UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W., SUITE 3100
ATLANTA, GEORGIA 30303

Report Nos. 50-369/81-24 and 50-370/81-12

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

Facility Name: McGuire Nuclear Station

Docket Nos. 50-369 and 50-370

License No. NPF-7 and CPPR-83

Inspectors: R. L. Fiedler — 9-2-81
R. L. Fiedler — Date Signed
D. P. Falconer — 9-2-81
D. P. Falconer — Date Signed

Approved by: P. T. Burnett — 9-2-81
P. T. Burnett, Acting Section Chief — Date Signed
Engineering Inspection Branch
Engineering and Technical Inspection Division

SUMMARY

Inspected on August 4 - 13, 1981

Areas Inspected

This routine, announced inspection involved 146 inspector-hours onsite in the areas of witnessing initial criticality, witnessing low power testing and review of power ascension test procedures.

Results

No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

*M. D. McIntosh, Plant Manager
*G. Cage, Operations Superintendent
*T. L. McConnell, Technical Services Superintendent
*T. J. Keane, Health Physics Supervisor
*R. Michael, Radwaste and Chemistry
*W. M. Sample, Projects and Licensing
*J. Randles, Performance Engineer
D. Marquis, Test Engineer
R. Tropasco, Test Engineer
D. Lempke, Projects and Licensing

Other licensee employees contacted included several engineers and numerous operators.

NRC Resident Inspector

*M. J. Graham

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on August 13, 1981 with those persons indicated in Paragraph 1 above.

3. Licensee Action on Previous Inspection Findings

Not inspected.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve noncompliance or deviations. The one new unresolved item identified during this inspection is discussed in paragraph 6.

5. Witnessing Initial Criticality

The inspectors observed the preparation for initial criticality and witnessed initial criticality in order to verify the following:

a. That the licensee was meeting the license commitments.

b. That startup and intermediate nuclear instruments were calibrated and the former were operating with the required count rate.

c. That crew requirements were met as defined in the procedures, and that staffing satisfied the requirements of technical specifications and license conditions regarding licensed operators.

d. That the proper version of the procedure was being used and that the procedure was being followed.

e. That on-site technical support was adequate.

The approach to initial criticality began at approximately 1500 on August 7, 1981 with the withdrawal of shutdown bank A control rods. The desired control-rod configuration of control bank D at 145 steps withdrawn and all other control and shutdown banks fully withdrawn was achieved at approximatly 2240 on August 7, 1981; at which time a boron dilution by injection of demineralized water into the nuclear coolant system (NCS) at a rate of approximatly 50 gpm was initiated. At 0913 on August 8. 1981, the dilution rate was reduced to 27 gpm and at 0925, August 8, 1981 the dilution was stopped. The reactor was declared critical at 0928, August 8, 1981 with approximately 2×10^3 counts per second (cps) on the source range. The reactor operator immediately inserted control bank D to 122 steps withdrawn in order to maintain the neutron flux level to a constant value of approximately 2×10^3 cps on the source range.

The operator actions during initial criticality were timely and correct.

At 10:00 on August 8, 1981, after adequate time for mixing of the NCS was allowed, the following conditions existed:

a. NCS boron concentration of 1279 ppm.

b. Control bank D at 74 steps all other control rod banks fully withdrawn.

c. Neutron flux level constant at approximately 10^3 cps as indicated by the source range.

The corrected critical boron concentration for a neutron flux level of 10 cps as indicated by the source range, and control bank D at 145 steps and all other control rod banks fully withdrawn was 1312 ppm. This constituted an over shoot in the dilution of 33 ppm which is equvalivent to 323 pcm at these conditions.

The over shoot was caused by the test group not properly anticipating the delayed mixing of the NCS.

A review of the ICRR plot of source range counts versus time showed that for the first nine hours the plot predicted criticality at some time after 1200 on August 8, 1981. However from 0830 to 0900 a sharp bend occurred in the plot. The remainder of the plot, from 0900 to criticality, was a steep vertical line.

The licensee agreed to include a requirement in the initial criticality procedure for Unit 2 to stop the dilution and allow mixing before proceeding at a lower dilution rate, when either of the following conditions is reached:

a. When the NCS boron sample reaches a boron concentration within 150 ppm of the design estimated critical boron concentration or,

b. The ICRR using the most conservative source range is approximately 0.1.

This is inspector followup item (IFI-50-370/81-12-01).

6. Low Power Testing

The inspectors witnessed portions of and reviewed the results of the following Low Power Tests:

TP/1/A/2150/03A	Boron Endpoint Measurement, All rods out,
TP/1/A/2150/03B	Boron Endpoint Measurement, Control bank D at zero, steps all other control rods fully withdrawn,
TP/1/A/2150/03C	Boron Endpoint Measurement, Control bank D & C at zero steps all other control rods fully withdrawn,
TP/1/A/2150/11A	Isothermal Temperature Coefficient, All rods out,
TP/1/A/2150/11B	Isothermal Temperature Coefficient, Control bank D at zero steps all other control fully withdrawn,
TP/1/A/2150/11C	Isothermal Temperature Coefficient, Control banks D & C at zero steps all other control rods fully withdrawn,
TP/1/A/2100/02	Zero Power Physics Controlling Procedure, Control bank D worth measurements were included as part of this procedure.

The above tests were witnessed and the procedures reviewed to verify the following:

a. Procedure of the appropriate revision was available and in use by all the crew members.
b. Minimum crew requirements were met.
c. All test prerequisites and initial conditions were met.
d. Special test equipment required by the procedure was calibrated and inservice.
e. Test was performed as required by a technically adequate procedure.
f. Changes to procedures were made in accordance with administrative requirements.
g. Operator actions were correct and timely.
h. A summary analysis was made.
i Data were being collected for final analysis by the proper personnel.
j. Test acceptance criteria were met.
k. Data sheets were complete, legible and the person taking the data identified.
l. Recorder traces were properly labeled and identified.
m. Special test exception requirements of the Technical Specification's were being met.

The performance of testing appeared adequate with the following exceptions.

All of the acceptance criteria of TP/1/A/2150/11A Isothermal Temperature Coefficient (ITC) all rods out (ARO) condition were not met. The ITC at ARO was less negative than that required by the FSAR. A Procedure Discrepancy process record was written. The resolution of this discrepancy will be reviewed during a subsequent inspection. This is inspector follow item (IFI-50-369/81-24-02).

The measured value of the ITC resulted in the identification of a positive moderator temperature coefficient which required Special Test Exception 3. 10. 3 to be invoked. The inspector could not verify by any documentation that the test group notified the licensed operators on shift that an LCO was not met and that a special test exception was invoked. There was no documentation by the licensed operator that the requirements of Special Test Exception 3. 10. 3 were met. The inspector verified that the requirements of Special Test Exception 3. 10. 3 were met by the test group and reminded the licensed operator on shift at the time that it was the responsibility of the licensed operator to verify that the requirements of the Technical Specifications were being met. There was no documentation that the operation of the Unit in the special test exception was being passed on to on-coming shifts. This problem was brought to the attention of plant supervisors who assured that this information was included in the control room logs. The inspector stressed the importance of notifying the licensed control room operators on shift of changing plant conditions. This was also discussed during the exit interview.

The licensee discovered an error in the ARO incore data collected by the on-line process computer during the zero power physics test. Extensive diagnostics revealed the application of incorrect conversion constants during data acquistion and incorrect settings of the incore detector travel limits. Both problems were resolved and the licensee plans to retake the ARO flux map later in the zero power physics test.

While observing control room activities during low power testing it came to the attention of the inspector that the waste liquid effluent line flow-rate recorder was not in continuous operation. This recorder was turned on only during actual waste liquid effluent discharges. This is an apparent violation of Technical Specification 3.3.3.8. This specification states that the radioactive liquid effluent monitoring instrumentation channels shown in Table 3.3-12 shall be OPERABLE. APPLICABILITY: At all times. The waste liquid effluent line flow-rate measurement device is listed as item 4.a. of table 3.3-12. BASES 3/4.3.3.8 states that the radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents.

The licensee maintains the intent of the specification is to ensure the flow recorder is operating during actual releases of liquid effluents only. Therefore, the recorder is operated only during planned releases by procedural requirements and turned off following the planned release.

Further, the effluent discharge path is isolated by two locked closed valves, one lock key is under the administrative control of the radwaste and chemistry group and the other lock key is under the administrative control of the operation group. Therefore, a potential release is unlikely. This is an unresolved item, (UNR-50-369/81-24-01), pending clarification of the requirement. The licensee committed to maintain the waste liquid effluent line flow-rate recorder in continuous operation until this item is resolved.

7. Power Ascension Test Procedure Review

The inspector reviewed procedure TP/1/A/2150/04A, Doppler-Only Power Coefficient, to verify the following:

a. The procedure format was consistent with Regulatory Guide 1.68.
b. The test objectives, pertinent prerequisites and initial test conditions were clearly identified.
c. The procedure incorporated clearly identified and quantitative acceptance criteria.
d. The procedure was consistent with the test description provided in the FSAR.

The procedure was acceptable.