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

Report Nos.: 50-413/92-03 and 50-414/92-03

Licensee: Duke Power Company
P.O. Box 1007
Charlotte, N.C. 28201-1007

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

Facility Name: Catawba Nuclear Station Units 1 and 2

Inspection Conducted: January 12, 1992 - February 8, 1992

Inspector: W. H. Miller, Jr. for — 2-28-92
W. T. Orders, Senior Resident Inspector — Date Signed

W. H. Miller, Jr. — 2-28-92
F. C. Hopkins, Resident Inspector — Date Signed

W. H. Miller, Jr. for — 2-28-92
J. Zeiler, Resident Inspector — Date Signed

Approved by: George A. Belisle — 3/2/92
George A. Belisle, Chief — Date Signed
Projects Section 3A
Division of Reactor Projects

SUMMARY

Scope: This routine, resident inspection was conducted in the areas of plant operations; surveillance observations; maintenance observations; licensee event reports; and follow-up of previously identified items.

Results: Two Non-Cited Violations were identified during this report period involving an improperly performed upper containment air temperature surveillance (Paragraph 6) and, the inoperability of the Control Room Ventilation System (Paragraph 7). The root cause for both of these incidents appeared to be failure to abide by the requirements of Technical Memorandums.

A licensee weakness was identified involving the implementation of the Technical Memorandum program (Paragraph 8).

9204010164 920303
PDR ADOCK 05000413
Q PDR

REPORT DETAILS

1. Persons Contacted

   Licensee Employees

   S. Bradshaw, Shift Operations Manager
   J. Forbes, Engineering Manager
   S. Frye, Operations Support Manager
   R. Futrell, Regulatory Compliance Manager
   *E. Geddie, Operations Superintendent
   T. Harrall, Safety Assurance Manager
   *M. Hazeltine, Compliance
   *C. Lewis, Compliance
   *W. McCollum, Station Manager
   M. Tuckman, Catawba Site Vice-President

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

   NRC Resident Inspectors

   *W. Orders
   P. Hopkins
   *J. Zeiler

   Accompanying NRC Personnel

   *A. Herdt, Branch Chief, Division of Reactor Projects, Region II
   S. Ninh, Project Inspector, Region II

   *Attended exit interview.

2. Plant Status

   a. Unit 1 Summary

      Unit 1 operated the entire report period at essentially full power with no major problems.

   b. Unit 2 Summary

      Unit 2 began the report period operating at 100 percent power. On January 15, a reactor trip occurred as a result of an automatic turbine trip on low Electro-Hydraulic Control pressure. Details of this event are discussed in Paragraph 4. The unit returned to 100 percent power on January 17 and remained at essentially full power the rest of the period.

c. Electrical Distribution System Functional Inspection Status

An NRC Electrical Distribution System Functional Inspection team had completed two weeks of a scheduled three week inspection at of the end of this report period.

The primary objective of the inspection is to assess the capacity of the electrical distribution system to perform its intended functions during all plant operating and accident conditions. A secondary objective is to assess the capability and performance of the licensee's engineering organization in providing engineering and technical support to the groups responsible for the electrical distribution system.

At the end of the report period, problems with a number of issues such as fuse control, thermal overload control, breaker coordination and diesel loading had been identified, but were inconclusive. A number of specific operability concerns were identified relative to selected breakers and control power circuits. In each case, the licensee declared the component inoperable and performed the necessary corrective maintenance to return the component to operable status. Licensee evaluations pertaining to past operability of this equipment is ongoing.

3. Plant Operations Review (71707)

The inspectors reviewed plant operations throughout the report period to verify conformance with regulatory requirements, Technical Specifications (TSs) and administrative controls. Control Room logs, the Technical Specification Action Item Log, and the Removal and Restoration (R&R) logs were routinely reviewed. Shift turnovers were observed to verify that they were conducted in accordance with approved procedures. The complement of licensed personnel on each shift inspected, met or exceeded the requirements of TSs. Daily plant status meetings were routinely attended.

Plant tours were performed on a routine basis. The areas toured included but were not limited to the following:

Turbine Buildings
Auxiliary Building
Units 1 and 2 Diesel Generator Rooms
Units 1 and 2 Vital Switchgear Rooms
Units 1 and 2 Vital Battery Rooms
Standby Shutdown Facility

During the plant tours, the inspectors verified by observation and interviews that measures taken to assure physical protection of the facility met current requirements. Areas inspected included the security organization, the establishment and maintenance of gates, doors, and

isolation zones in the proper conditions, and that access control badging were proper and procedures followed. The resident inspeciton staff also participated in a security drill during this report period.

In addition, the areas toured were observed for fire prevention and protection activities and radiological control practices. The inspectors also reviewed Problem Investigation Reports (PIRs) to determine if the licensee was appropriately documenting problems and implementing corrective actions.

No violations or deviations were identified.

4. Unit 2 Reactor Trip on Low Main Turbine Hydraulic Oil Pressure (71707)

On January 15, 1992, at approximately 2:15 a.m., with Unit 2 operating at 100 percent power, a reactor trip occurred due to an automatic turbine trip on low Main Turbine Hydraulic Oil (LH) pressure. The unit response to the trip was normal and the unit was stabilized in Mode 3, Hot Standby.

The LH System supplies hydraulic actuating and emergency trip oil to the Main Turbine's steam valve actuators. The emergency trip function of the LH System supplies hydraulic oil pressure to "disk dump" valves through a series of devices in the trip and overspeed protection circuits. The "disk dump" valves open when the emergency trip oil pressure is removed which in turn causes the steam valves to trip closed. The LH System is equipped with two oil delivery pumps. During normal operation, one LH pump is operating to supply all of the main turbine's hydraulic oil requirements, with the second pump in standby as a backup. Weekly testing of the LH pumps is performed to ensure that the backup pump automatically starts on a low oil pressure signal.

On January 15, with the A LH pump operating, Unit 2 Control Room Operators were attempting to perform a weekly test of the LH System. During the portion of the test which was to cause the automatic start of the B pump, a rapid decrease in hydraulic oil pressure occurred, causing the Turbine Trip.

Subsequent licensee efforts to duplicate the event were unsuccessful. After extensive troubleshooting it was speculated that the most probable cause for the low oil pressure condition was from the abnormal response of the pressure compensators in the LH pumps which maintain hydraulic oil pressure by controlling pump discharge pressure. Other possible contributing factors were the lower than normal LH System fluid temperature which could have caused a higher that normal oil viscosity, and air in-leakage at the suction of the A LH pump.

Following trouble-shooting and repairs of the LH System, including the replacement of the compensators, the unit commenced startup on January 16 and achieved 100 percent power the following day.

No violations or deviations were identified.

5. Reactor Coolant System Vacuum Refill (71707)

As documented in NRC Inspection Report Nos. 413, 414/91-27, Catawba personnel conducted a process known as Reactor Coolant (NC) System "vacuum refill" at the end of the Unit 1 End-of-Cycle 4 refueling outage. At the end of that report period, it was known that the process had gone well, but the details concerning the evolution had not been analyzed by the licensee. That analysis has since been completed and reviewed by the resident inspectors. Details of that review are delineated below.

Using the conventional refill method, the NC system is filled via the normal charging path, from the mid-loop (reduced inventory) level until the pressurizer is full. The NC pumps are then "bumped" three to four times in sequential order to flush the air and non-condensable gases from NC system high point pockets such as the steam generator U tubes. The air and non-condensable gases are vented from the NC system between pump runs. Hydrazine is later added to reduce system oxygen levels. This method generally takes between twenty-four and thirty-six hours to complete.

The vacuum refill process employs a vacuum pump to pull a negative pressure on the NC system before the fill process begins. After a vacuum has been achieved on the NC system, it is filled until it overflows the pressurizer. At this point, the system is ready for a reactor coolant pump to be placed in service.

The licensee states that three advantages can be obtained using the vacuum refill process. First, a reduced number of reactor coolant pump "bumps" and corresponding reduction in the potential for reactor coolant pump seal degradation is achieved. Second, a reduction in critical path time can be obtained by removing the unwanted air and non-condensable gases prior to filling the system. Finally, better chemistry conditions can be obtained at the start of the system heat up.

When this process was implemented at the end of the Unit 2 outage, a reduction of critical path time was not achieved, but the number of reactor coolant pump starts was reduced and better chemistry for heat up was achieved. The licensee believes that the vacuum refill system will greatly improve the reliability of NC system components and can be operated safely and efficiently. The licensee also believes that a substantial time savings can be achieved during subsequent outages when more experience is gained using the new system.

The resident inspectors will monitor this process during subsequent outages to evaluate its effectiveness and its contribution to plant reliability.

No violations or deviations were identified.

6. Inadequate Containment Air Temperature Surveillance (71707)

On January 7, Unit 1 was operating at 100 percent power with two (1B and 1C) of four Upper Containment Ventilation Unit Fans (UCVUFs) in service. At approximately 4:40 a.m., a Control Room Operator secured the 1C Fan in preparation for making a containment air pressure release via the Containment Addition and Release (VQ) System. Although the operator's intent was to restart the fan after the release, he forgot to do so. The fan was not restarted until January 12, at 7:35 p.m. Due to a pre-existing problem with the mis-wiring of two of the containment air temperature sensors located at the inlet of the 1B and 1C UCVUFs, the average containment air temperature calculated during the time that the 1C Fan was off, was invalid. Therefore, the daily TS required containment air temperature surveillances conducted during this period were likewise invalid.

The Upper Containment Ventilation portion of the Containment Ventilation System (VV) ventilates and cools the upper containment. It consists of four air handling units (UCVUFs) and four Upper Containment Return Air Fans (UCRAFs). During normal operation, two or three of the four UCVUFs and UCRAFs are required to maintain proper upper containment air temperature. Resistance Temperature Devices (RTDs) located near the inlet of each UCVUF are used to calculate the upper containment average air temperature. This temperature is calculated by the Operational Aid Computer (OAC) and is the arithmetical average of the temperature readings obtained from the RTDs of the running UCVUFs.

In December 1991, the licensee discovered that the RTD temperature cables on the 1B and 1C UCVUFs were reversed and had been so since the initial installation of the system. With the leads reversed, the licensee recognized that the average air temperature calculated by the OAC could be invalid. For the average to be valid, both the 1B and 1C UCVUFs must either be both on or off. A Technical Memorandum (TM 11-29) was issued December 31, 1991, describing the problem and instructing the operators to ensure that the proper combination of UCVUFs were operating prior to conducting the containment air temperature surveillance.

On January 7, the 1C UCVUF was secured by a Control Room Operator who was making preparations for a containment air release. Containment air releases are the normal method of controlling containment internal air pressure to within the limits prescribed by TSs. It is normally necessary to make one or two releases per 12 hour shift. The operators have found that stopping one of the UCVUFs causes the containment air temperature and pressure to rise slightly resulting in a greater quantity of air being released during the containment air release evolution. Similarly, the operators have found by using this process, that they can sometimes make only one VQ release per shift as opposed to the two that are sometimes necessary. The Control Room Operator failed to restart the UCVUF following the containment air release as he had intended to do, even though he indicated that he had reviewed the TM during shift turnover.

Likewise, the oncoming shift Control Room Operators failed to recognize that the correct number of fans were not running.

The daily TS surveillance for upper containment air temperature was performed 5 times between January 7 and January 12, but the data was inaccurate since the 1C UCVUF was not in service. Had an adequate review of the TM Logbook been performed by the oncoming and subsequent shifts up to January 12, it would have been recognized that the wrong combination of fans were running. As a result of this event and two other recently identified problems regarding TMs, the licensee initiated an in-depth review of the TM program. Details of this review are discussed in Paragraph 8.0.

The licensee evaluated the history of upper containment air temperatures which showed that all four UCVUF temperature indications have consistently been within just a few degrees of each other, regardless of which fans were running. Based on this, the licensee's Engineering Department determined that the upper containment temperatures would have remained within design limits during the period in question.

Technical Specification Surveillance 4.6.1.5.1 requires that the upper containment average air temperature be calculated daily using the temperature at the inlet of each operating UCVUF. Implicit in this requirement is that the calculation be valid. During the period between January 7 and 12, 1992, the surveillances were invalid.

This issue is identified as a violation of the TS Surveillance 4.6.1.5.1. However, after review of the circumstances relative to this issue, it was determined that this licensee identified violation will not be cited, in that, the criteria specified in Section V.G.1 of the NRC Enforcement Policy were satisfied. The safety analysis indicates minimal safety significance, the event was reported in Licensee Event Report (LER) 50-413/92-01, and adequate corrective action was initiated before the end of the inspection period. Accordingly, this is identified as Non-Cited Violation (NCV) 413/92-03-01: Improperly Performed Upper Containment Temperature Surveillances.

7. Control Room Ventilation System Inoperability (71707)

On January 16, at 3:53 a.m., Train B of the Control Room Area Ventilation System (VC) was removed from service for routine maintenance. Later that day after the completion of the maintenance, as Operations personnel were making preparations to place Train B in service, it was discovered that breaker 2EKPH #22, which provides control power for components in that train, had not been opened during the maintenance as it should have been. With the breaker closed when Train B was inoperable, the operating train of VC would not have been capable of adequately pressurizing the control room during certain accident scenarios. Therefore, both VC trains were inoperable during this period.

The VC System is shared by both Units and is designed to maintain a suitable environment for equipment operation in, and safe occupancy of the control room under all plant operating conditions. The system consists of two redundant full capacity equipment trains each containing filters; supply fans; pressurizing fans; and chilled water cooling units.

By design, the control room is to be maintained at a positive pressure relative to all surrounding areas. This pressurization is necessary to ensure control room habitability and compliance with GDC 19 following a design basis accident.

Early in 1991, the licensee identified that the design of the VC System is such that the pressurization of the control room could be jeopardized unless steps were taken to prevent the dampers in an inoperable train of VC from realigning upon the receipt of a safety injection (SI) signal. It was identified that if the dampers in the inoperable train were to realign, it would result in the operable train recirculating air through the inoperable train which in turn would degrade the pressurization of the control room. To prevent this from happening, Operations personnel issued Technical Memo (TM) 21-07 instructing the operators to remove the control power to the permissives for the dampers and fans on an inoperable train. If A train of VC is out of service, breaker 1EKPG #22 is to be opened and if B train is out of service, breaker 2EKPH #22 is to be opened.

Prior to removing VC Train B from service on January 16, an Assistant Shift Supervisor reviewed the work package, which should have included the necessary R&R tagouts to complete all the planned maintenance activities including the opening of breaker 2EKPH #22. The work package was then reviewed by the Control Room SRO, two Control Room Operators (ROs), the Work Control Center SRO, and at least one Non-Licensed Operator (NLO). None of these individuals recognized that the breaker had been omitted from the R&R tagouts even though all of them with the exception of the Work Control Center SRO were required to review the TM Logbook during shift turnover.

It is the inspectors' opinion that had an adequate review of the TM Logbook been performed by those involved, one of the individuals would have recognized the error. As a result of this and two other problems regarding the implementation of the TM program, the licensee initiated an in-depth review. Details of the problems with the TM program and the licensee's corrective actions are discussed in Paragraph 8.0.

The licensee analyzed the safety significance of breaker 2EKPG #22 not being open during the time in question on January 16 and determined that there were only two periods, of approximately 5 minutes each, when the operating train of VC would not have been able to perform its design function. These two periods were when the access doors to the B Train VC air handling unit were open. If an SI signal had been received during

this time, the VC System would not have been able to pressurize the control room due to air escape through the inoperable train. Therefore, during these periods, both trains of VC were inoperable.

The licensee's analysis of a LOCA scenario with the VC system degraded as described above, indicated that a positive pressure of approximately 0.015 inch wc would have existed with respect to all adjacent areas except one wall interfacing with a computer room, the service building and outside atmosphere. The control room would have been slightly negative (approximately .007 inch wc) with respect to these areas. According to the licensee's analysis, due to the low differential pressure across this wall, it appears that the upper limit of 10 cfm unfiltered inleakage into the control room would have been satisfied and control room operator doses would not have exceeded those stated in the FSAR Dose Analysis.

Technical Specification 3.7.6 requires that two independent trains of control room area ventilation be operable in all modes.

This issue is identified as a violation of TS 3.7.6, in that for two periods of approximately 5 minutes each on January 16, 1992, both trains of the control room ventilation system were inoperable. After review of the circumstances relative to this issue, it was determined that this licensee identified violation will not be cited, in that, the criteria specified in Section V.G.1 of the NRC Enforcement Policy were satisfied. The safety analysis indicates minimal safety significance, the event was reported in Licensee Event Report 50-414/92-02, and adequate corrective action was initiated before the end of the inspection period. Accordingly, this is identified as NCV 414/92-03-01: Control Room Ventilation System Inoperability Due to Breaker Misalignment.

8. Technical Memorandum Program Weaknesses (71707)

Since September, 1991, at least three incidents have occurred in which the root cause has involved personnel failing to follow the requirements contained in Technical Memorandums. Two of these incidents are discussed in Paragraphs 6 and 7 of this report. The other incident occurred on September 13 when an incorrect breaker alignment resulted in both trains of the VC System being inoperable for approximately 90 minutes. Details of this incident are discussed in NRC Inspection Report Nos. 413, 414/91-27 and 91-28. As a result of these problems, the licensee initiated an in-depth review of the TM program.

The TM program is described in Operations Management Procedure (OMP) 2-5, and is used by the Operations Department to provide enhancements to an existing procedure or provide temporary instructions in the absence of a procedure. TMs are designed to be used only on a temporary, short term basis. The Operations Unit Managers are responsible for issuing the TMs,

and for reviewing them to ensure that they are deleted when no longer needed. Each TM is assigned an expiration date and if the TM is determined to still be needed after that date, it is to be reissued. All operations shift personnel, except the Work Control Center (WCC) SRO, are required to review the TM Logbook during shift turnover and are expected to recognize the conditions that would require the implementation of the requirements specified therein.

Some of the proposed changes to strengthen the controls for the TM program include reducing the overall number of TMs, adding stricter requirements for setting expiration dates, and adding higher levels of management approval for extending expiration dates.

The problems associated with the TM program were identified as a licensee weakness and the inspectors will continue to monitor the licensee's progress toward strengthening the program.

No violations or deviations were identified.

9. Surveillance Observation (61726)

a. Surveillance Activities Reviewed

During the inspection period, the inspectors verified plant operations were in compliance with various TS requirements. Typical of these requirements were confirmation of compliance with the TS for reactivity control systems, reactor coolant systems, safety injection systems, emergency safeguards systems, emergency power systems, containment, and other important plant support systems. The inspectors verified that: surveillance testing was performed in accordance with 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 acceptance criteria and were reviewed by personnel other than the individual directing the test, and any deficiencies identified during the testing were properly reviewed and resolved by appropriate management personnel.

The inspectors witnessed or reviewed the following surveillances:

PT/1/A/4400/03G	Component Cooling Water System Crossover Defeat
PT/1/A/4250/06	Auxiliary Feedwater Pump Head and Valve Verification
PT/2/A/4350/02A	Diesel Generator 2A Operability Test
PT/2/A/4200/31A	Steam Generator PORV Stroke Test
PT/2/A/4200/06A	Boron Injection Valve Lineup Verification

PT/2/A/4450/02	Auxiliary Building Ventilation Filtered Exhaust System Operability
PT/2/A/4450/04	Diesel Generator Storage Tank Water Inspection
PT/2/A/4600/02A	Mode 1 Periodic Surveillance Items

No discrepancies were noted from the review of the above surveillances.

No violations or deviations were identified.

10. Maintenance Observations (62703)

a. General

Station maintenance activities of selected systems and components were observed/reviewed to ensure that they were conducted in accordance with the applicable requirements. The inspectors verified licensee conformance to the requirements in the following areas of inspection: 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 the status of outstanding jobs and to assure that priority was assigned to safety-related equipment maintenance which may affect system performance.

b. Maintenance Activities Reviewed

The inspectors witnessed or reviewed the following maintenance activities:

WR 92006825-01	Replacement of 1RN-837
WR 8062 PRF	Remove/Inspect Valve 1RN-291 for Flow Blockage
WR 92006077-01	ACOT on Nuclear Instrumentation Channel N-44

No violations or deviations were identified.

11. Review of Licensee Event Reports (90712)

The LERs listed below were reviewed to determine if the information provided met the NRC requirements. The determination included; adequacy of description, verification of compliance with the TS as well as other regulatory requirements, corrective actions taken, existence of potential generic problems, reporting requirements' compliance, and the relative safety significant of each event. In-plant reviews and discussions with plant staff was also conducted for the reports.

The inspector verified that the specific corrective actions for each event were complete. It was also noted that the licensee committed to several generic corrective actions to deal with ventilation systems design problems. These corrective actions include: 1) review available plant parameters for addition to the Performance Monitoring Database System to enhance the analysis and trending of ventilation systems; 2) initiate a thorough and systematic review of ventilation system design requirements and compare them against nominal operating data to ensure consistency with the FSAR and TS parameters; and 3) an extensive review of ventilation systems and associated procedures to verify that ventilation system testing is meeting the intent of TS, FSAR, and Regulatory Guides. The inspectors were also informed that a Self-Initiated Technical Audit is scheduled to be performed on the control room ventilation system in late 1992.

The following LERs are closed:

a. (Closed) 413/90-09: Technical Specification Violation For Inoperable Containment Purge System Due to Incomplete Procedures

b. (Closed) 414/90-03: Annulus Ventilation System Failure to meet Vacuum Decay Time Test Acceptance Criterion with Interacting Ventilation Systems In Post LOCA Alignment

c. (Closed) 414/90-05: Technical Specification For One Train of The Annulus Ventilation System Inoperable Due to Inappropriate Action

No violations or deviations were identified.

12. Follow-up On Previous Inspection Findings (92701, 92702)

a. (Closed) Inspector Follow-up Item 413/90-06-04: Functional Test of Auxiliary Shutdown Panels

In 1989, the Catawba Safety Review Group recommended to the Station that verification of remote position indication of valves at the auxiliary shutdown panels (ASPs) should be conducted. The Station initially rejected the recommendation because the verification is not required by ASME Section XI. However, the Station later considered it prudent to perform a functional test on the ASPs. The inspector verified that Unit 2 auxiliary feedwater pump turbine control panel (AFWPTCP) functional test was successfully completed on October 30, 1991. The Unit 1 AFWPTCP functional test will be performed during the 1992 outage. The remaining ASPs and safe shutdown facility tests are scheduled to be completed one per outage.

b. (Closed) Inspector Follow-up Item 413, 414/90-19-04: Investigation of Heater Element Problem in the Ice Condenser Air Handling Unit

The licensee had responded to this problem and determined that the presently installed heater elements in the ice condenser (NF) air handling unit (AHU) for both units will be replaced with the new design heater elements. The configuration of the new design heater elements significantly reduces the likelihood of contact, and resultant short circuits between the element wiring and the element. The inspector discussed this issue with the licensee's engineering staff and determined that all of Unit 1 NF AHU heater elements were completely replaced with the new design heater elements on October 31, 1991. Replacement of Unit 2 NF AHU heater elements is scheduled to be completed by July 31, 1992.

No violations or deviations were identified.

13. Exit Interview

The inspection scope and findings were summarized on February 11, 1992, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection findings listed below. 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.

Item Number	Description and Reference
NCV 413/92-03-01	Improperly Performed Upper Containment Temperature Surveillance. (Paragraph 6)
NCV 414/92-03-01	Control Room Ventilation System Inoperability Due to Breaker Misalignment. (Paragraph 7)