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

Report Nos: 50-369/83-16 and 50-370/83-23

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

Docket Nos: 50-369 and 50-370

License Nos: NPF-9 and CPPR-84

Facility Name: McGuire 1 and 2

Inspection at McGuire site near Charlotte, North Carolina

Inspectors: J. F. Rogge for — 5/6/83
W. Orders — Date Signed

J. F. Rogge for — 5/6/83
J. Maxwell — Date Signed

Approved by: A. C. Rone — 5/6/83
A. Ignatonis, Acting Section Chief — Date Signed
Project Branch 2, Division of Project and
Resident Programs

SUMMARY

Inspection on March 2-20, 1983

Areas Inspected

This routine, announced inspection involved 166 resident inspector-hours on site in the areas of plant operations, surveillance testing activities, maintenance activities, broken hold-down springs, missing thermal sleeves, steam generator modification, and plant modification.

Results

Of the 7 areas inspected, no violations or deviations were identified in 6 areas; one violation was found in one area (Failure to control activities affecting quality concerning station modification (50-369/83-16-02)).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*M. McIntosh, Station Manager
*G. Cage, Superintendent of Operations
E. Estep, Project Engineer
*M. Sample, Project Engineer
*B. Barron, Operations Engineer, Unit 2
*D. Mendezoff, Licensing Engineer
*T. McConnel, Superintendent and Technical Services
*L. E. Weaver, T&E Supervisor

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

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on March 18, 1983, with those persons indicated in paragraph 1 above. The licensee expressed understanding of the discussed inspection findings.

3. Licensee Action on Previous Enforcement Matters

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. New unresolved items identified during this inspection are discussed in paragraphs 8 and 13.

5. Plant Operations

The inspector reviewed plant operations throughout the report period, March 2 - March 20, 1983, to verify conformance with regulatory requirements, technical specifications and administrative controls. Control room logs, shift supervisors logs, shift turnover records and equipment removal and restoration records were routinely perused. Interviews were conducted with plant operations, maintenance, health physics, and performance personnel on day and night shifts.

Activities within the control rooms were monitored during all shifts and at shift changes. Actions and/or activities observed were conducted as prescribed in Section 3.1 of the Station Directives. The complement of

licensed personnel on each shift met or exceeded the minimum required by technical specifications. Operators were responsive to plant annunciator alarms and appeared to be cognizant of plant conditions.

Plant tours were taken throughout the reporting period on a routine basis. The areas toured included but were not limited to the following:

Turbine Buildings

Auxiliary Building

Units 1 and 2 Electrical
Equipment Rooms

Units 1 and 2 Cable
Spreading Rooms

Station Yard Zone
within the protected area

Unit 2 Reactor Building

During the plant tours, ongoing activities, housekeeping, security, equipment status and radiation control practices were observed.

McGuire Unit 1 continued a maintenance outage throughout the report period. The primary objectives of the outage were threefold as follows:

1) perform D2/D3 steam generator modification
2) remove loose thermal sleeves
3) repair valve ND-1

Outage activities are detailed elsewhere in this report. At the close of this report period, the steam generator modification are complete aside from feedwater line weldups, all thermal sleeves have been removed except one 10 inch cold leg accumulator sleeve which is still missing, and valve ND-1 has been repaired and tested.

McGuire Unit 2 received operating license NPF-17 on March 3, 1983. At 2:05 a.m. the following day, the licensee loaded the first of the 193 fuel assemblies, and completed loading the core of 4:35 a.m. on March 7.

The licensee devoted the remainder of the report period preparing to enter Mode 5, which occurred at 3:05 p.m. on March 22. Current plans entail initial criticality on or before April 25, 1983.

6. Surveillance Testing

The surveillance tests detailed below were analyzed and/or witnessed by the inspector to ascertain procedural and performance adequacy.

The completed test procedures examined were analyzed for embodiment of the necessary test prerequisites, preparations, instructions, acceptance criteria and sufficiency of technical content.

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.

The selected procedures perused attested conformance with applicable Technical Specifications, they appeared to have received the required administrative review and they apparently were performed within the surveillance frequency prescribed.

Procedure	Title
PT-2-A-4350-02A	D/G 2A Operability Test
PT-2-A-4600-05	Radiation Monitor Functional
PT-2-A-4350-03A	Electrical Power Source Alignment
PT-2-A-4208-02	Containment Spray Valve Stroke
PT-2-A-4250-046	Turbine Trip - Reactor Trip Functional
PT-2-A-4350-10	125 VDC Vital T&C

The inspector employed one or more the following acceptance criteria for evaluating the above items:

10 CFR
ANSI N 18.7
McGuire Technical Specifications
McGuire Station Directives
Duke Administrative Policy Manual

Within the areas inspected, no violations or deviations were identified.

7. Maintenance Observations

The maintenance activities categorized below were analyzed and/or witnessed by the inspector to ascertain procedural and performance adequacy.

The completed procedures examined were analyzed for embodiment of the necessary prerequisites, preparation, instruction, acceptance criteria and sufficiency of technical detail.

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.

The selected work requests/maintenance packages perused attested conformance with applicable Technical Specifications and procedural requirements and appeared to have received the required administrative reveiw.

Work Request Number	Activity
53886	1D RC Pump
111611	Valve INV -243
110219	Valve INI - 9
14298	Valve EVCA Charger
109734	Valve INV-245
92212	Steam Generator Modifications
14358	Unit 1 Ice Weighing

8. IEB 83-04

IEB 83-04, (Open) "Failure of the undervoltage trip function of reactor trip breakers."

The inspector observed the licensee conducting tests on the undervoltage trip functions for the reactor trip breakers for both units 1 and 2. The tests were conducted to comply with IE Bulletin 83-04. Specifically, the Bulletin required that utilities with other than WDB-50 type reactor trip breakers perform surveillance tests of undervoltage trip functions independent of the shunt trip function, within the IE Bulletin time frame.

The licensee conducted the tests on March 16, 1983 and found the results to be acceptable in accordance with the surveillance tests which were utilized. The licensee has not yet taken all of the actions required to close this bulletin. Bulletin IEB-83-04 remains open pending satisfactory response from the licensee concerning steps 1 through 5 listed in the bulletin.

Details of further testing and investigative efforts will be entailed in subsequent reports.

While the tests were being conducted the inspector observed that the licensee had failed to correctly identify the reactor trip breaker and bypass breakers with the color identifications which are specified for their respective electrical trains, i.e.; train A is required to have black letters and red background and train B is required to have black letters on yellow background.

The inspector pointed out this unsatisfactory condition to the licensee on March 16, 1983 and the licensee promptly corrected the color coding identification deficiency on March 17, 1983. The inspector informed the licensee

that the FSAR section 8.3.1.2.10 is very specific in requiring that all safety-related equipment be marked with the specified electrical train color codes for ease of identification and to assure that electrical separation is maintained.

Since the condition was promptly corrected and no other instances were identified during this inspection this item will be maintained as an Unresolved item pending the result of further inspection to determine extensiveness. (UNR 50-369/82-16-01)

9. D2/D3 Steam Generator Modification

On October 21, 1981, a steam generator tube leak occurred at Ringhals Unit 3 (Varberg, Sweden), a three-loop Westinghouse plant with Model D3 steam generator, resulting in plant shutdown. From the subsequent investigation, the occurrence of some type of accelerated wear mechanism involving interaction between the steam generator tubes and the tube support plates was identified. Eddy current testing (ECT) was performed on all three steam generators. The ECT results indicated that preferential wear was occurring in the outer three rows of tubes in the preheater section (Rows 47, 48, and 49).

A task force was established by Westinghouse to identify and correct the cause of the problem. To accomplish the objective, the task force gathered information relative to the problem such as ECT data from operating plants, pulled tube data, tube vibration data, information from analytical models, and information from a series of air and water scale-model test facilities. Westinghouse determined that this type of accelerated tube wear is characteristic of the preheater section of its Model D and E steam generator and was attributed to feedwater flow induced vibration.

Several conceptual modifications to reduce the tube vibration and the resultant wear were developed by Westinghouse during the above investigations. From those, Westinghouse proposed to install an internal manifold in the Models D2 and D3 steam generator.

In the original design, feedwater flow entering the steam generator passes through a four-venturi reverse flow limiter and is deflected by an impingement plate before entering the tube bundle. It has been demonstrated that this combination of features leads to severe turbulence in the inlet plenum, the major factor contributing to wear of the steam generator tube.

The design modification for the D2/D3 preheat steam generators to alleviate these severe turbulence conditions consists of replacing the flow impingement plate assembly with an internal manifold assembly, and replacing the four hole reverse flow limiter with a 19 hole reverse flow limiter. The modification is designed to isolate the tube bundle from the highly turbulent feedwater inlet flow and to distribute the feedwater more uniformly over the full area of the bundle at the inlet plenum region. The flow splitter divides the flow into several channels as it enters the manifold. The larger number of holes in the reverse flow limiter results in smaller

jets providing a more fully developed flow entering the manifold. The momentum force on the manifold assembly is reduced without compromising the function of the reverse flow limiter.

The manifold box consists of two perforated plates, the inlet and exit plates. The minimum hole size of the inlet plate was dictated by the need to ensure that build-up of contaminants will not plug the holes during service. The kinetic energy of the flow jets exiting the inlet plate is dissipated by impinging on the ligaments of the downstream exit plate. The flow enters the preheater inlet plenum region through the holes in the exit plate with a relatively uniform flow velocity.

In NUREG-0966, March 1983 transmitted to the licensee on March 16, 1983, NRC staff concluded the proposed modification discussed above is acceptable and would not be inimical to the health and safety of the public.

The D2/03 modification was installed on Unit 1 during the ongoing maintenance outage and will be installed on Unit 2 later this year, prior to the unit surpassing 50% power level. (License condition NPF-17/C-5).

10. Missing Thermal Sleeves

As detailed in Report 50-369/83-13, Duke Power Company in response to Preliminary Notification PNO-V-82-28 (dated 6/17/82) which reported that four thermal sleeves originally located in the reactor coolant loop cold leg safety injection branch connection nozzles at the Trojan Plant had become loose and traveled into the reactor vessel, checked similarly located thermal sleeves in piping systems and found that the thermal sleeve in the 10-inch safety injection line of reactor coolant loop B was missing. The licensee reported this matter to Region II on July 5, 1982.

The licensee determined by reviewing a construction radiograph that the 10-inch B loop sleeve was in place during construction. A total of seven similar thermal sleeves existed in the following lines: four in the 10-inch safety injection to reactor coolant loop penetrations A, B, C, and D; two in the three inch charging line nozzles in loops A and D; and one in the 14-inch pressurizer surge line in loop B nozzle. The licensee radiographed all sleeve locations and determined that the remaining six sleeves were in place.

A Westinghouse safety analysis was presented to NRC on July 14, 1982 which revealed there would be no safety concern even if all the sleeves were to leave their original position and end up in the bottom of the reactor vessel or in the case of the pressurizer surge lines sleeve, the sleeve would end up in the "B" S/G.

The NRC, after evaluating the Westinghouse analysis and the licensee loose parts program, determined that there were no safety concerns and allowed the Unit to return to operation.

The six thermal sleeves, which were in place, were removed during the ongoing outage on Unit 1. The 10-inch thermal sleeve which was reported as missing, still is. Extensive searches of RCS cold legs, reactor vessel and core support assembly have been futile. The licensee currently believes the missing thermal sleeve was ejected during one of two hot functional tests and subsequently discarded.

All thermal sleeves have been removed from Unit 2. The licensee will resolve the issue of the missing thermal sleeve to the satisfaction of the NRC prior to restart of Unit 1.

11. Broken Holddown Spring

On March 10, 1983 during video inspection of the McGuire Unit 1 core, the holddown spring for a Non-Fuel Bearing Component (NFBC) was observed to be broken. This discovery led to the inspection of all NFBC holddown assemblies for the Unit 1 core. Of the 94 NFBC's equipped with the spring (see below), 21 were broken. Of these 21 broken springs, three were identified as having fractures. Upon evaluation of the broken holddown springs, and particularly the double fractures, Duke management with Westinghouse concurrence decided to replace the NFBC's in question with thimble plugs.

Identification of this problem area occurred in April 1980 when broken NFBC holddown springs were identified at Ohi Unit 1. In October 1980, prior to McGuire Unit 1 initial fuel load, Westinghouse identified deficiencies in the design of holddown assembly springs of NFBC's. The purpose of these springs is to hold the NFBD's (which include thimble plugs, burnable poison rods and sources) in the fuel assemblies, resisting the lifting force of reactor coolant flow. Experience at the other plants had shown that springs identical to those at McGuire were prone to breakage in the first 3000 hours of operation.

Analyses indicated that single fractures were the most likely failure mode within the first fuel cycle. This was not considered as safety concern. For NFBC's, which were intended to remain in the core past the first cycle, the decision was made to replace the springs.

The 46 assemblies which were refitted with new springs in 1980 were inspected and confirmed to be intact and undamaged.

The primary consequences of removing the referred to assemblies are the potential extension of the first cycle by 36 EFPD and the necessity of additional core physics testing.

12. Plant Modifications - Unit 1

On March 15, 1983, portions of a modification of the control room console for the auxiliary feedwater electrical controls and flow indication were observed. The modification was being performed to comply with TMI Action

Item II.E.1.2 "Auxiliary Feedwater Initiation and Indication". The modification was QA Condition I work and was administratively controlled under shutdown request number 6950.

On March 15, 1983, electricians conducting the re-routing of Class 1E electrical wiring associated with the modification were observed using pocket knives to strip the insulation from 16 gauge stranded cables. Subsequent conversations with plant management revealed that using knives to strip insulation from Class 1E wiring is considered an acceptable practice at McGuire, and has been the case throughout the construction of the facility. The use of a knife or other tools not specifically designed for wire stripping may result in wire damage, weak terminations and possible high resistance connections.

On March 16, 1983, the electricians were observed using an electrical tabulation book in conjunction with a referenced drawing (MC 1711-10.01). The inspector perused the tabulation book to determine if it reflected the modification. As a result, the tabulation book was found to contain sheets which were to have been removed pursuant to an earlier document revision, contrary to the requirements necessitating document control.

In review of construction Procedure M-418, the controlling procedure for the modification, it was noted that the procedure requires on a "sample basis" inspections be made to verify that electrical terminations are tight and correctly made, i.e., proper tool, wire stripping and, crimp. Subsequent inspection revealed that no inspection results have been recorded to indicate specifically what, if any, wiring terminations have ever been inspected. Moreover, there is no established sampling basis against which to inspect.

Failure to limit the use of personal tools, specifically the use of tools not manufactured for the purpose of wire stripping is contrary to the requirement of ANSI N45.2, Section 2, and Criterion II of 10 CFR 50, Appendix B as implemented by Duke QA Topical Report, Duke-1, Section 17.2

Failure to establish a systematic sample program based on accepted sampling standards is contrary to the requirements of ANSI N45.2, Section 11, and Criterion X of 10 CFR 50, Appendix B as implemented by Duke QA Topical Reports, Duke-1, Section 17.2

Failure to control the applicable documentation as it relates to this modification is contrary to Criterion VI of 10 CFR 50, Appendix B as implemented by Duke QA Topical Report Duke-1, Section 17.2.

The above three examples collectively constitute an apparent weakness in the Duke QA program in the area of providing control over activities affecting the quality of structures, systems or components. Failure to provide that control over activities affecting quality is in violation of the requirements entailed in criterion II, 10 CFR 50, Appendix B as implemented by Duke QA Topical Report Duke-1. This a Violation (369/83-16-02).

13. Plant Status Observation

On March 16, 1983 the inspector observed that the Unit 1 main control console had two apparent deficiencies. The conditions were discussed by the inspector with licensee QA and engineering personnel and are as follows:

a. The fillet weld on the structural support member at the top of panel 1MC2 where it joins panel 1MC1 was cracked.

b. The bolts that join panel 1MC2 did not have 100 percent thread engagement with their respective nuts.

The inspector informed responsible licensee personnel of this condition which was subsequently documented on a nonconformance report numbered MC-561.

This is an unresolved item which will require further information concerning the requirements for bolt thread engagement, acceptance criteria for welds and the licensee's evaluation of any other similar conditions which may exist on either Units 1 or 2 main control boards. The unresolved item will be identified as; "main control board deficiencies." (369/83-16-03)

On March 16, 1983 a visiting Region II inspector observed work activities as they related to the licensee correcting deficiencies on the Unit 2 containment annulus ventilation system. The licensee is required as a part of the licensing of Unit 2 to conduct a test of the annulus ventilation system. The test is to be conducted in accordance with the licensee's test procedure is identified as TP/2/A/1450/06. A review of the control room log books indicated that portions of the test started on or about December 20, 1982 and was satisfactorily completed as of March 16, 1983. A review of the documented results of the test indicated that the test is approximately 90 percent completed. The remaining portions of the test yet to be completed requires that the time for the annulus pressure to increase from a negative 3.5 inches of water to a negative 0.5 inches of water be attained at equal to or greater than 278 seconds. Currently, the licensee has not been able to attain this pressure change in the allotted time. The inspector was shown and observed that the pressures have not been attainable primarily because of the numerous air leaks which exist around various penetrations through the containment concrete structure. For example, the inspector observed that where the equipment access Hatch penetrates the containment concrete structure, at least one foot of area near the bottom of the penetration demonstrated significant air leakage.