



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

Report Nos. 50-413/87-08 and 50-414/87-08

Licensee: Duke Power Company
422 South Church Street
Charlotte, N.C. 28242

Docket Nos.: 50-413 and 50-414

License Nos.: NPF-35 and NPF-52

Facility Name: Catawba 1 and 2

Inspection Conducted: February 26 - March 25, 1987

Inspectors:	<u>T. A. Peebles for</u>	<u>4-6-87</u>
	P. K. Van Doorn	Date Signed
	<u>T. A. Peebles for</u>	<u>4-6-87</u>
	P. H. Skinner	Date Signed
	<u>T. A. Peebles for</u>	<u>4-6-87</u>
	M. S. Lesser	Date Signed
Approved by:	<u>T. A. Peebles</u>	<u>4-6-87</u>
	T. A. Peebles, Section Chief	Date Signed
	Projects Branch 2	
	Division of Reactor Projects	

SUMMARY

Scope: This routine, unannounced inspection was conducted on site inspecting in the areas of review of plant operations; surveillance observation; maintenance observation; review of licensee nonroutine event reports; followup of previously identified items; follow up of 10 CFR Part 21 reports and followup of IE Bulletins.

Results: Of the seven (7) areas inspected, two apparent violations were identified in one area; Inadequate Mechanical/Electrical Design and Installation Interface for PORVs, paragraph 10.a.; Failure to Follow Test Procedure and Inadequate Test Procedure for PORVs, paragraph 10.b.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

J. W. Hampton, Station Manager
*S. D. Alexander, Supervising Design Engineer
*H. B. Barron, Operations Superintendent
W. F. Beaver, Performance Engineer
W. H. Bradley, QA Surveillance
S. Brown, Reactor Engineer
B. F. Caldwell, Station Services Superintendent
R. N. Casler, Operating Engineer
R. H. Charest, Station Chemistry Supervisor
M. A. Cote, Licensing Specialist
*T. E. Crawford, Integrated Scheduling Superintendent
W. P. Deal, Health Physics Supervisor
C. S. Gregory, I. & E. Support Engineer
*C. L. Hartzell, Compliance Engineer
J. Knuti, Operating Engineer
F. N. Mack, Project Services Engineer
W. W. McCollough, Mechanical Maintenance Supervisor
*J. L. Moser, Senior Design Supervisor
C. E. Muse, Operating Engineer
*F. P. Schiffley, II, Licensing Engineer
G. T. Smith, Maintenance Superintendent
J. Stackley, I. & E. Engineer
D. Tower, Shift Operating Engineer
*D. L. Ward, Supervising Design Engineer
*R. F. Wardell, Technical Services Superintendent
J. W. Willis, Senior QA Engineer, Operations

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

*Attended exit interview.

2. Exit Interview

The inspection scope and findings were summarized on March 25, 1987, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

The following new items were described at the exit interview:

- ° Violation 50-413/87-08-01: Inadequate Mechanical/Electrical Design and Installation Interface for PORVs.
 - ° Violation 50-413/87-08-02: Failure to Follow Test Procedure and Inadequate Test Procedure for PORVs
 - ° Unresolved Item 50-413/87-08-03: Adequacy of System Upgrade Program
3. Licensee Action on Previous Enforcement Matters (92701) (92702)
- a. (CLOSED) Violation 414/86-39-02: Failure to Follow Procedures to Troubleshoot and Repair Solidstate Controls, Inc. Inverters. This violation was addressed in licensee correspondence dated November 18, 1986. This response was supplemented by a letter to the NRC dated March 6, 1987, addressing corrective action for Deviation 414/86-54-04. The inspector has reviewed the corrective actions described in the licensees correspondence and considers this item closed.
 - b. (CLOSED) Unresolved Item 413/86-15-03: Resolve Questions Concerning Engineering Analysis of Hangers Pulled Out of Foundation on Steam Line to Auxiliary Feedwater Turbine. This item is closed based on discussion with Design Engineering (DE) personnel. The DE personnel have stated that although the memoranda and reports issued for this problem imply the temperature in the Auxiliary Steam (SA) line did not decrease below 180°, it was apparent that it did and a water accumulation occurred in the line resulting in a water hammer. The action taken should preclude reoccurrence of this problem.
 - c. (CLOSED) Deviation 414/86-54-04: Failure to Meet Commitments Contained in DPC Correspondence Dated November 18, 1986. The licensee responded to this deviation in correspondence dated March 6, 1987. The inspector reviewed the corrective actions contained in this correspondence and considers this item closed.
 - d. (OPEN) Unresolved Item 50-413, 414/87-05-01: Management Review and Corrective Action of Excessive Problems Occurring on a Specific Assigned Shift. The inspector held discussions with licensee operations management to review licensee actions being taken regarding this issue. Management has met with the Shift Supervisor and the Shift Supervisor has recognized the need for improvements and has implemented improvements such as more formalized preshift and planned evolution briefings, intershift control board reviews, taking more time to review consequences of operator actions prior to implementation when time permits, reduction in alternate unit transfers, and more thorough review of surveillances. Licensee management will continue to review shift performance via incident

review, observation of the shift and discussions with the Shift Supervisor. Licensee actions appear adequate at this time. This item remains open pending results of the improvements.

- e. (OPEN) Unresolved Item 414/87-05-04: Channel Check of Off Scale High Auxiliary Feedwater Flow Rate Gauges. Technical Specifications (TS) 4.3.3.5 and 4.3.3.6 require a monthly channel check on Auxiliary Feedwater Flow Rate (CA) during Modes 1, 2 and 3. At power levels greater than approximately 30% the CA flow gauges are pegged high off scale. This is because Unit 2 has the Westinghouse D-5 Steam Generators and approximately 13% of total main feed flow is diverted through the auxiliary feed flow nozzles. This large amount of flow pegs the 0-600gpm CA flow gauges. The licensee requested its Design Engineering group to evaluate the validity of verifying channel operability by performing a channel check on an off scale gauge. Licensee Design Engineering concluded that comparing high off scale gauges would not satisfy channel check requirements. Various documents provide additional guidance. Regulatory Guide 1.97 Rev. 1 of August 1977 and Section 7.5 of the Catawba Final Safety Analysis Report (FSAR) discuss means for checking, with a high degree of confidence, the operational availability of instrument channels during reactor operation. One method in which channel checks may be accomplished is described as "cross checking between channels that bear a known relationship to each other and have readouts available." IEEE Standard 338-1977 (endorsed by Regulatory Guide 1.118 Rev. 2, June 1978) states that one method to verify operability of instrument channels is to compare readings on channels monitoring the same variable and recognize any differences.

These methods of performing the required Channel Check are apparently intended to be used on Unit 2 Auxiliary Feedwater Flow Rate however with a gauge pegged off scale high it is impossible to compare it with other off scale gauges and obtain any useful information. A failed high Auxiliary Feed Flowrate channel would appear perfectly normal to an operator performing a channel check, obviously defeating the purpose of the surveillance. The inspector noted that after the Unit 2 Reactor Trip of 3/23 when CA flow rate did come on scale, one channel remained failed high. A work request has been written to correct the problem. It appears that the performance of a Channel Check by comparing two gauges pegged high off scale does not constitute a satisfactory check of operational availability nor is it a valid qualitative assessment of channel behavior. Further, the licensee procedure (PT/2/A/4600/03A, Monthly Surveillance Items) for conducting the check requires the gauges to be within 30gpm of each other. The licensee has committed to implementing an upgraded method to channel check the CA flow gauges. This item remains unresolved pending NRC Management review of licensee actions and possible generic implications.

No violations or deviations were identified.

4. Unresolved Items*

One new unresolved item is identified in paragraph 10.c

5. Plant Operations Review (Units 1 & 2) (71707 and 71710)

- a. The inspectors reviewed plant operations throughout the reporting period to verify conformance with regulatory requirements, Technical Specifications (TS), and administrative controls. Control room logs, danger tag logs, Technical Specification Action Item Log, and the removal and restoration log were routinely reviewed. Shift turnovers were observed to verify that they were conducted in accordance with approved procedures.

The inspectors verified by observation and interviews, the measures taken to assure physical protection of the facility met current requirements. Areas inspected included the security organization, the establishment and maintenances of gates, doors, and isolation zones in the proper condition, that access control and badging were proper and procedures followed.

In addition to the areas discussed above, the areas toured were observed for fire prevention and protection activities. These included such things as combustible material control, fire protection systems and materials, and fire protection associated with maintenance activities. The inspectors reviewed Problem Investigation Reports to determine if the licensee was appropriately documenting problems and implementing appropriate corrective actions.

On March 5, 1987, Unit 1 was forced to shutdown due to 1B diesel generator inoperability greater than 72 hours. Two high bearing temperature trips of the engine indicated potential damage to the number one journal bearing. Inspection of the bearing by the licensee and the vendor revealed no problems and the trips were attributed to faulty temperature sensors. While the unit was in Mode 5 one pressurizer Power Operated Relief Valve (PORV) failed to stroke during a surveillance test. Troubleshooting revealed that incorrect pipe fitting of instrument air to all PORV actuators during initial construction had been done. This is further discussed in paragraph 10. Unit 1 returned to power on March 14. On March 16 1CF-28, the Feedwater Regulating Valve to Steam Generator A, failed closed. Unable to recover, operators initiated a manual Reactor Trip, anticipating an imminent steam generator low low level trip. The licensee, unable to identify the specific cause of the Feedwater Regulating Valve failing shut, postulated a failed optical isolator and E/P converter, both of which were replaced.

*An Unresolved Item is a matter about which more information is required to determine whether it is acceptable or may involve a violation.

On March 23 Unit 2 declared an Unusual Event due to unidentified leakage in excess of Technical Specifications limits. The licensee decided to take advantage of the situation by performing the 100% less of Electrical Load Test (delayed from the startup test program) prior to the required shutdown. Upon initiation of the test from 100% power the reactor tripped due to a turbine trip. The licensee had not yet identified the cause of the turbine trip. The source of excessive leakage was determined to be steam leakage from INC-33, a pressurizer PORV block valve. Upon isolating the leak by shutting the valve unidentified leakage dropped from approximately 2.0gpm to 0.3gpm.

No violation or deviations were identified.

6. Surveillance Observation (Units 1 & 2) (61726)

- a. During the inspection period, the inspector verified plant operations were in compliance with various TS requirements. Typical of these requirements were confirmation of compliance with the TS for reactor coolant chemistry, refueling water tank, emergency power systems, safety injection, emergency safeguards systems, control room ventilation, and direct current electrical power sources. The inspector verified that surveillance testing was performed in accordance with the approved written procedures, test instrumentation was calibrated, limiting conditions for operation were met, appropriate removal and restoration of the affected equipment was accomplished, test results met requirements and were reviewed by personnel other than the individual directing the test, and that any deficiencies identified during the testing were properly reviewed and resolved by appropriate management personnel.

- b. The following surveillances were reviewed for adequacy.

PT/2/A/4200/10A	ND PUMP 2A Performance Test
PT/2/A/4250/01A	Main Steam Isolation Valve Movement Test
PT/2/A/4600/03A	Monthly Surveillance Items

- c. The following surveillance was observed

PT/0/A/4971/12R	Reactor Coolant Pump Under Voltage Test
PT/0/A/4971/13R	Under Frequency Relay Test

No violations or deviations were identified.

7. Maintenance Observations (Units 1 & 2) (62703)

- a. Station maintenance activities of selected systems and components were observed/reviewed to ascertain that they were conducted in accordance with requirements. The inspector verified licensee conformance to the requirements in the following areas of inspection: the activities were accomplished using approved procedures, and functional testing and/or calibrations were performed prior to returning components or systems to service; quality control records were maintained; activities performed were accomplished by qualified personnel; and materials used were properly certified. Work requests were reviewed to determine status of outstanding jobs and to assure that priority is assigned to safety-related equipment maintenance which may effect system performance.

The following maintenance activity was observed:

Diesel Generator 1B Bearing Replacement

No violations or deviations were identified.

8. Review of Licensee Nonroutine Event Reports (Units 1 & 2) (92700)

The below listed Licensee Event Reports (LER) were reviewed to determine if the information provided met NRC requirements. The determination included: adequacy of description, verification of compliance with Technical Specifications and regulatory requirements, corrective action taken, existence of potential generic problems, reporting requirements satisfied, and the relative safety significance of each event. Additional inplant reviews and discussion with plant personnel, as appropriate, were conducted for those reports indicated by an (*). The following LERs are closed:

*LER 413/86-39 Rv.1	Turbine Driven Auxiliary Feedwater Pump And Standby Shutdown System Inoperable Due To Personnel Error
*LER 413/87-02	Unit Shutdown Due To Unidentified Leakage From Improperly Installed RTD Turbine Fitting
LER 413/87-03	Cold Leg Accumulator Boron Concentration Not Recognized To Be Out Of Specification Due to A Personnel Error
LER 413/87-04	Technical Specification Violation Due To Personnel Error In Calculating Radiation Monitor Setpoints

- *LER 414/86-51 Rv. 1 Reactor Trip Due To Feedwater Pump Suction Flow Pressure Switch Out Of Calibration
- *LER 414/86-53 Rv. 1 Reactor Trip Due To Personnel Error And Failure Of Main Feedwater Pump Automatic Controller
- *LER 414/87-01 Two Ice Condenser Intermediate Deck Doors Inoperable Due To Personnel Error
- LER 414/87-03 Auxiliary Feedwater Auto-Start During Feedwater Transient Due To Failed Level Transmitter
- **LER 414/87-05 Containment Isolation Valve Technical Specification Violation Due To Management Deficiencies

** This item is closed based on the issuance of violation 50-414/87-05-01.

b. Review of Part 21 Reports

(CLOSED) P2186-02 (Unit 1 only): BBC Brown Boveri K600/K800 Circuit Breakers Wire Harness. The inspector reviewed the licensee's documentation for this item as detailed in Potentially Reportable Item QA Serial No. CA-86-09. The licensee evaluation identified that no K600 nor K800 breakers were used at Catawba. Based on this information, this item is closed.

(CLOSED) P2185-10 (Unit 1 only): Potential Valve Spring Failure in TDI Diesel Engines. This part 21 report was addressed by the licensee in Significant Deficiency No. 414/86-02 dated January 16, 1986. It was reviewed by the inspectors as documented in IE Inspection Report 50-413/86-15, 50-414/86-16. Based on this review this item is closed.

(CLOSED) P2185-10 (Unit 2 only): Valve Actuators on Pressurizer Power Operated Relief Valves Discovered With Only One of Two Required Springs. This item was addressed by the licensee in December 26, 1985, and identified as Significant Deficiency No. 414/85-12. The licensee's corrective action was reviewed by the inspector and this item was closed by IE Inspection Report 50-413/85-55, 50-414/85-68. Based on this review this item is closed.

No violations or deviations were identified.

9. IE Bulletins (92703)

The following IE Bulletins were reviewed to ensure receipt, evaluation, and appropriate implementation:

- a. (CLOSED) IE Bulletin 86-02: Static "0" Ring Differential Pressure Switches. The licensee responded to this IEB in correspondence to the NRC dated July 28, 1986, in which the licensee stated that no Model 102 or 103 differential pressure switches were installed in safety-related applications at Catawba. In addition, the licensee stated a further review would be conducted to determine if any of the subject switches had been installed in systems that are subject to Limiting Conditions for Operation in the Technical Specifications. This further review was addressed in DPC memoranda to N.A. Rutherford from T.C. McMeekin dated August 29, 1986 which stated that the pressure switches identified in IEB 86-02 were not used in Technical Specification applications. Based on this review, this item is closed.
- b. (CLOSED) IE Bulletin 86-03: Potential Failure of Multiple ECCS Pumps Due to Single Failure of Air Operated Valve in Minimum Flow Recirculation Line. The licensee responded to IEB 86-03 in a letter dated November 10, 1986. In their response the licensee stated that the issue of single failures and deadheading ECCS pumps was discussed extensively with the NRC staff during the licensing review of Catawba. The issue was discussed in response to questions 440.36, 440.110, and 440.142 as well as in FSAR Tables 6.3.2-5 and 6.3.2-6. As a result of the reviews the licensee has concluded that the potential for a single failure causing the failure of more than one ECCS train does not exist at Catawba. This item is closed.

No violations or deviations were identified.

- 10. Special Inspection of Installation and Testing of Pressurizer Power Operated Relief Valves (61726)
 - a. This special inspection was conducted to review licensee actions regarding inoperable Pressurizer Power Operated Relief Valves (PORVs). On March 11, 1987, the licensee informed the inspectors that air piping had been misrouted to the PORVs rendering them inoperable under certain conditions. Catawba has three Pressurizer PORVs. Two of these, NC32B and NC34A, have been upgraded to safety-related electrically and have additionally been provided with a safety-related nitrogen supply from the Cold Leg Accumulators as a backup to the normal non-safety-related air supply. Nitrogen backup allows assured open operation for low temperature overpressure protection and steam generator tube rupture events (Ref. Catawba SSER5, pages 5-6 and 5-7). Plant modifications were implemented to attach nitrogen supply lines to originally installed air supply lines. Downstream of the nitrogen attachment the air lines connect to electrically operated solenoid valves which regulate the supply to the PORVs. Original installation of these downstream portions of the air lines was made to the wrong solenoid valves. The supply for

NC36B (the non-safety-related, not nitrogen operating valve) was run to NC32B. The NC32B supply was run to NC34A and the NC34A supply to NC36B. This resulted in valve NC32B not being supplied with nitrogen. Additionally opposite train electrical power was supplied to control valves NC32B and 34A. It appears that a mechanical layout drawing (CN-1522-09.23-00) was used to install and inspect air and nitrogen piping up to a 2-inch by 3/4-inch reducer. The line between the reducer and the isolation valves for the solenoids was field run, i.e. not shown on the mechanical layout drawing or the instrument loop drawing (CN-1499-NC10). The loop drawing was used to inspect and install the solenoid valve loops. Apparently no inspection was done on the intermediate piping and the layout drawing did not clearly define which line went to which valve. A Flow Diagram, Drawing CN-1605-1.1, was issued by the Design Engineering Department and did show the valves by number to be supplied by the specific lines. However, this drawing was not required to be used and apparently was not used for the installation process. This problem resulted in an apparent violation of Technical Specification (TS) 3.4.4 which requires all PORV's to be operable in Modes 1, 2 and 3. This is Violation 413/87-08-01: Inadequate Mechanical/Electrical Design and Installation Interface for PORVs. The licensee indicated that this appears to be a unique design relative to the PORVs and does not suspect the plant to be susceptible to this error elsewhere. It should also be noted that Catawba does have an additional safety related depressurization method via a safety-related auxiliary pressurizer spray valve and that Catawba does not normally operate with a full (water solid) pressurizer.

- b. Further review was conducted to determine why testing had not discovered this problem earlier. The first time the valves were required to be tested individually with nitrogen was in November 1986. Testing was conducted on November 6, 1986, to satisfy surveillance TS 4.4.4.3 Procedure PT/1/A/4600/03C requires venting and isolation of the normal air supply (Enclosure 13.2, steps 4 and 5), then operating the two PORVs with nitrogen, then closing the vent (step 14), and later closing the supply valve. The operator apparently opened the vent until nitrogen was being expelled and then closed the vent prior to the valves being stroked, thinking that, since nitrogen was present, the valves were being stroked with nitrogen. Nitrogen should not have been present due to check valves between the nitrogen and air supply lines where they are vented. This was apparently not fully understood by the operator. In addition, further testing has shown that trapped air between the check valves and the PORVs is sufficient to stroke the valves. Therefore, it appears that even if the procedure were followed the test procedure is not adequate to assure operation with nitrogen. This is an apparent violation of TS 6.8.1 which requires procedures for testing to be followed and to be adequate to fulfill requirements. This is Violation 413/87-08-02: Failure to Follow Test

Procedure and Inadequate Test Procedure for PORVs. The licensee indicated that an ad-hoc committee utilizing corporate and site engineers has been formed in part as a result of this item to review the entire test program at Catawba.

The two violations identified above are being considered for escalated enforcement along with previously identified issues and are subject to modification based on further review and information to be discussed with the licensee at the NRC's RII office on April 16, 1987.

- c. Further discussions with the licensee during review of this event indicated that the program for upgrading of non-safety-related systems to safety-related by analysis may not require consideration of all aspects of upgrading such as QA inspections. The licensee was requested to provide information relative to this process for further review. This is Unresolved Item 50-413/87-08-03: Adequacy of System Upgrade Program.

Two violations were identified as described above.