



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

Report Nos.: 50-413/91-07 and 50-414/91-07

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: February 3, 1991 - March 2, 1991

Inspectors: W. H. Miller, Jr.

W. T. Orders

3-25-91

Date Signed

W. H. Miller, Jr.

P. C. Hopkins

3-25-91

Date Signed

W. H. Miller, Jr.

J. Zeiler

3-25-91

Date Signed

Approved by:

George A. Bellisle  
George A. Bellisle, Chief  
Projects Section 3A  
Division of Reactor Projects

3/26/91

Date Signed

#### SUMMARY

Scope: This routine, resident inspection was conducted in the areas of review of plant operations; surveillance observations; maintenance observations; licensee event reports; 10 CFR Part 21 reports; and followup of previously identified items.

Results: One apparent violation is currently being considered for escalated enforcement involving a design inadequacy which could have prevented the control room ventilation system from performing its intended safety function. In the event of a LOCA concurrent with a loss of off-site power, which is an analyzed accident, the control room ventilation system would have been incapable of automatically

maintaining the control room pressurized, a function which is necessary to prevent exceeding GDC 19 exposure limits for the operator. (Paragraph 6).

One Non-Cited Violation was identified involving an inadequate design review which approved a design change removing a necessary structural support from the Main Feedwater and Auxiliary Feedwater Systems (Paragraph 8).

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

\*\*S. Bradshaw, Compliance  
B. Caldwell, Station Services Superintendent  
\*R. Casler, Operations Superintendent  
T. Crawford, Integrated Scheduling Superintendent  
\*R. Ferguson, Shift Operations Manager  
\*\*J. Forbes, Technical Services Superintendent  
R. Glover, Performance Manager  
\*J. Hampton, Station Manager  
T. Harrall, Design Engineering  
\*\*\*L. Hartzell, Compliance Manager  
R. Jones, Maintenance Engineering Services Manager  
\*\*\*V. King, Compliance  
F. Mack, Project Services Manager  
\*\*W. McCollum, Maintenance Superintendent

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

#### NRC Resident Inspectors

\*\*\*W. Orders  
\*\*\*P. Hopkins  
\*J. Zeiler

\*Attended exit interview on March 6, 1991.  
\*\*Attended exit interview on March 14, 1991.  
\*\*\*Attended both exit interviews.

### 2. Plant Status

#### Units 1 and 2 Summary

Unit 1 began the report period operating at full rated power. On February 27, 1991, the unit was shut down in order to investigate and repair an electrical ground on the main generator exciter. Details pertaining to this forced outage are discussed in paragraph 7. On March 2, repairs to the exciter were completed and unit startup commenced. The report period ended with the unit in Mode 2.

Unit 2 operated at virtually full power the entire period.

### 3. Plant Operations Review (71707)

The inspectors reviewed plant operations throughout the report period to verify conformance with regulatory requirements, Technical Specifications

and administrative controls. Control Room logs, the 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 complement of licensed personnel on each shift inspected, met or exceeded the requirements of Technical Specifications. Further, 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.

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. Electrical Switchyard Inspection (71707)

On February 11, 1991, McGuire Nuclear Station Unit 1 experienced a reactor trip due to loss of offsite power. Subsequent licensee investigation revealed the that the loss of offsite power was caused by Transmission Department personnel attempting to perform post implementation testing on a modification of a relay circuit on the auto-transformer bank connecting the 525 Kilovolt (KV) and 230 KV switchyards. Due to inadequate isolation of energized equipment, the testing resulted in opening the breakers to both the red and yellow buses in the switchyard, ultimately resulting in the Unit 1 transient.

One of the conclusions drawn from the licensee's evaluation of the event was the need for improved communications between transmission and operations personnel at all of Duke's nuclear facilities, pertaining to switchyard activities, including administrative controls germane to access to and work in the switchyard.

As a result of the event at McGuire, the resident inspectors performed a detailed inspection of the switchyard at Catawba to determine the adequacy of access control and equipment condition. Minor discrepancies were noted in both areas and were identified to the licensee.

At the end of this report period, the licensee is developing a program to address the above referenced improvements. Currently, as a short term measure, any work to be done in the Catawba switchyard is to be coordinated with and consented to by the Operations Shift Supervisor.

The inspectors will review these areas in subsequent inspections to ensure that appropriate measures are implemented.

No violations or deviations were identified.

#### 5. VX Operability Concern (71707)

Summary:

On February 26, 1991, McGuire Nuclear Station notified Catawba Design Engineering staff of a potential problem associated with the operation of the Containment Air Return/Hydrogen Skimmer System (VX) and the Containment Spray System (NS). The concern involved the repeated cycling of equipment in those systems after a high energy line break inside containment when pressure fluctuates near the start/stop setpoint of the equipment. This excessive cycling could cause the equipment to fail.

Background:

The VX system includes the containment air return (CAR) fans, hydrogen skimmer fans, and associated dampers, valves, and ductwork. The fans actuate nine minutes following a containment high-high pressure signal (3.0 psig) to circulate containment air through the ice condenser, and to minimize the accumulation of hydrogen in dead-ended containment compartments.

The NS system is an engineered safety feature composed of two trains, each containing a pump, heat exchanger, valves, and spray header, designed to keep the containment building pressure within design limits by removing thermal energy after an accident.

The Containment Pressure Control System (CPCS) is composed of instrumentation and controls designed to prevent excessive depressurization of the containment through inadvertent or excessive operation of the NS or VX Systems. CPCS automatically trips all NS pumps and CAR fans and closes the NS discharge valves when containment pressure decreases to 0.35 psig following a high energy line break inside containment.

**Details:**

The NS and VX Systems actuate following a containment high-high pressure signal (Sp) using the CPCS signal as a permissive to start. As containment pressure decreases CPCS trips the NS pumps and CAR fans at a setpoint of 0.35 psig. At McGuire, the deadband of the CPCS pressure instruments is 0.005 psig. Under certain accident conditions, with such a small deadband, the equipment could cycle on and off at a frequency which could jeopardize .<sup>10</sup>.

At Catawba, a preliminary review by the Design Engineering staff concluded that the potential problem was less of a concern due to system design differences. First, the CPCS instrument deadband is a factor of 10 greater than McGuire. With a larger deadband, the equipment would cycle less frequently. Second, the Catawba hydrogen skimmer fans are designed to operate continuously after actuation, but at McGuire, these fans are part of the equipment which trip at 0.35 psig. Finally, the Catawba hydrogen skimmer fans are twice the capacity of those at McGuire; this renders the role of the CAR fans in hydrogen mitigation less important if they do fail.

With regard to the NS System, during the first 30 days of the postulated large break LOCA, containment pressure is not assumed to decrease to 0.35 psig, the point at which the equipment could cycle. Since the NS System would have completed its safety function by the time containment pressure decreased to this pressure, the subsequent operability of this system did not present a safety concern.

The licensee initiated PIR O-C91-90 to conduct a detailed operability evaluation of the NS and VX Systems. As part of this review, the operability of the CAR fans were evaluated in detail since these fans served several post accident functions such as containment atmospheric cleanup, containment equipment Environmental Qualification (EQ) control, as well as hydrogen control.

With regard to equipment EQ control, large and small break LOCA energy releases were reviewed to determine the containment affect assuming the failure of the CAR fans. This analysis concluded that the postulated failure of the NS and VX Systems would not occur until the point in the accident scenario where they are not required from an EQ standpoint.

Containment hydrogen control was re-evaluated and it was confirmed that since the hydrogen skimmer fans continue to operate during the accident scenario, sufficient flow was available to keep hydrogen concentrations within limits, without the aid of the CAR fans.

The licensee determined that the NS and VX Systems were operable based on the analyses performed.

Conclusions:

The inspectors reviewed the results of the licensee's operability evaluation and determined that the licensee had adequately addressed the potential problem associated with the NS and VX Systems. The licensee is currently evaluating NS and VX System control changes, e.g., increasing the CPCS instrument deadband, to preclude this potential cycling scenario from occurring and thereby, assuring the long-term survival of this equipment.

No violations or deviations were identified.

6. Catawba Control Room Ventilation Design Inadequacy/Inoperability (71707)

Summary:

At approximately 9:00 p.m., on February 19, 1991, while reviewing the design basis of the Catawba control room ventilation system, the licensee identified an accident scenario which could have prevented the control room from being pressurized during certain accident conditions. This would have occurred due to failed/closed outside air intake isolation valves. This in turn could have resulted in exceeding GDC 19 dose limits for the control room operators.

By approximately 3:15 a.m. the following morning, the licensee had implemented compensatory measures to assure that the isolation valves would be re-opened within 3 minutes of the onset of the accident.

On February 25, continuing evaluations identified an additional concern. A combination of a loss of off-site power concurrent with a loss of coolant accident, coupled with the failure of an emergency diesel generator, could prevent post accident pressurization of the control room even with the compensatory measures in place. This would happen if the diesel providing power to the outside air intake isolation valves failed after the isolation valves went closed, but before operator action could be taken to re-open the valves, which in turn could lead to exceeding GDC 19 limits. Removing motive power from the valves would resolve the GDC 19 operability concern since the licensee did not take credit in the accident analysis for these valves closing. The station would still have been in TS 3.0.3; however, because it then could not have met the TS requirements associated with the automatic isolation functions of the systems' smoke, chlorine and radiation detectors. A temporary waiver of compliance was approved that same day allowing power to be removed from the valves until an emergency TS could be approved deleting the automatic isolation functions. The emergency TS was approved on March 6, 1991.

System Description and Design Basis:

The Control Room area ventilation system is shared by both Units 1 and 2 and is designed to maintain a suitable environment for equipment operation and safe occupancy of the control room under all plant

operating conditions. The system consists of two redundant full capacity equipment trains each containing intake smoke, radiation, and chlorine detectors; prefilters; final filters; supply fans; pressurizing fans; and chilled water cooling units. The system is fully redundant except for selected passive interconnecting duct headers.

The control room is normally maintained at a slightly positive pressure relative to surrounding areas by taking makeup air from either or both of two outside intakes. Each outside air intake is monitored for the presence of radioactivity, chlorine, and smoke. Isolation of the outside air intakes occur automatically upon detection of one or more of these monitored parameters. Should both intakes close, the operator can override the intake monitors and open the desired intake based upon plant conditions to ensure control room pressurization. Pressurization is necessary to ensure control room habitability and compliance with GDC 19 following a design basis accident.

#### Event Description:

On February 19, 1991, in a design review prompted by the identification of a problem at McGuire Nuclear Station, Catawba personnel detected a similar situation concerning the isolation of the control room outside air intakes on a loss of offsite power (LOOP). The outside air isolation valves would close when re-energized by the D/G Load sequencer following a LOOP because the control power to the smoke detectors and radiation detectors is non-safety. Upon loss of control power, the detectors are designed to fail in the conservative direction, which would cause the valves to close. Licensee analysis revealed that as long as the intake air isolation valves could be re-opened within nine minutes, the GDC 19 dose limit or its equivalent (30 REM Thyroid) would not be exceeded. Accordingly, compensatory measures were defined and implemented whereby the outside air isolation valves would be opened by the operator immediately following the onset of the event.

On February 25, 1991, subsequent evaluations of the aforementioned detector control circuits identified an additional concern. A combination of a LOOP, LOCA and the failure of an Emergency Diesel Generator could prevent post-accident pressurization of the control room even with the compensatory actions in place. This would happen if the diesel generator providing power to the outside air isolation valves failed after the isolation valves had gone closed (due to the detectors failing), but before operator action could be taken to open the valves. The outside air isolation valves could then not be opened quickly enough to prevent the calculated Design Basis Dose from exceeding GDC 19 limits. This postulated scenario was reviewed by Duke Power's Design Engineering Department at approximately 2:15 p.m., on February 25, 1991, and the station was notified that the Control Room Ventilation System should be declared inoperable shortly after 4:00 p.m. the same day. Because both trains were affected, and the system is shared by both units, the station

was placed in TS 3.0.3. The Resident Inspectors were notified of the potential need for a Waiver of Compliance, and a telephone conference was arranged with the NRC staff at approximately 5:00 p.m. to request a waiver of compliance with the associated TSs.

By telephone call on February 25, 1991 and a letter dated February 26, 1991, Duke Power requested a Temporary Waiver of Compliance from the requirements of Technical Specifications (TSs) Table 3.3-6, Item 3 (Action 31), 4.7.6.e(2) and 4.7.6.e(5). TSs 4.7.6e(2) and 4.7.6e(5) which require periodic demonstration of Control Room Area Ventilation System operability by verifying that, on a High Radiation-Air Intake, Smoke Density-High or High Chlorine/Toxic Gas test signal, the system automatically isolates the affected intake from the outside air with recirculating flow through the system filters and charcoal absorber banks. Table 3.3-6, Item 3 (Action 31) also requires isolation of the air intakes if the minimum channels operable requirement could not be met for the High Radioactivity-Air Intake instrumentation.

The NRC staff reviewed the evaluation and justification regarding the Control Room Area Ventilation System operability and agreed that, as an interim measure, the automatic isolation feature of the air intake isolation valves upon radiation, smoke or chlorine could be deactivated by removal of motive power and the valves controlled in accordance with administrative procedures pending a change in the Technical Specifications that would reflect a modification to the system to effect a permanent resolution to the concerns. It should be noted that the LOCA analysis for Catawba conservatively assumes that both outside air intakes remain open for the duration of a LOCA. A mixture of clean and contaminated outside air is assumed to be used to pressurize the control room. Under these conditions GDC 19 dose limits are shown not to be exceeded. The waiver of compliance was in effect until the staff approved the emergency TS change request on March 6, 1991.

#### Requirements:

Technical Specification 3.7.6 requires that two independent Control Room Area Ventilation Systems be OPERABLE in all modes. System operability includes the capability to maintain the control room at a positive pressure of greater than or equal to 1/8 inch Water Gauge relative to adjacent areas during normal operation and accident conditions.

10 CFR Appendix B, Criterion III, Design Control, requires in part that measures be established to assure that applicable regulatory requirements and the design basis specified in the license application for the facility be correctly translated into specifications, drawings, procedures, and instructions. Further, design control measures are to provide for verifying the adequacy of design, by the performance of

design reviews, the use of alternate or simplified calculational methods, or the performance of a suitable testing program.

10 CFR 50 Appendix A Criterion 19-Control Room, specifies that a control room shall be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. Adequate radiation protection shall be provided to permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 5 rem whole body, or its equivalent to any part of the body, for the duration of the accident.

Contrary to the above, the Catawba Control Room Area Ventilation System has been inoperable since start-up in that the system design was inadequate. In the event of a Loss of Coolant Accident concurrent with a Loss of Offsite Power, an analyzed accident, the system was incapable of automatically maintaining the control room at a positive pressure relative to adjacent areas, a condition necessary to prevent control room personnel from receiving radiation exposures in excess of 5 rem whole body or its equivalent to any part of the body for the duration of the accident. The inoperability on the control room area ventilation system is apparent violation 50-413,414/91-07-02.

#### Safety Significance:

The Catawba control room ventilation system was inoperable in that control room pressurization would not have been available immediately following a simultaneous LOOP and LOCA accident. This lack of proper pressurization impacts the DBA control room dose analysis and shows that the GDC 19 thyroid limit would be exceeded if pressurization was not restored within nine minutes following the accident. The licensee's safety analysis states however, that due to conservatism in the dose analysis, the realistic safety significance of control room pressurization immediately following an accident is minimal. The most important conservatism relative to this problem concerns the assumption of an instantaneous release of 25% of the core inventory of iodines to containment. This nonmechanistic assumption leads to an unrealistically large calculated dose to the thyroid during the period when the control room would be unpressurized. The licensee also stated that studies have shown that even for a large break LOCA (without Emergency Core Cooling System) it would take at least 15-30 minutes to heat up the core and begin releasing a significant amount of fission products. Even if activity had been released and infiltrated into the control room, the area radiation monitors would have alarmed the operators to check and restore pressurization. (Damper position indication is available in the control room.) The licensee asserts that analyses for Catawba show that the combination of all ESF systems, i.e., containment sprays, ice condenser, HEPA and carbon filters, and most importantly the containment itself, serve to keep offsite and onsite doses well below regulatory limits, implying that the safety significance of this concern is minimal.

The licensee's design engineering staff stated that because, during a simultaneous LOOP and LOCA, the possibility existed that a single failure could have precluded the ability to pressurize the control room, the VC System should be considered to have been inoperable in the past but that the conservative assumptions used in the dose analysis indicate that any realistic increase in dose would have been minimal. This condition was applicable to both Unit 1 and 2 since initial start-up.

Conclusions:

The Catawba control room area ventilation system has been inoperable since start-up in that the system design was inadequate. In the event of a Loss of Coolant Accident concurrent with a Loss of Offsite Power, which is an analyzed accident, the system was incapable of automatically maintaining the control room at a positive pressure relative to adjacent areas, a condition necessary to prevent control room personnel from receiving radiation exposures in excess of those specified in GDC 19.

One apparent violation was identified.

7. Unit 1 Main Generator Electrical Ground (71707)

At approximately 1:25 p.m., on February 27, Unit 1 received a control room alarm indicating an electrical ground in the main generator excitation system (Alterex). Attempts to reset the exciter ground fault relay were unsuccessful, which indicated that an actual ground existed. While investigating the source of the ground, it was discovered that cooling water was leaking inside the Alterex housing. Alterex windings are air cooled using the Recirculating Cooling Water System (KR) as the source of the cooling water to the tube side of a heat exchanger located directly above the windings. It was postulated that a leak in this heat exchanger was causing the electrical ground. A decision was made to reduce power below the P-9 setpoint (69 percent reactor power) and trip the generator offline. At the P-9 setpoint, the turbine can be tripped without tripping the reactor. This activity was performed without incident and the unit entered Mode 3 at approximately 10:26 p.m. that same evening.

On February 28, disassembly of the Alterex to repair the exciter heat exchanger commenced with the unit remaining in Mode 3. Once the heat exchanger was removed and inspected, a pin-hole leak was discovered in one of the tubes. Repairs to the Alterex were completed on March 2, and startup commenced the same day.

No violations or deviations were identified.

8. Inadequate Design Engineering Review of Station Modification (71707, 37328)

On January 30, 1990, Design Engineering identified an operability concern with the Unit 1 Feedwater System (CF) and Auxiliary Feedwater System (CA)

involving a missing structural support on a 1-inch CF line which was to have been installed pursuant to Nuclear Station Modification (NSM) CN-11005. Appropriately, the licensee entered the Action Statement of TS 3.7.8 which allows 72 hours to replace or restore the operability of the support or enter the action statement for the inoperability of the system affected. The support was reinstalled within the 72 hour limit under modification CEVN-3224 and the licensee exited the action statement.

Nuclear Station Modification (NSM) CN-11005 was initiated by Design Engineering as part of a snubber reduction program to remove unnecessary snubbers in the CA and CF systems. The engineering instructions for CN-11005 deleted a snubber on the 1-inch CF line and referred to another NSM, CN-10895, which replaced the snubber with a strut designated as 1-R-CF-0055. When the NSMs were implemented, maintenance personnel were confused by the instructions, and perceived that the addition of the strut was incorrect. They initiated an Exempt Change Variation Notice (CEVN), i.e., change to the original NSMs, to delete the strut. This change was then reviewed by Design Engineering, who did not discover the inconsistency between the NSMs, and approved the change by mistake.

The licensee performed a past operability evaluation of the CF and CA systems considering the effect of the missing support on the stress analysis of the systems. This evaluation showed that the 1-inch CF line would not have failed in the event of a design basis earthquake and, therefore, these systems would have remained fully operable had an event occurred.

10 CFR 50, Appendix B, Criterion III, Design Control, requires in part that design control measures shall provide for verifying or checking the adequacy of design or design changes. In this case, measures were inadequate to prevent the removal of a structural support which had previously been evaluated as necessary for the operability of the CF and CA systems. After review of the circumstances relative to this issue, it was determined that this event constitutes a licensee identified violation, and as such will not be cited in that the criteria specified in Section V.u.1 of the NRC Enforcement Policy were satisfied. This is documented as Non-Cited Violation (NCV) 413/91-07-01: Inadequate Design Review for Structural Support Modification.

One NCV was identified.

9. Surveillance Observation (61726)

a. General

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.

b. Surveillance Activities Reviewed

The inspectors witnessed or reviewed the following surveillances:

OP/0/A/6450/11	Control Room Area Ventilation/Chill Water Chill Water System (Enclosures 4.7 and 4.11)
PT/1/A/4350/01	NC Pump Operability Verification for Modes 3 and 4
PT/1/A/4450/13B	Auxiliary Feedwater Pump CO <sub>2</sub> Test
PT/1/A/4600/02C	Mode 3 Periodic Surveillance Items
PT/D/A/4400/010	Fire Pump Operability Test
PT/2/A/4150/01D	NC System Leakage Calculation
PT/2/A/4150/02	Visual Inspection of Radioactive Systems Outside Containment
PT/2/A/4200/06C	Containment Spray Valve Lineup Verification
PT/2/A/4200/14A	Ice Condenser Intermediate Deck Door and Inlet Door Position Monitoring System Inspection
PT/2/A/4350/02A	Diesel Generator (D/G) 2A Operability Test
PT/2/A/4350/03	Electrical Power Source Alignment Verification
PT/2/A/4450/13B	Unit 2 Auxiliary Feedwater Pump Room CO <sub>2</sub> Weekly Test
PT/2/A/4600/02A	Mode 1 Periodic Surveillance Items
OP/2/A/6350/02	Diesel Generator Operation (Enclosure 4.7)

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:

006784	MNT	Maintenance Repair Fuel Oil Leak on Rear of 2A D/G
05141	SWR	Semi-Annual Inspection and Lubrication on D/G 2A Engine Prelube Oil Pump Motor
47316	OPS	Repair Pedestal Bearing on 2A D/G
000326	SWR	Perform Inspection on the Unit 2 Diesel Generator Engine Starting Air System (VG)
004048	SWR	Perform Calibration on Unit 1 Control Room Air Handling Unit Cooling Control
004329	SWR	Perform Maintenance and Calibration on Unit 1 Control Room Air Handling Unit 1 Instrumentation
12032	IAE	Perform Negative Voltage and Ground Check on 2 EPK
004168	MES	Retube Air Supply line For 2A1 Air Dryer Tower
009272	SWR	Repair Hangers 1-R-NV-0505 and 1-R-NV-0506 to allow Inspection of Valve 1INV-M077A Limitorque Operator Wiring and Inspection of Limit Switches
55084	OPS	Inspect and Repair 1B1 VG Compressor Failing to Pressurize Starting Air Tank When 1B Dryer Tower is Regenerating
48075	OPS	Diesel Generator 2A Engine Lube Oil (LD) System Does Not Maintain Oil Pressure above 50 psi
009875	SWR	Remove End Covers to Component Cooling Water System Heat Exchanger to allow for maintenance

No violations or deviations were identified.

11. Part 21 Reports (36100)

- a. (Closed) P21-89-12: SMB-000 and SMB-00 Cam Type Torque Switch Failures/Fiber Spaces.

The licensee documented corrective actions for this 10 CFR 21 notification in PIR O-C89-0324. Licensee analysis of the associated failure rate, current testing periods and methodology led to the determination that the referenced valve actuators installed at Catawba are operable. The Durez phenolic switches are scheduled to be replaced during the next refueling outage on both units. Based on the licensee's analysis and planned corrective action, this item is closed.

- b. (Closed) P21-89-18: Melamine Torque Switch Binding/Breaking.

The licensee documented their review of this 10 CFR 21 notification in PIR 0-C88-0341. Licensee analysis revealed that there are no applicable installation locations at Catawba in the priority "high temperature" category. Further, valve testing at Catawba has revealed no associated failures. The referenced Melamine switches are to be replaced in the next refueling outage for both units. Based on the licensee's analysis and planned corrective actions, this item is closed.

No violations or deviations were identified.

12. Review of Licensee Event Reports (92700, 90712)

The below listed Licensee Event Reports (LERs) 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.

- a. (Closed) LER 414/91-01: Feedwater isolation on High Steam Generator Level Due to Inappropriate Action.

On the morning of January 8, 1991, Unit 2 was in Mode 3, having been shut down to allow inspection of the ice condenser. At approximately 2:07 a.m. the unit experienced a feedwater isolation and an CA auto start signal when the level in the A steam generator (S/G) was allowed to exceed the high-high level setpoint. The operator at the controls was distracted from the control boards by other activities and did not respond in a timely manner while the S/G 2A Level Deviation alarm was in alarm. The operator reset the CA auto start signal and initiated the process of recovery returning the unit to pre-event conditions by 3:00 a.m. This event led to the issuance of a violation for Failure to follow procedures. For details, pertaining to the onsite review of this event refer to NRC Inspection Report 413, 414/90-03.

Based on a review of the LER content, timeliness and corrective actions taken or planned, coupled with the onsite followup which has and will be taken in review of the licensee's response to the violation, this item is closed.

- b. (Closed) LER 414/91-03: ESF Actuation Due to Improper Isolation of Control Function During Corrective Maintenance.

On January 8, 1991, with Unit 2 in Mode 3, an inadvertent CA auto-start occurred on Train A of the CA System while Instrument and Electrical (IAE) personnel were correcting a wiring problem in the ATWS Mitigation System Actuation Circuitry (AMSAC). The CA auto-start signal was generated when a jumper was placed across

terminals causing the AMSAC logic to react as if both Main Feedwater Pumps (MFWPs) had tripped. After the actuation, Operations terminated the event and returned the plant to normal Mode 3 conditions. This event resulted in the issuance of a violation for Failure to Follow or Inadequate Procedures. For details, refer to NRC Inspection Report 413, 414/91-03.

Based on a review of the LER content, timeliness and corrective actions taken or planned, coupled with the onsite followup which has and will be taken in review of the licensee's response to the violation, this item is closed.

- c. (Closed) LER 413/91-02: Technical Specification Violation for Mode Change With Residual Heat Removal System Train "A" Inoperable Due to Inappropriate Action.

At approximately 1:19 a.m. on January 23, 1991, Unit 1 was taken from Mode 2 to Mode 1 with Train A of the Residual Heat Removal (ND) System inoperable, a violation of the requirements of Technical Specification 3.0.4. This event resulted in enforcement action. See NRC Inspection Report 413, 414/91-03 for details.

Based on a review of the LER content, timeliness and corrective actions taken or planned, coupled with the onsite followup which has and will be taken in review of the licensee's response to the violation, this item is closed.

No violations or deviations were identified.

13. Followup on Previous Inspection Findings (92701 and 92702)

- a. (Closed) Enforcement Action (EA) 89-138: Both Channels o. RVLIS Inoperable. (Pertaining to Severity Level III Violation identified in Inspection Report No. 413, 414/89-19 as Item No. 413/89-19-01: Both Channels of RVLIS Inoperable)

This EA involved the inoperability of both channels of the Unit 2 reactor vessel water level instrumentation (RVLIS) due to the failure to open the system's pressure transmitter isolation valves. On May 25, 1989, with the unit in Mode 5, the isolation valves were closed in order to isolate RVLIS while using valves in the system to vent the reactor vessel head. In order to isolate the RVLIS system, four valves were required to be closed. When venting was complete and the system was to be restored to service, an unqualified Instrumentation and Electrical (IAE) technician was tasked to perform this work. The IAE technician failed to open two of these valves, due to his unfamiliarity with the system, which failed to unisolate the system. The unit returned to Mode 1 on June 7, 1989, with the system still isolated, violating TS 3.3.3.6.

The licensee responded to EA 89-138 on October 2, 1989 acknowledging the violation and specifying corrective actions which had or would be taken to prevent recurrence. Those corrective actions included the following:

1. Opening the two remaining isolation valves and counseling the IAE supervisor responsible for allowing unqualified person to perform the work,
2. Revising the startup and instrument channel check procedures for verification of proper RVLIS indication,
3. Creating a new procedure which describes RVLIS isolation and restoration when disabling the system to accommodate reactor vessel head venting,
4. Providing training to the operators for greater understanding of proper RVLIS range values,
5. Reemphasis made to all station groups to ensure that all surveillances are performed, channel checks are made properly, and that annunciators being used to verify a condition reflect true operational status,
6. Developing new guidance on post-maintenance testing, and,
7. Reviewing the functional verification for maintenance on all station instrumentation.

Based on a review of implemented corrective actions, the inspectors determined that adequate corrective action has been accomplished. This item is considered closed.

- b. (Closed) Severity Level IV Violation 413/89-29-02: Inoperable Train of Control Room Ventilation Due to Inadequate Flow Balancing.

On September 15, 1989, Train A of the Control Room Ventilation (VC) System was declared inoperable due to inadequate pressurization of the control room with only one of the two outside air intakes open. Train B of VC was already inoperable for maintenance. With both units in Mode 1, Technical Specification 3.0.3 was entered due to both trains of VC being inoperable.

After investigation, it was determined that the pre-operational and surveillance testing procedures were inadequate. The test procedures did not test each train of VC to verify that the acceptance criteria could be satisfied with only one outside air intake open. This incident was also attributed to equipment malfunctions of dampers 2CR-D-4, 9, and 10. Increased leakage, over

a period of time, past the above dampers enabled cross train flow which lessened the ability of VC train A to pressurize the CR.

All control room penetrations were inspected and Train A's return damper was adjusted and then tested satisfactorily. Compensatory measures were taken to limit burning in the area of the intakes, to establish a fire watch in the intake areas, to restrict movement of chlorine cylinders in the plant, and to instruct the operators on actions to take if one or both intakes became isolated. Design Engineering revised the criteria for control room and control room area pressurization flow rates. A VC flow balance procedure was developed to ensure adequate pressurization in all alignments and to ensure all appropriate VC fans maintained proper flow. All testing was completed with acceptable results.

Based on review of the licensee's corrective actions and subsequent system testing, this item is considered closed.

- c. (Closed) Severity Level IV Violation 413/89-29-04: Inadequate Design Controls to Ensure VE Systems Operability.

In September 1989, it was found that the Annulus Ventilation System (VE) on both units had been inoperable since initial licensing. It was found that the VE Systems were unable to produce and maintain a negative pressure of -0.5 inches water gauge throughout the annulus under all possible outside air temperatures following a loss of coolant accident.

The operating setpoint specified by Design Engineering did not explicitly consider the effect of external temperatures on annulus (i.e., secondary containment) pressure. Information Notice 88-76 clearly indicates that this was not an unique situation. The operating setpoint did, as a matter of common practice, contain a degree of engineering margin to provide added assurance that the system would perform its required safety function. The operating setpoint and associated testing were insufficient to ensure that the system would perform its design function in the manner described in the FSAR.

Design control measures were inadequate to ensure that the VE System could perform its design function as described in the FSAR; although, such measures were sufficient to ensure that the system could fulfill its design basis, i.e., required safety function.

The licensee responded to this violation in correspondence dated March 6, 1990. As corrective action, the licensee tested both trains of VE System and new operating setpoints were developed by September 13, 1989. Test procedures have been revised to reflect the new operating setpoint.

All Information Notices have been reviewed to ensure that they have received an adequate evaluation.

The licensee's Operating Experience Program (OEP) ensures that a pro-active attitude in evaluating emerging problems and in looking at similar problems across the system.

Performance tests have been established for VE that have acceptance criteria that are more limiting than Technical Specifications and provide a relationship between the Technical Specification surveillance and the Design Basis accident.

Design Engineering personnel reviewed safety related ventilation system differential pressure transmitters that indicate or control building pressurization (positive or negative) to ensure that reference point differences are accounted for.

In December 1990, Design Engineering personnel completed a Design Basis Document(DBD) for the VE System. Following its completion, revisions to the FSAR and Technical Specifications were made as appropriate.

Based on a review of the corrective actions performed by the licensee, this item is closed.

- d. (Closed) Severity Level IV Violation 414/89-29-05: MMP 1.0 Inadequate to Ensure Proper Testing of Loads Following Circuit Breaker Replacement.

Maintenance Management Procedure (MMP) 1.0 states that a functional verification will demonstrate that components operate as designed and a retest will demonstrate that components meet the minimum acceptance criteria as defined in Technical Specifications or other regulatory documents. The retest must adequately test all components on which maintenance or incidental adjustments were performed if a reasonable possibility exists that the parameter to be tested was affected by the maintenance.

The post-maintenance testing program as defined in MMP 1.0 failed to adequately address retest requirements for circuit breaker replacement. This resulted from the fact that the product literature, specifications and qualifications tests supplied to the licensee from the vendor were inadequate and unsubstantiated in regards to the HFB-3125A Ambient Compensated Breaker. (Reference 10 CFR Part 21 Report from the vendor concerning Molded-Case Ambient Compensated Circuit Breakers).

As corrective action, the licensee revised MMP 1.12, to include the IAE Section's functionals to include running loads for breaker

replacements. Breakers that have adjustable settings have been set to the Design Specification document.

Based on a review of the licensee's corrective actions, this item is closed.

No violations or deviations were identified.

#### 14. Exit Interview

The inspection scope and findings were summarized on March 6, and March 14, 1991 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.

<u>Item Number</u>	<u>Description and Reference</u>
Apparent Violation 413,414/91-07-02	Inadequate system design resulting in the Catawba control room area ventilation system being inoperable since start-up. (Paragraph 6)
NCV 413/91-07-01	Inadequate Design Review for Structural Support Modification. (Paragraph 8)