



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION II
 101 MARIETTA STREET, N.W.
 ATLANTA, GEORGIA 30325

Report No.: 50-400/88-10

Licensee: Carolina Power and Light Company
 P. O. Box 1551
 Raleigh, NC 27602

Docket No.: 50-400

License No.: NPF-53

Facility Name: Shearon Harris Nuclear Power Plant

Inspection Conducted: May 2-6, 1988

Inspector: Stephen Tingen 6/6/88
Date Signed

Accompanying Personnel: F. Jape, May 5 and 6, 1988

Approved by: F. Jape 6-15-88
Date Signed
 for F. Jape, Section Chief
 Test Program Section
 Division of Reactor Safety

SUMMARY

Scope: This routine, announced inspection was in the areas of Complex Surveillance Testing, IE Bulletin Followup, and licensee action on previous inspection items.

Results: No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *W. Cooper, Senior Engineer Technical Support
- *J. Harness, Plant General Manager
- *M. Jackson, Project Engineer, Maintenance
- *D. Kanning, Senior Specialist, Maintenance Support
- *S. Mabe, Project Engineer, Maintenance Field Support
- *C. McKenzie, Principal Engineer, Quality Insurance
- *J. Morris, Senior Engineer, Maintenance
- *D. Morrision, Project Engineer
- M. Pugh, Inservice Inspection
- *W. Slover, Project Engineer, Technical Support
- *D. Tibbits, Director, Regulatory Compliance
- *M. Wallace, Senior Specialist, Regulatory Compliance
- *R. Watson, Vice President, Harris Nuclear Plant
- *L. Woods, Supervisor, Technical Support
- *G. Young, Engineering Technician, Maintenance

Other licensee employees contacted included engineers, operators, technicians, and office personnel.

NRC Resident Inspector

- *G. Maxwell

*Attended exit interview

2. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

3. Unresolved Items

Unresolved ~~items~~ are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. One unresolved item identified during this inspection is discussed in Paragraph 4.

4. Complex Surveillance (61701)

The inspector reviewed the results of the pressurizer safety valves set point tests performed by Crosby Valve and Gage Company in December 1985, and also inquired about future pressurizer safety valve set point testing.



The acceptance criteria for safety valve testing is contained in Shearon Harris Nuclear Power Plant (SHNPP) Technical Specifications (TSs) which invokes ANSI/ASME OM-1-1981, Requirements for Inservice Performance Testing for Nuclear Power Plant Pressure Relief Devices.

The pipe connecting each pressurizer nozzle to its safety valve is shaped in the form of a loop seal. Condensate resulting from normal heat losses accumulates in the loop seal and prevents leakage of hydrogen gas or steam through the safety valve seats. If the pressurizer pressure exceeds the set pressure of the safety valves, they start lifting and the water in the seal discharges during the accumulation period. The inspector reviewed the test reports for the three pressurizer safety valves. The valves were removed from the system and sent to Crosby to accomplish the testing. The safety valves were set point tested utilizing hot water and nitrogen as the test medium. The hot water setpoint testing was performed with approximately 250°F water and an ambient temperature of 135°F. The ambient temperature when utilizing nitrogen as the medium was not recorded. Results of nitrogen set pressure tests were consistently higher, up to 40 psi, than the results obtained from hot water testing. The final set point was based on the hot water results. Testing with hot water is consistent with SHNPP Final Safety Analysis Report Accident Analysis in that the pressurizer safety relief valves lift one time and remain open in the over pressure accident analysis, therefore, the set pressure should be and was based on what is in the loop seal during the initial lift.

SHNPPs first refueling outage is scheduled to begin in July 1988. Present licensee plans are not to set point test any pressurizer safety valves during the first refueling outage. SHNPP is committed to ANSI/ASME OM-1-1981, which requires that safety valves be tested over a five year period with a minimum of 20% of the valves to be tested within any 24 month period, therefore, one of the three SHNPP pressurizer safety valves is required to be tested during the first 24 month period from initial reactor startup. The licensee interprets ANSI/ASME OM-1-1981 differently and is not planning to set point test any pressurizer safety valves until the second refueling outage which will be approximately 30 months after initial startup. Due to the difference of understanding this area requires further review and evaluation and is considered as Unresolved Item Number 50-400/88-10-01, Set Point Test Frequency of Pressurizer Safety Valves.

No violations or deviations were identified.

5. IE Bulletin Followup (25573)

(Open) 50-400/85-BU-03, 50-400 T2515/73, "Motor Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings." The purpose of this bulletin is to require licensees to develop and implement a program to ensure that switch settings for High Pressure Coolant Injection and Emergency Feed Water System Motor Operated Valves (MOVs)

subject to testing for operational readiness in accordance with 10 CFR 50.55a(g) are properly set, selected and maintained. Action Item b of the bulletin requires that correct switch setting be established; Item c requires that correct differential pressure testing or alternate methods to demonstrate operability with the settings from Item b; Item d requires plant procedures to be provided to assure the maintenance of correct switch settings throughout plant life. SHNPP letter dated March 4, 1987, Serial Number NLS-87-051, reported that Bulletin 85-03 actions were complete. SHNPP valves covered by this bulletin are Limitorque-operated S800, SMB000 and SMB00 rising stem gate and globe valves. There are 28 bulletin valves identified, of which 22 are AC motor driven and six are DC motor driven. In letters dated May 13, 1986, July 25, 1986, and September 18, 1987, SHNPP identified the selected bulletin safety-related valves, the valves maximum differential pressures, and the licensee's program to assure valve operability. NRR has completed a review of these responses and considers that the licensee's selection of applicable safety-related valves and the valves' maximum differential pressures meets the requirements of the bulletin and that the program to assure valve operability requested by action item e of the bulletin is acceptable. NRR review of the March 4, 1987 response, Action Item f of the bulletin, is still ongoing.

In order to evaluate the SHNPP Bulletin 85-03 program, the inspector held discussions with appropriate licensee personnel and reviewed the following procedures:

- CM-I-0109, Torque Switch Setting Change for IE Bulletin 85-03 Motor Operated Valves
- CM-I0012, Terry Turbine DC Limitorque Calibration Check and Stroking
- EPT-010T, Temporary Procedure for Dynamic Testing of NSSS Motor Operated Valves for IEB 85-03
- EPT-035T, Temporary Procedure for Dynamic Testing of Technical Specification Required Motor Operated Valves, As Required for IEB 85-03
- CM-I0005, DC Limitorque Calibration Check and Stroking
- MMM-024, Limitorque Valve Failure Analysis and Troubleshooting Procedure
- CM-P00001, Post Maintenance Testing Requirements for Limitorque Motor Operated Valves
- CM-M0050, Limitorque Valve Actuator size SMB-000 disassembly and maintenance
- CM-I0004, Limitorque Calibration Check and Stroking of Special Westinghouse supplied valves

These procedures provided clear instructions on obtaining specific values for switch settings. Procedures specified that torque switches are required to be set with the Belleville spring in the relaxed condition. Geared limit switches on MOVs with AC motors were set based on valve stem movement. Geared limit switches on MOVs with DC motors were set based on handwheel turns. The following switches are utilized in SHNPP MOVs:

- Thermal Overload Relay
- Open Torque Switch
- Close Torque Switch
- Geared Limit Switches:
 - Open Limit
 - Open Indication
 - Open Torque Switch Bypass
 - Close Limit
 - Close Indication
 - Close Torque Switch Bypass

SHNPP MOVs switches utilize two separate switch logics. One logic governs valve operation when valve operation is initiated from the individual valve control switch in the control room. The other logic governs valve operation when initiated via a Safety Injection (SI) signal. The reason for the two logic systems is that during a SI signal, the primary concern is for the system to function as required. In the SI mode of operation, the thermal overloads, torque switches, and torque switch bypass switches are not utilized. The valve repositions to its safety position with the motor being deenergized by actuation of the open or closed limit switch. During bulletin valve operation from the valve individual control switch in the control room, thermal overloads are utilized to protect the motor from overheating. In this mode when repositioning an MOV from open to close, actuation of the closed torque switch secures the valve motor, the closed limit switch will provide indication, and during the first 5% of valve stem travel the closed torque switch will be bypassed. When positioning a MOV from closed to open from the MOV control switch, the valve motor will be deenergized by actuation of the open limit switch with the open torque switch as a backup. The open limit switch will provide valve position indication, and during the first 5% of valve stem travel, the open torque switch will be bypassed. The only exception for MOV control room switch operation logic is for the Limatorque - Operated SB bulletin valve. This MOV utilizes the closed limit switch to secure the motor when shutting the valve.

In order to accomplish Bulletin 85-03 SHNPP did not utilize diagnostic testing. All valves were operationally tested to as close as practical to accident pressure. SHNPPS' approach was to determine switch settings, set the switches accordingly, test valves at accident pressure or as close to accident pressure as possible, and require strict procedural control to maintain the valves and switch settings throughout plant life. Valve degradation will be determined by stroke time testing, measuring motor

current, and by performing periodic valve inspections. The inspector considers this to meet the Bulletin 85-03 requirements. At the exit meeting the inspector informed the licensee that major MOV maintenance may require re-testing the valve operability under accident pressures. The inspector had the following findings concerning the SHNPP IEB 85-03 program that need to be resolved prior to final acceptance of the program:

- a. Operation of MOVs at degraded voltages needs to be addressed. Testing at accident pressures was accomplished at nominal voltage to the valve actuator motor. At voltages less than nominal, the motor output torque is reduced; therefore, during an accident situation with less than nominal voltage to the MOV, the valve may not operate.
- b. As discussed in Bulletin 85-03, one of the contributing factors to the Davis-Besse loss of main and auxiliary feedwater was that the torque bypass switch setting of 5% full stroke from the close to open valve position was not adequate to unseat gate valves with a large differential pressure. A contributing factor was that the bypass switch was set by counting handwheel turns while handwheel free motion was not accounted for. SHNPP MOVs with DC motors (total of six) close to open bypass switches are set similar to the Davis-Besse valves that failed to operate. SHNPP has committed to change open torque switch bypass settings from 5% to 15% during the 1988 Summer refueling outage. In addition procedures are being revised to account for free handwheel motion when setting MOV switches.
- c. Bulletin 85-03 discusses MOV failures caused by inadvertent valve backseating that resulted in stems shearing from their seats. SHNPP procedures for setting MOV switches do not check for valve backseating following adjustment. SHNPP Policy is not to backseat MOVs, but there are no checks performed that could detect valve backseating.
- d. A problem has been recently identified with the SHNPP DC motor driven MOVs Control logic that involves bulletin valves. The control logic is designed such that the motor's electrical shunt fields are continuously energized with no voltage surge protection. As a result of this design, when the power supply breaker to the motor is opened, a momentarily high voltage of several thousand volts is experienced in the shunt coil due to the collapsing of the electrical field in the coil. This momentary voltage transient typically exceeds the rating of the insulation of the coil windings and is believed to cause damage to the insulation of the coil windings. Loss of the shunt coil results in a loss of motor speed control. Subsequent to this inspection, the licensee has submitted a 10 CFR Part 4 Notification Report on this matter. The report is dated May 18, 1988.

These items will remain open until resolution. No Violations or Deviations were identified.

6. Action on Previous Inspection Findings (92701) (92703)

- a. (Closed) Inspector Followup Item 50-400/T2500/16, Inspection to Determine if a Potential Seismic Interaction Exists Between Movable Incore Flux Mapping System and Seal Tables at Westinghouse Designed Facilities. During SHNPP construction, it was realized that portions of the flux mapping system could fall on the in-core instrumentation tubing/seal table during a seismic event and damage the in-core instrumentation tubing/seal table thereby causing a small break loss of coolant accident. This potential interaction was possible because the SHNPP flux mapping system was installed directly above the in-core instrumentation tubing/seal tube. In order to prevent this potential interaction SHNPP has completed design modifications that installed wheel stops on the flux mapping control system trolley, and added supports to the flux mapping system support frame. This problem was described and identified in IEN 85-45. This item is closed.
- b. (Closed) 50-400/T2515/69, Inspection of Response to IEB 85-01. IEB 85-01 discussed potential disabling of auxiliary feed water pumps by steam binding caused by back leakage of main feed water past the isolation check valves between the auxiliary feed water and main feed water systems. IEB 85-01 has been previously closed by Region II, the purpose of this inspection was to complete Temporary Instruction 2515/69 action items. In order to verify procedures have been developed by the licensee to monitor auxiliary feed water system temperature, recognize steam binding if it should occur, and recover from a steam binding event, the inspector reviewed Procedure AOP-010, Revision 3, Feed Water Malfunction. This procedure provides instructions for recovering from steam generator back leakage which includes auxiliary feed water pump binding. The procedure provides auxiliary feed water back leakage symptoms and requires monitoring auxiliary feed water temperature. Alarms sound in the Control Room when auxiliary feed water temperature reaches 135°F. The inspector verified that up to date procedures were in the control room. The inspector also held discussions with control room operators on this subject. The operators were knowledgeable on the temperature monitoring requirements and action required to recover from pump binding. This item is closed.
- c. (Closed) 50-400/86-74-02, Review of procedure for weekly monitoring of service water system heat exchangers. This inspector followup item involved SHNPP developing an approved procedure for the weekly recording of instrument readings from safety-related heat exchangers to detect fouling. The inspector reviewed Procedure PPP-100, Plant Performance Monitoring, which was issued to accomplish system monitoring. The inspector also reviewed a portion of the data taken per the procedure. The monitoring program appeared to be comprehensive and numerous data has been recorded. SHNPP is now in the process of trending the data in order to detect fouling. This item is closed.



7. Exit Interview

The inspection scope and results were summarized on May 6, 1988, with those persons indicated in Paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection findings. An unresolved item was identified, UNR 50-400/88-10-01, Set Point Test Frequency of Pressurizer Safety Valves. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspectors during this inspection.