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

Report No.: 50-370/85-07

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

Docket No.: 50-370 License No.: NPF-17

Facility Name: McGuire 2

Inspection Conducted: February 7-11 and February 24-28, 1985

Inspector: J. L. Mathis 3/22/85
J. L. Mathis Date Signed

Approved by: Frank Jape 3/22/85
F. Jape, Section Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection entailed 74 inspector-hours onsite in the areas of follow-up on IEB 84-03, plant tour, preparation for refueling, refueling activities, licensee action on previous inspection findings, followup on a previously identified inspector followup item, and followup on CRDM Breech Screw inspection.

Results: One deviation was identified - Failure to provide procedures for core unloading and reloading, and annunciator or computer alarm to prescribe operator actions as stated in the November 21, 1984, response to IEB 84-03, paragraph 7.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*M. P. McIntosh, Plant Manager
*N. McCraw, Compliance Engineer
*D. Mendezoff, Licensing Specialist
*T. L. McConnell, Superintendent Technical Service
*G. Gilbert - Operation Engineer
*M. Hatley, Assistant Engineer
*R. L. Browder, Fuel Handling
D. Fisher, Design Engineer
D. Kulla, Supervisor, Design Engineering
*R. A. Johansen, Test Engineer Surveillance
*J. B. Day, Licensing Test Engineer

Other licensee employees contacted included construction craftsmen, two engineers, technicians, two operators, mechanics, one security office member and office personnel.

Other Organization

*M. McClenny, Westinghouse

NRC Resident Inspectors

*W. Orders, Senior Resident Inspector
*R. Pierson, Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on February 28, 1985, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings listed below. No dissenting comments were received from the licensee.

Deviation 370/85-07-01, Failure to provide procedures for core unloading and reloading, and annunciator or computer alarm to prescribe operator actions as stated in the November 21, 1984, response to IEB 84-03, paragraph 7.

Inspector Followup Item (IFI) 370/85-07-02, Westinghouse determination to replace or repair control rods which were dropped during breech guide screw inspection, paragraph 10.

The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection.

3. Licensee Action on Previous Enforcement Matters

(Closed) Violation, 370/81-03-04. This item concerned written procedures to be established, and implemented to ensure containment integrity during core alternations. PT/1/A/4200/02C was written to verify that containment integrity was established. This item is closed.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Followup on Previously Identified Inspector Followup Item (92701)

(Closed) IFI 370/83-09-01. Duke Power Company's (DPC) committment to inspect ropes, hooks and grapples has been incorporated into the following procedures:

MP/O/B/7650/90
MP/O/B/7650/91
MP/O/A/6550/04

This item is closed.

6. Plant Tour (92706)

The inspector toured the plant periodically during the inspection to verify that monitoring equipment was recording as required, equipment was properly tagged, operations personnel were aware of plant conditions and plant housekeeping efforts were adequate. The inspector also determined that appropriate radiation controls were properly established, critical clean areas were being controlled in accordance with procedures, excess equipment or material was stored properly and combustible material and debris were disposed of expeditiously. During the tours, the inspector looked for the existence of fluid leaks, various valve and breaker positions, equipment caution and danger tags, component positions and status, adequacy of fire-fighting equipment, appropriate notations on radiation postings, and instrument calibration dates.

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

7. Followup on IE Bulletin 84-03, Refueling Cavity Water Seal (92703)

The licensee's November 21, 1984, response to IE Bulletin 84-03 provided a summary of the licensee's evaluation of the potential and consequences of a refueling cavity water seal failure for the McGuire and Catawba Nuclear Stations. For the purpose of evaluation, three failure scenarios were considered by the licensee:

- gross seal failure (100% of seal circumference)
- gross seal failure (25% of seal circumference)
- seal leakage with a nominal 1/16 inch gap around entire circumference

All failure scenarios assumed that the water in the refueling cavity is at required elevation and the water flows unobstructively through openings created by the failed seal. Although the original seal was designed and tested by the manufacturer, Presray, which established the adequacy of the seal configuration, DPC's response indicated that a reevaluation of the seal integrity would be conducted via subjecting the seal configuration used at McGuire and Catawba to a series of tests designed to determine the ultimate capacity of the seals. The ultimate capacity of the refueling cavity seal was determined for various widths and differential elevations of annulus openings. The various widths and elevations were intended to envelope as-built dimension for Unit 2. Duke is committed to maintain the minimum acceptance criteria of a seal capacity to withstand twice the normal static head of water.

The licensee's response stated that the testing was scheduled to start the week of November 26, 1984, and to be completed the week of December 3, 1984. This testing was actually performed December 17-21, 1984 (as documented in DPC's letter dated December 31, 1984), and the test results were submitted in a letter dated January 18, 1985. Based on evaluation of the test results, it was concluded that further testing was needed to address the adverse effects of a dropped fuel assembly on the Presray seal.

On January 9, 1985, a telephone conference call was held between DPC and NRC Region II staff. Region II expressed concern for the adverse effect of a dropped assembly on the seal and requested that DPC evaluate this or protect the seal with a metallic backing plate. Duke's evaluation and test results were submitted by letter dated January 29, 1985, to NRC Region II. DPC determined that no hardware changes were required based on the following:

a. The fuel handling mechanism is designed to prevent inadvertent release of an assembly. It is singularly failure-proof and therefore it is highly unlikely that an inadvertent release will occur.

b. The period of time an assembly is over the cavity seal is very small.

c. Recent Duke test results for a dropped fuel assembly on the seal shows that the seal would remain intact.

The inspector verified that the drop fuel assembly test performed at McGuire supported the licensee's conclusion. The test results were satisfactory in that the seal did not experience any deformation and remained intact.

The inspector verified that the licensee's seal arrangement and procedures were as described in their November 21, 1984, response. The November 21, 1984 response stated that...steps are included in the core unloading and reloading procedure to direct the operators in the event of decreasing level in either the refueling cavity or the spent fuel pool. During the inspection period, the inspector's review revealed that the procedure changes were in draft and had not yet been embodied into the final approved procedure. It was also noted that the unloading or reloading procedure was not in use at the time since these activities had not begun. The licensee was notified that it appeared that the commitment had not been met on the procedure.

The inspector also examined instrumentation provided in the spent fuel pool to detect a seal failure that occurs while the fuel transfer tube is open. The licensee's November 21, 1985 response to IEB 84-03 stated that if a seal failure occurred, an annunciator alarm would be actuated in the control room. The inspector found that there is no annuciator alarm; instead, there is a computer alarm. The computer alarm does not guide the operator to a response procedure. This issue was discussed with the licensee as to what would guide the operator to a response procedure to mitigate decreasing water level and preventing uncovering of fuel in the spent fuel pool. The licensee stated that a response procedure would be prepared to cover this issue.

Both items discussed above constitute Deviation 50-370/85-07-01, Failure to provide procedures for core unloading and reloading, and annunciator or computer alarm to prescribe operator actions as stated in the November 21, 1984, response to IEB 84-03.

8. Preparation for Refueling (60705)

During the Unit 2 refueling outage, the inspector verified that initial preparations and conditions were satisfied prior to core alteration in accordance with licensee and NRC requirements. The inspector reviewed procedure number PT/2/A/4550/01, Preparation for Refueling, which provided a functional check of the following equipment prior to refueling to acertain procedural and performance adequacy.

New fuel elevator
Spent fuel pool manipulator crane
Fuel transfer system
Reactor building manipulator crane
Rod Cluster Control change fixture
Communications
Fuel handling tools

The selected tests were examined to ascertain that current written and 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 inspector witnessed installation of the refueling cavity seal. It was installed in accordance with the Reactor Vessel Head Removal and Replacement Procedure (MP/2/A/7750/57).

Steps were included in MP/2/A/7750/57 to remove all equipment and foreign material from the vessel cavity. Also, sign-off steps were included for QC inspectors to verify that the surface was clean prior to installing the pneumatic seal. Maintenance personnel installing the reactor cavity seals were provided sufficiently-detailed guidance to ensure proper preparation, installation, alignment, inflation and verification on installing the seal prior to moving irradiated fuel.

No violations or deviation was identified.

9. Refueling Activities (60710)

Total core unloading for Unit 2, cycle 2, started February 24, 1985, and ended March 3, 1985. Unloading was performed in accordance with the fuel transfer sheet of procedure number PT/2/A/4550/06, Total Core Unloading Procedure. The inspector witnessed various refueling evolutions during unloading and transferring of fuel assemblies from the reactor vessel to the spent fuel pool. The inspector interviewed licensee personnel performing fuel assembly handling evolutions to ensure that the personnel were properly trained and were following approved procedures. The inspector also verified that adequate housekeeping, radiological, and accountability controls were established and implemented. Staffing during refueling appeared to meet Technical Specification requirements.

During core unloading, fuel movement was stopped twice due to mechanical problems with the fuel mast roller on the manipulator crane and traverse locking assembly on the east side of the fuel carriage conveyor car. As a result or this problem, a modification involving removal of the east side of the traverse locking-pin assembly on the fuel conveyor car was performed by Oceaneering, Inc. Divers removed the east side traverse locking-assembly housing by grinding the top fillet weld and two fillet welds on the side of the housing connecting the traverse locking pin to the car. The modification was handled as an exempt change. The conveyor car will still be locked into position on the track by another mechanical locking pin and an electrical interlock which requires torque on the conveyor chain for the upender to be moved. The inspector reviewed the variation notice to verify that the modification was reviewed and approved in accordance with Technical Specifications and conformed to licensee modification procedure control.

No violation or deviations were identified.

10. Independent Inspection Effort (92706)

Followup on Control Rod Drive Mechanism (CRDM) Breech Screw

Duke Power Company letter dated December 12, 1984, provided a followup to a conference call conducted between NRC Region II and DPC's Corporate Office on December 7, 1984. The subject of the call was the continued operation of McGuire Unit 2 following the discovery by Westinghouse of a CRDM fabrication error following an event at a Korean reactor. The drive mechanism in use at McGuire Unit 2 is of the same design as that in use at the Korean reactor.

Duke evaluated the implication of the Korean event on continued operation of Unit 2 and determined that, for reasons detailed in the December 12, 1984 letter, such operation through the remainder of the current fuel cycle did not pose any undue risk to the public health and safety.

In order to further assure that the possibility of this occurrence would not go undetected, the following actions were taken at McGuire:

a. Each operating shift reviewed a description of the Korean event and was advised of the potential for a similar occurrence at McGuire Unit 2.

b. The frequency of control rod stepping tests was increased from once every 31 days to once every seven days.

c. If rod stepping anomalies of a mechanical nature were observed during these stepping tests or during any normal rod stepping, the plant was to be shutdown and the drive rod assemblies inspected.

d. As part of shift turnover, actions b. and c. were reviewed.

During refueling for Unit 2, Westinghouse Electro Mechanical Division (WEMD) inspected all Unit 2 control rod drive assemblies against specific torquing criteria outlined in procedure number TP/2/A/1150/23, Inspection procedure for onsite Heavy Drive Rod Assemblies. The inspector witnessed the onsite inspection on February 24, 1985, and reviewed the following repair procedures for assembly guide screws that did not meet acceptance criteria:

MP/O/A/7700/20, Repair Procedure for Heavy Drive Rod Assemblies without Breech Guide Screws

MP/O/A/7700/19, Repair Procedure for CRDM Heavy Drive Rod Assemblies With Loose (but installed) Breech Guide Screws

While witnessing performance of these procedures by WEMD, the inspector observed the following:

a. Adherence to procedures
b. Inspection and testing controls
c. Resolution of nonconformance
d. Records control
e. Measuring and testing controls
f. Personnel certification

During inspection of the CRDM heavy drive rod assembly guide screws, WEMD found that the screws on five CRDM did not meet the torque acceptance criteria.

These screws were repaired by installing and welding a larger diameter locking pin in the guide screws 180° from the existing pin. Additionally, the repair procedures required a reverse torque test to confirm that the guide screws were positively locked.

While handling drive rods, in locations D-14 and B-8, the drive rods were inadvertently dropped to the bottom of the cavity. The extent of damage, if any, is unknown due to the drop. Westinghouse is presently evaluating whether these rods can be repaired, or if replacement is necessary.

This problem will be examined in a future inspection and was identified to the licensee as Inspector Followup Item 50-370/85-07-02, Westinghouse determination to repair or replace the control rods which were dropped during breech guide screw inspection.