the Delta T channels, it was difficult to determine whether the overtemperature Delta T and overpower Delta T setpoints had exceeded their allowable values. On July 2, 1985, a letter was sent to Westinghouse requesting their assessment of the causes and licensing implications of the drift in the Delta T channels.

The results of the Westinghouse evaluation identified two potential causes for the Delta T decrease; a change in the hot leg temperature streaming pattern and/or a reduction in thermal power. Based upon an extensive evaluation of key plant parameters, Westinghouse concluded that the maximum error due to changes in hot leg temperature steaming pattern is limited to 0.5 degree F. Some secondary plant parameters indicate that up to 0.5 degree F of the Delta T reduction may be due to a decrease in thermal power, possibly caused by fouling of the feedwater venturis.

The Westinghouse evaluation stated that the approximately 1 degree F drift associated with the Delta T channels is within the uncertainty allowances assumed in the safety analyses. Therefore, the precision heat balance performed in June may be considered valid. In addition, since the error associated with the calculated flow is within the uncertainty allowance assumed in the safety analyses, there are no flow related technical specification violations associated with the Delta T drift incident. However, when the 1 degree F drift is added to the errors associated with not calibrating the Delta T channels during startup, the total error associated with the Delta T channels is greater than the uncertainty allowances assumed in the safety analyses. Prior to the June 21, 1985, calibration of the Delta T channels, these errors were as follows:

	Loop A	Loop B	Loop C	Loop D
BOC 1 Delta T	57.4	57.8	59.8	58.1
6/21/85 Delta T	55.97	54.73	56.53	56.12
Error in Degree F	1.43	3.07	3.27	1.98
Error in % full-power	2.5	5.3	5.5	3.4

These Delta T channel errors can potentially impact the FSAR accidents which take credit for a reactor trip on the overtemperature Delta T or overpower Delta T trip functions. There is sufficient margin included in the overtemperature Delta T setpoint calculation to account for the Delta T channel errors. Therefore, the accident analyses which take credit for a reactor trip on overtemperature Delta T (RCCA Withdrawal at Power, RCCA Misalignment, and Boron Dilution) remain valid. However, for the overpower Delta T trip function, there is not sufficient margin in the setpoint calculation to account for the Delta T channel errors.

Several Technical Specification problem areas were encountered, including unit consistency in the overpower and overtemperature Delta T expressions, application of maximum setpoint variation from the computed trip setpoint, and TS implication that rescaling should take place each time a precision heat balance is performed. In some instances McGuire appeared to be less conservative than recommended, and in one appeared to be more conservative.

This issue will be maintained as an Unresolved Item (370/85-41-01) pending qualified evaluation of Westinghouse's analysis and subsequent evaluation of this incident as it affects McGuire.

12. Failure to Perform Technical Specification Surveillance

On October 22, 1985, at 1:20 P.M., Operations personnel discovered that Enclosure 13.2 (Refueling Canal Drain Operability Checklist) of PT/2/A/4600/03E (Quarterly Surveillance Items) had not been completed for Unit 2 by its latest due date of October 18. The refueling canal drains are required to be operable in Modes 1 through 4. The procedure was subsequently performed and successfully completed at 1:45 p.m. that afternoon.

During the licensee investigation of the incident, they discovered that the Unit 2 PORV (Pressure Operated Relief Valve) block valve operability test (Enclosure 13.1 of PT/2/A/4600/03E) was performed on October 21, three days after its latest due date of October 18. The PORV block valves are required to be operable in Modes 1 through 3.

A review of the incident with respect to the root cause revealed that an Operations Engineer in charge of scheduling Operations periodic tests reviewed PT/2/A/4600/03E, which had been completed on June 25. He incorrectly assumed that the PT performed on June 25 met the requirements for the entire quarter (April 21 through July 21), and the next due date would be October 21, or three months from July 21. The correct due date for the PT was September 25 or three months from its last completed date of June 25.

On October 21, control room personnel completed Enclosure 13.1 of PT/2/A/4600/03E (PORV Block Valve Operability Checklist) but did not complete Enclosure 13.2 (Refueling Canal Drain Operability Checklist). On October 22, Operations shift personnel turned the procedure over to the Operations PT group, stating that the shift did not have time to perform the PT. The assistant shift supervisor in charge of the PT group contacted the Operations Engineer to find out how much grace time there was left on the surveillance. It was at this point that the Operations Engineer detected his mistake.

It was not discovered until later, during the investigation on the refueling canal drains, that the PORV block valves had been technically inoperable from October 18 to October 21 when Enclosure 13.1 of the PT was completed. The same Operations shift was on duty on October 21 and 22. The shift supervisor initialed the procedure step verifying Enclosure 13.2 (Refueling Canal Drain Operability Checklist) was completed and signed the procedure as being completed on October 22. The shift supervisor also made log entries into the shift supervisor's logbook concerning the missed surveillance on the refueling canal drains but no entry was made concerning the PORV block valves.

Contrary to TS 3.6.5.8 and 4.4.4.2, the surveillance to verify the operability of the refueling canal drains and the PORV block valves were not performed within their applicable surveillance intervals as described above. This is a violation (370/85-41-02).

13. Containment Pressure Control

A review of Licensee Event Report (LER) 369/85-29, has indicated that the peak containment pressure calculation for FSAR Section 6.2.1 resulted in a value which may exceed the design internal containment pressure of 15 psig. This analysis was performed using parameters as described in LER 369/85-29, specifically the WCAP-8246 Model computer code. With the procedural change implemented on November 30, 1984, such that the order in which pump suction transfer changed (containment spray pumps are swapped last on the lo-lo alarm), the containment spray could have been secured for a short period of time following ice melt, this could have resulted in containment pressure reaching 15.8 psig.

Duke has proposed that with a newer computer code, WCAP 10329 and other considerations, containment pressure would not exceed 15 pounds, even with the procedural changes implemented in November 1984.

Emergency Procedures were changed on 10/4/85 to specifically require ND spray initiation at 3000 seconds versus 3600 seconds. This reduces peak pressure to within design pressure using the older computer code.

This item will be carried as an Unresolved Item (369/85-40-01).

14. Inservice Testing Discrepancy

On October 18, 1985, Quality Assurance (QA) personnel were performing QA surveillance MC-85-63 on the Pump and Valve Inservice Testing Program (IWP/IWV). During the surveillance, it was discovered that valves 1NV-223 and 2NV-223, Centrifugal Charging Pump Suction from Refueling Water Storage Tank Check Valves had never been partially stroked as required by the IWP/IWV. These check valves are located between the Refueling Water Storage Tank and the Centrifugal Charging Pump Suction line. A search was conducted for station procedures which included partially stroking these valves. None were found. A Nonconforming Item (NCI) Report was subsequently issued by QA to the Nuclear Production Department.

The IWV section of IWP/IWV provides rules and requirements for inservice testing to verify operational readiness of certain valves. These valves are required to perform a specific function in shutting down a reactor to cold shutdown conditions or in mitigating the consequences of an accident.

Article 3522 of IWV states that "check valves shall be exercised to the position required to fulfill their function unless such operation is not practical during plant operation. If only limited operation is practical, during plant operation the check valve shall be part-stroke exercised during plant operation and full-stroke exercised during cold shutdowns. Valves that cannot be exercised during plant operation shall be specifically identified by the owner and shall be full-stroke exercised during cold shutdowns."

The IWV test requirement for valves 1NV-223 and 2NV-223 is to verify proper valve movement of these valves every three months. However, in accordance with Article 3522, the licensee has taken exception to full-stroke exercising these valves during plant operation or cold shutdown. Instead, these valves were to be partially stroked during cold shutdown and fully stroked during refueling.

Licensee personnel believe that the same reasoning for not full-stroke exercising these valves during plant operation or cold shutdown should also apply to the partial-stroke test. Testing of this valve requires opening INV-221A or INV-222B, Changing Pump Suction from Refueling Water Storage Tank and Centrifugal Changing Pump Suction from Refueling Water respectively. Failure of one of these valves in the open position aligns the Refueling Water Storage Tank to the suction of the changing pumps with no means of isolating the flow path. This could result in an increase in boron inventory in the reactor coolant system and could result in a plant shutdown. Full-stroke exercising at cold shutdown could result in a low temperature overpressurization. It is their intention to revise the IWP/IWV submittal to require only full-stroke exercising during refueling. The partial-stroke requirement will be deleted.

A review of past events determined that failure to perform this type of surveillance was an isolated incident. In addition, this discrepancy was identified by a licensee conducted QA surveillance. Since this incident meets the requirements of 10 CFR Part 2 Appendix C Section V.A., a notice of violation for failure to perform a required surveillance will not be issued.

15. Open Items Review

The following item was reviewed in order to determine the adequacy of corrective actions, the implications as they pertain to safety of operations, the applicable reporting requirements, and licensee review of the event. Based upon the results of this review, the item is herewith closed.

Unit 2 LER 85-22