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

Report Nos.: 50-413/92-02 and 50-414/92-02

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

Docket Nos.: 50-413 and 50-414 License Nos.: NPF-35 and NPF-52

Facility Name: Catawba 1 and 2

Inspection Conducted: January 21-24, 1992

Inspector: H. L. Whitener 3-11-92
H. L. Whitener Date Signed

Approved by: Frank Jape 3/11/92
F. Jape, Chief Date Signed
Test Programs Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of followup inspection of outstanding items relating to inservice inspection and leak rate testing.

Results:

Licensee actions to resolve the concerns raised by the NRC were acceptable. In the matter of reverse local leak rate testing of valves, an evaluation was performed and is included in the station records. The inspector concurred with the evaluation but requested that the licensee confirm that the closing force on small (0.5 inch) solenoid valves is significantly greater than the accident lifting force. In the matter of Inservice Testing, the licensee has updated the test procedures; these are included in the test program in conformance with Generic Letter (GL) 89-04.

The inspector agreed in principal with the licensees contention that for a material bonded leakage barrier such as the D. G. O'Brien electrical penetrations, a Type B local leak rate test is not required. This is based on the NRC acceptance that a welded joint is not required to be leak rate tested subsequent to the initial leak test. The expected lifetime of the bonding and

accuracy of pressure checks will be reviewed in a future routine leak rate inspection.

In summary, the licensee has adequately resolved the issues in the commitment dated February 14, 1990.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*M. Baughman, Systems Engineer
R. Dover, Design Engineering, General Office
*E. Fritz, Systems Engineer
*M. Hazeltine, Compliance
*S. Kirksey, Systems Engineer
*J. Lowery, Compliance
*W. McCollum, Station Manager

NRC Resident Inspectors

*W. Orders, Senior Resident Inspector
*J. Zeiler, Resident Inspector

*Attended exit interview

2. Action on Previous Inspection Finding (92701)

a. (Closed) Inspector Followup Item 50-413,414/89-33-02, Review Licensee's Evaluation of Reverse Testing Certain Containment Isolation Valves.

Appendix J to 10 CFR Part 50 allows reverse testing under certain conditions. Reverse testing is applying the pressure differential across a component in the opposite direction from the direction that would be expected under loss-of-coolant accident (LOCA) conditions or when the component is performing its intended function.

Also, ASME Boiler and Pressure Vessel Code (ASME B&V Code) Section XI, Subsection IWV, Paragraph 3423, allows containment isolation valves to be tested in the reverse directions for certain specific valve types.

The regulations and the ASME Code allow testing in the reverse direction when it can be shown that a test in the reverse direction is as conservative as a test in the accident direction. Therefore, it is the Nuclear Regulatory Commission (NRC) position that a licensee may preform reverse testing without prior NRC approval. However, the basis for considering a reverse test conservative, as required by the regulations, must be documented in plant records.

During a previous inspection (NRC Report No. 50 413, 414/89-33) the leak rate system engineer identified thirteen valves which are reverse leak rate tested on Unit 2. A similar number were expected

to exist on Unit 1. Documentation demonstrating the conservatism of these tests was not available in the station records. Subsequent to the 1989 inspection, the licensee reviewed the local leak rate program and identified seventeen valves in each Unit which are reverse tested. Justification for the reverse testing was documented in the station records. The documentation included the following valves for both Units:

Valve No.	Size (inches)	Type	Description
FW11	4.0	Plug	Refueling Water System
NM6Y	0.75	Relief	Nuclear Sampling System
NV14	3.0	Relief	Nuclear Chemical Volume Control
VQ16A	4.0	Diaphragm	Containment Air Addition and Release
WF 22	1.0	Globe	Equipment Decontamination
MIMV 6480	0.5	Globe	Instrument Valves (ILRT Line)
6481			
6490			
6491			
6470			
6471			
MISV 5230	0.5	Solenoid	Instrument Valves
5231			
5232			
5233			
IASV 5080	0.5	Solenoid	
5160			

The inspector reviewed the licensee's justifications, leak rate test drawings, valve alignments, valve design drawings, valve location, and valve orientation for the above valves. For the MIMVs, Miscellaneous Instrument Manual Valves, MISVs, Miscellaneous Instrument Solenoid Valves; and, IASVs, Instrument Air Solenoid Valves; the test pressure is applied over the disk in the reverse direction. This is normally considered non-conservative. The licensee justified testing these valves in the reverse direction by calculating the lifting force which would result from accident pressure (Pa = 14.68 psig) acting on the surface area of less than 0.2 sq in. A force of 0.02 pound force was obtained and considered inconsequential. However, after correction of a conversion factor it appears that the lifting force on the 0.5 inch diameter valves is about three pounds force. This is still a small force and the inspector concurred with the licensee that for manual valves, reverse testing was acceptable. Licensee management agreed to re-evaluate the solenoid valves and ensure that the lifting force is insignificant to the closing force.

This item is considered closed.

b. (Closed) Inspector Followup Item 50-413,414/89-33-03, Review Licensees Full Flow testing of Check Valves as committed to in NRC Inspection Report 89-27.

This item was an update to issues identified in an Inservice Testing (IST) inspection in September 1989. The licensee provided a commitment to resolve the issues raised relative to full flow testing of check valves, back flow testing of check valves and limiting valve stroke time in a letter to the NRC dated February 14, 1990. The NRC acknowledged acceptance of the licensee commitments in a letter to Duke Power Company (DPC) dated April 17, 1990 and emphasized the NRC position that licensees with approved IST programs must update these programs to meet Generic Letter (GL) 89-04, "Guidance On Developing Acceptable Inservice Testing Programs", and Attachment 1 to GL 89-04. The licensee was advised that the meeting minutes for GL 89-04 clarified this issue.

At this inspection, licensee engineers pointed out that Catawba intends to meet the requirements of GL 89-04 and Attachment 1 in their IST program. The inspector observed several upgrades to the IST program that support this position relative to full flow testing and backflow testing of check valves and basing limiting stroke times on effective valve performance (reference values). Activities in these areas are discussed below.

(1) Full Flow Testing of Check Valves

In the IST inspection (September 1989) the inspectors identified that certain check valves (NI-175, NI-176, NI-125, NI-129, NI-180 and NI-181) in parallel flow paths were not being tested on an individual component basis. Due to a lack of instrumentation, tests on these valves only verified full flow upstream of the parallel flowpath and not flow through the individual flow paths. GL 89-04, Attachment 1, Section 1 specifically requires flow through individual flow paths be known or an alternate method be used. Section 2 specifies as an alternative to full flow, a partial flow test during cold shutdown (CSD) and a sample valve disassembly and inspection program. The licensee revised Relief requests H11 and H14 to the Catawba Nuclear Station (CNS) Pump and Valve IST Manual to specify partial stroke tests at CSD and valve disassembly at refueling. The licensees program document is still in the process of being revised; however, these tests (Sample Disassembly) are currently specified and scheduled through the, "Check Valve Maintenance Program", and incorporated into the program justification document. The inspection plan calls for one of four valves to be inspected each refueling outage. If problems are identified all four valves in a group are inspected.

The inspector concluded that the licensee met his commitment and this matter is closed.

(2) Backflow Testing of Check Valves

In the September 1989 inspection the inspectors found that certain safety related check valves whose function was to prevent reverse flow were not being backflow tested. Examples identified were ND-10, ND-44, FW-28 and FW-56. Section XI of the ASME Code, paragraph 3522, requires that category C check valves performing a safety function in the closed position to prevent reverse flow be tested in a manner that proves the disk seats to stop reverse flow. In Generic Letter 89-04, the NRC emphasized the need to backflow test such valves. The generic letter further states that verification can be done by visual observation, by observation of appropriate pressure indication in the system, by leak testing, or by other positive means. In the commitment of February 14, 1990, the licensee agreed to review all check valves for applicability of GL 89-04, Attachment 1 and incorporate backflow testing in the IST program. The licensee has evaluated all check valves in the IST and Check Valve Maintenance programs. A number of the valves were identified to be backflow tested including ND-10, ND-44, FW-28 and FW-56. The current method of backflow testing these valves is observation of the pump in the parallel train for windmilling. While this is not a sensitive leak rate test, it is a positive method of identifying gross backflow which would occur in the event a check valve failed to close. These tests are incorporated into the pump test procedures. In addition, the licensee is actively pursuing the use of acoustic emission techniques for use in backflow testing. Test engineers stated that new developments in acoustic monitoring look promising. The inspector concluded that the licensee met his commitment and this matter is closed.

(3) Limiting Value of Stroke Time

In the commitment dated February 14, 1990, the licensee stated that the limiting values for valve full stroke time would be determined in accordance with Position 5 of Attachment 1 to GL 89-04.

A concern was identified in the September 1989 inspection when the inspectors identified four valves (ND 26, ND-27, ND-60 and ND-61) which had full stroke time limits of 90 seconds but the actual average stroke time was about six seconds.

Paragraph IWV-3413 of the ASME Section XI Code requires that the owner establish limiting values of stroke times for power operated valves but does not provide guidelines for establishing this limit. Position 5 of Attachment 1 to GL 89-04 clarifies

the intent of the Code and provides guidelines for establishing stroke time limits. If the limiting values are specified in the Safety analysis or TS for the plant, these limits must be met. If the actual stroke time is much less than these limits a new limit should be established based on the average actual stroke time when the valve is in good condition. This limit should not be overly restrictive but should provide for identification of valve degradation before failure.

The inspector reviewed a memorandum to File, dated October 31, 1990, which documents the licensees review of valve stroke time limits and the criteria established for setting these limits. These criteria addressed the guidelines of GL 89-04 and resulted in revision to limiting stroke time values for 71 valves. Included in these 71 valves were the four valves identified by the inspectors. The full stroke time limiting value for these four valves was reduced from 90 seconds to 15 seconds.

The inspector concluded that the licensees action was consistent with the recommendation of GL 89-04, Attachment 1, Position 5.

This matter is closed.

c. (Closed) Inspector Followup Item 50-413, 414/89-33-01, Review D. G. O'Brien Design Data to Determine if Local Leak Rate testing Requirements Have Been Met.

The concern that the D. G. O'Brien electrical penetration pressure seal around the conductor and pressure housing is not Type B tested was previously identified when it was found that in Type B local leak rate testing only the flange O-rings were pressure tested.

D. G. O'Brien electrical penetrations consist of an O-ring sealed flange incorporating hermetically glass-sealed electrical connector modules welded into the flange. The modules consist of two electrical connectors welded on each end of a section of steel pipe to form a pressure vessel. Electrical insulation within the connectors is provided by the circumferential glass employed in the hermetic sealing operation. The penetration assembly is sealed on the outboard end by using a mounting flange with double metal O-ring seals. The glass envelope is sealed to both the conductors and steel pressure housing and is maintained at accident pressure. The pressure in the glass envelope is monitored by a pressure gauge which is read periodically.

During this inspection the inspector was unable to obtain vendor and design data on site. However, subsequent to the inspection the inspector discussed the penetration hermetic seal design with a DPC Design Engineer by telephone. The inspector was informed that the glass to metal seal is a fusion process where the material inter-mingles. Therefore, the seal can be considered a bonded leakage

barrier in the sense of material bonding versus an adhesive bond or compression fitting.

The inspector agreed in principal with the licensees contention that for a material bond (as opposed to an adhesive bond or compression fitting), a Type B leak rate test is not required. This conclusion is based on the fact that, after an initial test, a welded joint is not required to be Type B leak rate tested.

The design test documentation and reliability of the pressure monitoring will be reviewed during future leak rate test inspections.

This matter is closed.

3. Exit Interview

The inspection scope and results were summarized on January 23, 1992, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.