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

Report Nos.: 50-369/83-27 and 50-370/83-34

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

Docket Nos.: 50-369 and 50-370

License Nos.: NPF-9 and NPF-17

Facility Name: McGuire Nuclear Station Units 1 and 2

Inspection at McGuire site near Charlotte, North Carolina

Inspector: Virgil Brownlee for 7/26/83
W. Orders Date Signed

Approved by: Virgil Brownlee 7/26/83
V. L. Brownlee, Section Chief Date Signed
Reactor Projects, Section 2A
Division of Project and Resident Programs

SUMMARY

Inspection on June 14-20, 1983

Areas Inspected

This special unannounced inspection involved 56 inspector-hours on site in the areas of surveillance testing, and technical specification compliance.

Results

Of the 2 areas inspected, 1 item of noncompliance was found: (Failure to perform technical specification required surveillance testing resulting in safety related equipment being unable to perform its intended function. (50-370/83-34-01)).

REPORT DETAILS

1. Persons Contacted

   Licensee Employees

   *M. McIntosh, Station Manager
   *G. Cage, Superintendent of Operations
   *M. Sample, Project Engineer
   *B. Barron, Operations Engineer, Unit 2
   *D. Mendezoff, Licensing Engineer
   *M. Pacetti, MSRG
   *G. Copp, Nuclear Engineer
   *T. McConnell, Superintendent Technical Services

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

   *Attended exit interview

2. Exit Interview

   The inspection scope and findings were summarized on June 17, 1983, with those persons indicated in paragraph 1 above. The licensee acknowledged the inspector's findings and expressed concern over the issues raised during the meeting. The licensee stated that they have initiated a comprehensive review of all technical specification requirements to determine the magnitude of a misapplied channel functional test definition (revised March 3, 1983). Subsequent to this report period the licensee has completed their review and found conditional minor discrepancies.

3. Licensee Action on Previous Enforcement Matters

   Not inspected.

4. Unresolved Items

   Unresolved items were not identified during this inspection.

5. On May 26, 1983, during a procedure review, the licensee discovered that the surveillance requirements detailed in Technical Specification 4.3.2.1, Table 4.3-2. Item 6, dealing with Containment Pressure Control System (CPCS) had not been performed adequately for either unit. The requirement stipulates that on a monthly basis, the CPCS shall undergo an analog channel operational test. The test requirement consists of the injection of a

simulated signal into the channel as close to the sensor as practicable to verify the operability of alarm, interlock and/or trip functions and the analog channel operational test includes adjustments, as necessary, of the alarm, interlock and/or trip setpoints such that the setpoints are within the required range and accuracy.

The previous CPCS monthly test procedure (IP/0/A/4201/02) had been developed to satisfy the surveillance requirements of McGuire 1 Technical Specifications (issued January 28, 1981; now superceded) based upon the definition of "Channel Functional Test" as follows:

A Channel Functional Test shall be:

> Analog channels - injection of a simulated signal into the channel as close to the sensor as practicable to verify operability including alarm and/or trip functions.

Procedure IP/0/A/4201/02, Containment Pressure Control Functional Test, was written to satisfy this requirement by checking the operation of the CPCS alarm modules permissive actuation, however, setpoints of the alarms and trip functions were not verified.

The licensee maintains that the new term and definition issued in the combined technical specifications March 3, 1983, represent a change in testing activities since the setpoints must be verified. The significance of the change was not realized during the licensees reviews performed in January and February of draft copies of the new Technical Specifications and a subsequent review of the approved document.

The immediate corrective actions taken subsequent to detecting the surveillance discrepancies were to revise the applicable procedure, initiate the performance of the required surveillance, and begin cooling both units down from Mode 3 pursuant to Technical Specification 3.0.3.

The CPCS for each unit is composed of eight pressure transmitters (4 per train) each of which sends a signal to a solid state alarm module. For each train, one module gives a start permissive for the Air Return and Hydrogen Skimmer fans upon reaching the 0.25 psig increasing setpoint. Another module gives an open permissive for the discharge valve and damper for these fans. A third module is used for the containment spray (NS) pump start permissive and the fourth module gives the open permissive for the NS pump's outlet valves.

On Unit 1, 6 of 8 modules in the as found condition were set with setpoints which exceeded the Technical Specification allowable setpoint of $\leq$ 0.25 psig (T.S. Table 3.3-4). On Unit 2, 5 of 8 modules exceeded the limits. The actual as found setpoints were as follows:

LOOP	TRAIN	EQUIPMENT	SETPOINT PSIG Unit 1	Unit 2
5370	A	Containment Spray Discharge Valves NS29A & NS32A	0.058	0.114
5360	B	Containment Spray Discharge Valves NS12B & NS15B	0.406	0.103
5520	A	NS Pump A	0.578	3.1
5510	B	NS Pump B	0.540	4.09
5500	A	A Air Return Damper & A Hydrogen Skimmer Inlet Valve	0.239	4.08
5490	B	B Air Return Damper & B Hydrogen Skimmer Inlet Valve	0.297	4.04
5390	A	A Air Return Fan & A Hydrogen Skimmer Fan	0.625	0.114
5380	B	B Air Return Fan B Hydrogen Skimmer Fan	0.272	4.06

The significance of these modules having been found with setpoints in excess of the allowable setpoint value is realized once the applicable systems controlled by CPCS are analyzed. Functional description of the CPCS is provided below.

Containment Spray

The primary purpose of the spray system is to spray cool water into the Containment atmosphere when appropriate in the event of a loss-of-coolant accident (LOCA) and thereby assure the Containment pressure cannot exceed containment design pressure of 15 psig of two spray pumps and spray heat exchangers in parallel, with associated piping, valves and spray headers in the upper containment volume.

One train of the Containment Spray System is defined as one spray pump with spray heat exchanger and partial flow from a Residual Heat Removal System pump with one residual heat exchanger. Each train provides complete backup for the other.

The spray system is actuated by a containment HI-HI pressure (3 psig) signal initiated either manually from the Control Room or on coincidence of two out of four high-high containment pressure signals. This signal starts the

containment spray pumps and opens the discharge valves to the spray headers. If the 0.25 psig permissive is present from CPCS as discussed previously.

The system's pumps continue operating until they are shut off, either manually or automatically by CPCS at 0.25 psig decreasing. CPCS provides interlocks to prevent the system's pumps from starting if containment pressure is less below 0.25 psig and to automatically terminate the pumps when containment pressure decreases to 0.25 psig subsequent to an accident.

In consideration of the as found setpoints, it appears that on Unit 1, containment spray would have functioned as designed (i.e., would have started at 3 psig) except that the system would have reset slightly prematurely (approximately 0.55 psig as opposed to 0.25 psig). On Unit 2, the containment spray system would not have functioned as designed in that the 0.25 psig CPCS permissive was found set at 3.1 psig for Pump A and 4.09 psig for Pump B. This means that the pumps would have started at 3.1 and 4.09 psig increasing instead of at the required 3 psig and would have automatically terminated at 3.1 and 4.09 psig decreasing respectively as opposed to 0.25 psig.

Containment Air Return and Hydrogen Skimmer System

The containment air return fans function to assure rapid return of air to the lower compartment after the initial loss-of-coolant blowdown. Two fans are provided, each with the capability to perform the assigned function.

A secondary function of this system is to prevent the accumulation of hydrogen in restricted areas within containment resulting from a loss-of-coolant accident. Hydrogen pocketing is prevented by continuously drawing air out of each of the areas at such a rate as to limit the potential local hydrogen concentration to less than four percent by volume. Two hydrogen skimmer fans are provided for this purpose.

The containment air return fans are started by containment Hi Hi pressure signal 9±1 minutes after containment pressure reaches 3 psig. An isolated damper is provided on the discharge of each fan. The damper acts as a barrier between the upper and lower containments to prevent reverse flow and resulting in ice condenser bypass.

The hydrogen skimmer fans and inlet valves are also initiated by containment Hi Hi pressure (3 psig).

The containment air return and hydrogen skimmer system continues to operate once initiated until shut off manually or automatically by the Containment Pressure Control System (CPCS) as discussed previously. CPCS prevents the system from operating prior to receiving a 0.25 psig increasing permissive and automatically terminates the system at 0.25 psig decreasing.

In consideration of the CPCS as found setpoints, it appears that on Unit 1, the system would have functioned as designed except for reseting at a slightly higher pressure indicated in the previous table. On Unit 2, it appears that the system would not have functioned as designed in that the CPCS 0.25 psig permissives were set at 4.08 and 4.04 psig respectively for the A and B air return dampers and hydrogen skimmer inlet valves; and 4.06 psig for the B air return for hydrogen skimmer which would not only negate the 3 psig start signal but would automatically reset/terminate those components at those same setpoints on decreasing containment pressure.

The licensee performed an evaluation of the above detailed circumstances in order to determine the impact of having the containment spray (NS) and containment air return and hydrogen skimmer (VX) systems unable to perform their intended function, (i.e., actuate at greater that the required 3 psig).

The licensee analysis reflects the following:

The NS and VX systems are designed to mitigate the containment pressure response to a high energy line break, in conjunction with other containment systems. The design basis of these containment systems is essentially to prevent exceeding the design pressure of the containment. The containment pressure response to a large pipe break is characterized by a relatively rapid and steady initial pressure increase to well above the degraded 4.1 psig setpoint. The NS and VX systems would actuate as designed, with only a short delay crresponding to the time between the pressure increasing from 3.0 to 4.1 psig. For other scenarios which do not result in the containment pressure exceeding the 4.1 psig actuation setpoint, the containment design pressure is not challenged, and therefore the remaining containment systems are capable of providing the necessary mitigative function, without the actuation of the NS and VX systems.

Based on the above arguments, this evaluation has determined that for those scenarios requiring NS and VX actuation to mitigate the pressure response of the containment, the effect of the increased actuation setpoint is limited to a short time delay for actuation. This delay is considered acceptable based on a review of the dynamic containment pressure response following high energy line break events.

Technical Specification 4.3.2.1, Table 4.3-2, Item 6, requires that the Containment Pressure Control System undergo a monthly analog channel operational test to verify the operability of alarm, interlock and/or trip functions, including adjustments if necessary to align setpoints to within the required range and accuracy.

The inspectors and regional review concurs that the safety significance of this event is minimal yet it highlights an inadequate review of new technical specifications which would have detected the error much earlier and perhaps have prevented the Unit 2 error. Additionally the absence of

documented set points for Unit 2 raises the question of when and where were the set points set.

Technical Specification 3.3.2 requires in part that at least 3 channels per train of the Containment Pressure Control System be operable in modes 1, 2, 3, and 4 with their setpoints set at $\leq$ 0.25 psig.

Technical Specification 3.6.2 requires that two independent containment spray systems be operable in modes 1, 2, 3, and 4.

Technical Specification 3.6.5.6 requires that two independent containment air return and hydrogen skimmer systems be operable in modes 1, 2, 3, and 4.

Contrary to the requirements of Technical Specification 4.3.2.1, Table 4.3-2, Item 6, from March 3, 1983, to May 26, 1983, for Unit 2 and March 29, 1983 to May 26, 1983, for Unit 1, the Containment Pressure Control System (CPCS) did not undergo an acceptable monthly analog channel operational test to verify the operability of alarm, inter-lock and/or trip functions, including adjustments if necessary to align setpoints to within the required range and accuracy. Moreover, on May 26, 1983, when the required surveillance was performed six of eight CPCS modules on Unit 2 were found with setpoints in excess of Technical Specification allowable limits.

Contrary to the requirements of Technical Specification 3.3.2, three channels per train of the Containment Pressure Control System were not operable with their setpoints at $\leq$ 0.25 psig when the units were in modes 1, 2, 3, or 4 during the period of March 3, 1983, to May 26, 1983, for Unit 2 and March 29, 1983, to May 26, 1983, for Unit 1 in that the surveillance testing required by Technical Specification 4.3.2.1, Table 4.3-2, Item 6, had not been appropriately performed for that period, and when performed, the equipment did not meet the requirements of T.S. 3.3.2.

NOTE: Failure to perform the surveillance requirements specified in Technical Specification 4.3.2.1, Table 4.3-2, Item 6, constitutes a failure to meet the operability requirements for the limiting conditions for operation for that equipment as specified in Technical Specification 4.0.3.

Contrary to the requirements of Technical Specification 3.6.2, two independent containment spray systems were not operable on Unit 2, when the unit was in modes 1, 2, 3, and 4 during the period of March 3, 1983, to May 26, 1983, in that the Containment Pressure Control System instrumentation which controls containment spray actuation did not receive Technical Specification required surveillance during that period. Moreover, when the required surveillance testing was performed, the instrumentation was found set at setpoints in excess of Technical Specification allowable limits such that containment spray would not have performed as designed if called upon to do so.

Contrary to the requirements of 3.6.5.6, two independent containment air return and hydrogen skimmer systems, were not operable on Unit 2, when the unit was in modes 1, 2, 3, or 4 during the period of March 3, 1983, to May 26, 1983, in that the Containment Pressure Control System instrumentation which controls containment air return and hydrogen system actuation did not receive Technical Specification required surveillance during that period. Moreover, when required surveillance testing was performed the instrumentation was found set at setpoints in excess of Technical Specification allowable limits such that the containment air return and hydrogen skimmer system would not have performed as designed if called upon to do so.

Singularly and collectively, the above delineated deficiencies constitute violations of the applicable Technical Specifications.

This is a Violation (50-369/83-27 and 50-370/83-34-01).