U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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Licensee:	Duke Power Company
Facility:	Catawba Nuclear Station, Units 1 and 2
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Enclosure 2

EXECUTIVE SUMMARY

Catawba Nuclear Station, Units 1 & 2
NRC Inspection Report 50-413/97-08, 50-414/97-08

This integrated inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a 6-week period of resident inspection; in addition, it includes the results of announced inspections by Regional reactor safety and inspectors.

Operations

- A Violation was identified for inadequate and untimely corrective actions to determine operability of a Main Feedwater Containment Isolation Valve (1CF-51) following control room indication of low nitrogen actuator pressure. Contributing to this was an inadequate alarm response which failed to specify the alarm setpoint range or require actions to be completed within the safety significance and Technical Specification (TS) allowed action timeframe for an inoperable valve (Section O1.2).

- The quality of licensee's containment cleanliness inspections following the Unit 2 End-of-Cycle 9 (2EOC9) refueling outage was poor and had declined from previous outages. However, the debris identified in the Unit 2 lower containment would not have readily transported to the Emergency Core Cooling System (ECCS) sump screens or impacted ECCS performance. Appropriate corrective action to reinspect and remove all debris from containment was performed (Section O1.3).

- On May 9, a rapid power reduction from 100 percent power to 67 percent power was implemented on Unit 2 as a result of a significant main turbine hydraulic oil leak. Identification of the oil leak by a non-licensed operator was an example of good attention to detail. Operations adequately controlled the power maneuver and activities to repair the hydraulic oil leak were accomplished without incident (Section O1.4).

- A Non-Cited Violation (NCV) was identified for an isolated instance where excessive overtime was not authorized. The overtime control program was generally effective; however, several weaknesses were identified. For example, the absence of timesheet audits to determine if unauthorized overtime in excess of Technical Specification guidelines was being worked was considered a limitation of the licensee's overtime control program. No formal record, independent of payroll timesheets, existed for monitoring hours worked. As a result, no alternative means for verifying that overtime (specifically excessive overtime worked by exempt personnel who may perform safety-related functions) was being provided. (Section O6.1).

Maintenance

- A NCV was identified for an inadequate procedure which resulted in the inadvertent autostart of Nuclear Service Water (NSW) pumps. An IFI was identified regarding reportability of NSW system actuations (Section M1.2).

- The high number of equipment motor failures experienced over the last couple of years was attributed in part, to organizational changes, programmatic deficiencies, inadequate resources, high work loads and management's failure to take a proactive role in this area. A NCV was identified regarding these previous problems which was related to the lack of procedures to control preventive maintenance, storage and transportation of motors. Following the completion of Self-Assessment and Root Cause Analysis inspections, necessary steps to establish a more comprehensive preventive maintenance program for electric motors were established. The present program provides for adequate inspections, testing, and trending of motors in storage and in use. Procedures to control receiving, storage and transporting of motors within and out of the Duke system have been established. At the present time, engineering and technical resources in charge of the electric motor maintenance program appear to be adequate (Section M1.3).

- Management focus on air operated valve maintenance has resulted in improved performance. Air operated valve program elements were in place and an Engineering Directive was in development. Observed maintenance was performed well with good management involvement (Section M1.4).

Engineering

- The licensee's pursuit and resolution of a small nonconservative thermal power calculation error identified in the new plant computers was an example of good questioning attitude (Section E1.1).

- The licensee's initial evaluation of a potential vulnerability involving air entrainment in the suction piping of the Auxiliary Feedwater System and subsequent air binding of the pumps was prompt and conservative. Effective interim compensatory actions were implemented to ensure Auxiliary Feedwater System operability until completion of the evaluation. An Unresolved Item was identified regarding a potential for air binding the Auxiliary Feedwater pumps (Section E2.1).

Plant Support

- Overall, radiation control practices were found to be proper. In one instance (i.e., higher than normal radiation background in the men's auxiliary building change facility), radiation protection personnel did not demonstrate a questioning attitude and initiate appropriate actions until questioned by the inspector (Sections R1 and R2).

- The licensee's performance during the annual emergency exercise was considered appropriate. Particularly good performance by personnel in the Operations Support Center was noted (Section P1).

- Maintenance of the protected area perimeter fence and conduct of security and safeguards activities were found to be appropriate (Section S1).

Report Details

Summary of Plant Status

Unit 1 operated at or near 100% power during the inspection period.

Unit 2 was shut down for a refueling outage at the beginning of the inspection report period. The Unit entered Mode 2 (Startup) on May 1 and reached full power on May 8. On May 9, power was reduced on Unit 2 to 67% in order to repair a main turbine hydraulic oil leak. Unit 2 operated at or near 100% power for the remainder of the inspection period.

Review of Updated Final Safety Analysis Report (UFSAR) Commitments

While performing inspections discussed in this report, the inspector reviewed the applicable portions of the UFSAR that were related to the areas inspected. The inspector verified that the UFSAR wording was consistent with the observed plant practices, procedures, and/or parameters.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspector conducted frequent control room tours to verify proper staffing, operator attentiveness and communications, and adherence to approved procedures. The inspector attended daily operations turnover and Site Direction meetings to maintain awareness of overall plant operations. Operator logs were reviewed to verify operational safety and compliance with Technical Specifications (TS). Instrumentation, computer indications, and safety system lineups were periodically reviewed from the Control Room to assess operability. Frequent plant tours were conducted to observe equipment status and housekeeping. Problem Identification Process (PIP) reports were routinely reviewed to assure that potential safety concerns and equipment problems were reported and resolved.

In general, the conduct of operations was professional and safety-conscious. Good plant equipment material conditions and housekeeping was noted throughout the report period. Specific events and noteworthy observations are detailed in the sections below.

O1.2 Inoperable Main Feedwater Containment Isolation Valve (71707)

a. Inspection Scope

The inspector reviewed the licensee's failure to promptly determine the operability of Unit 1 "C" Main Feedwater Containment Isolation Valve (CFCIV) 1CF-51 following receipt of a control room alarm indicating low valve actuator pressure. Seventeen hours following receipt of the alarm, actions were completed to measure actuator accumulator pressure. At that time, it was determined that pressure was below the setpoint for valve operability. The licensee determined the valve had been inoperable since the alarm was received, resulting in a failure to meet

the allowable action times of TS 3.6.3 for an inoperable containment isolation valve. The inspector discussed the incident with operations, engineering, and safety assurance personnel, as well as reviewed associated alarm responses and PIP 1-C97-1037 involving this incident.

b. Observations and Findings

On April 3, 1997, at 6:08 a.m., the Unit 1 Control Room operators received a computer alarm indicating low pressure in the accumulator that supplies nitrogen to the actuator which closes the "C" CFCIV, 1CF-51. A work request was initiated for maintenance personnel to determine the actual pressure in the accumulator. Following shift turnover, the work request was assigned to the Single Point of Contact (SPOC) maintenance staff. However, instead of working this job during day-shift, operations directed SPOC to work planned activities on the Component Cooling Water System associated with the entry of both units in a 72-hour TS action statement. At 7:00 p.m., when the on-coming night shift returned, it was realized that accumulator pressure had still not been checked. At 11:18 p.m., after resolving problems in locating the necessary pressure instrumentation, SPOC personnel installed local pressure gauges and measured 2000 psig in the accumulator. The required pressure necessary to ensure the valve would close was 2050 psig. The accumulator was recharged to its normal pressure of 2780 psig. The licensee initiated PIP 1-C97-1037 to address the potential past inoperability of the valve and the reason why the pressure measurement was not performed until more than 17 hours following receipt of the alarm. This inadequate and untimely response is considered a violation of 10 CFR 50, Appendix B, Criterion XVI, for inadequate corrective actions.

On May 8, the licensee determined that 1CF-51 had been inoperable during the period that accumulator pressure was below 2050 psig. This pressure was based on the valve vendor's calculated pressure for ensuring that there was sufficient nitrogen pressure to close the valve. Since the exact time that pressure decreased below this setpoint could not be conclusively determined, the time used was based on when the alarm first annunciated.

The inspector reviewed the actions required by the computer alarm response for low CFCIV accumulator nitrogen pressure. The actions required operations to contact the Operations Work Manager and initiate a work request for maintenance to determine operability (via checking the accumulator pressure) and recharge the accumulator. The alarm response procedure was determined to be inadequate, in that, it failed to provide the actual alarm setpoint range (2050 - 2150 psig) or provide actions for checking nitrogen pressure commensurate with the timeframe allowed by TS 3.6.3 for a potentially inoperable CFCIV. This is considered a violation of TS 6.8.1. The operators had believed that the setpoint was 2100 psig and were unaware that the pressure switch for the alarm could have been set anywhere between 2050 and 2150 psig. This misunderstanding resulted in lower priority being placed on ensuring actions to check nitrogen pressure were accomplished within a reasonable timeframe. The inspector also noted that the associated work request

was given a priority of "I" indicating routine scheduling and not "E" (emergent) for high priority work having potential operability or TS consequences.

The inspector reviewed the safety consequences of the valve being inoperable during the period. The main feedwater system would have still been capable of performing its safety function even if 1CF-51 had failed to close. The safety function of 1CF-51 is to terminate feedwater flow in both directions in order to prevent excessive forward feedwater flow and/or steam generator blowdown during various design basis accidents. The valve closes automatically on Phase A Containment Isolation and Feedwater Isolation signals. The prevention of excessive forward feedwater flow would have been mitigated by main feedwater pump trip functions and isolation of the feedwater flow control valve which also receives a feedwater isolation signal. Steam generator blowdown isolation would have been accomplished via the feedwater isolation check valve located directly upstream of 1CF-51.

TS 3.6.3 states that if a containment isolation valve is inoperable, the valve shall be restored to operable within four hours or closed or otherwise be in Hot Standby in the following six hours. Since the valve was potentially inoperable for 17 hours and 10 minutes, the licensee had failed to meet the action requirements of TS 3.6.3.

c. Conclusions

The inspector determined that operations staff actions for a control room alarm indicating potential inoperability of CFCIV 1CF-51 were inadequate and untimely. Contributing to the lack of work priority placed on determining valve operability was an inadequate alarm response which failed to specify the alarm setpoint range or require actions to be completed within the safety significance and TS allowed action timeframe for an inoperable CFCIV. This issue was identified as a violation of TS 6.8.1 and 10 CFR 50, Appendix B, Criterion XVI (Violation 50-413/97-08-01: Inadequate Alarm Response Results in Inadequate and Untimely Corrective Actions for Valve Operability Determination.)

O1.3 Unit 2 Containment Cleanliness Walkdowns (71707, 61726, 62707)

a. Inspection Scope

On April 28, the inspector identified several small items of trash and debris inside the Unit 2 containment building during routine walkdowns performed following the Unit 2 refueling outage. The inspector reviewed the licensee's corrective actions to perform additional inspections of the containment and PIP 2-C97-1453.

b. Observations and Findings

The walkdown was performed during Mode 3 prior to the unit startup from refueling outage 2EOC9 after the licensee had completed TS required containment cleanliness inspections. The inspector identified debris

and trash, including a plastic face shield, a watch, discarded tie wraps, nuts and bolts. The inspector observed that cleanliness standards had declined from observations made during previous outages. The licensee initiated a PIP and performed additional inspections of lower containment. Approximately 15 pounds of additional debris were removed by the licensee following these inspections. The debris was found mainly inside the crane wall area in lower containment which is not directly adjacent to the Emergency Core Cooling System (ECCS) sump screens. Debris is not easily transportable to the ECCS sump screens from these areas and would not have adversely impacted ECCS performance.

The inspector found acceptable conditions in the pipe chase areas directly adjacent to the ECCS sump screens. These areas were in much better condition than those located inside the crane wall.

c. Conclusions

The quality of licensee's containment cleanliness inspections following the Unit 2 End-of-Cycle 9 (2EOC9) refueling outage was poor and had declined from previous outages. However, the debris identified in the Unit 2 lower containment would not have readily transported to the ECCS sump screens or impacted ECCS performance. The licensee took appropriate actions to reinspect and remove all debris from containment.

O1.4 Unit 2 Main Turbine Hydraulic Oil Leak and Power Reduction (71707, 62707)

a. Inspection Scope

On May 9 the licensee performed a rapid power reduction of Unit 2 from 100 percent power to 67 percent power as a result of a significant main turbine hydraulic oil leak. The inspector observed control room activities during the power reduction and reviewed the licensee's actions to repair the hydraulic oil leak.

b. Observations and Findings

The hydraulic leak was discovered by a non-licensed operator who was investigating an unusual odor in the Unit 2 turbine building. The leak was caused by a failed O-ring located on a solenoid valve (2LH-93) associated with main turbine combined intercept valve CIV-3. At the time of discovery the leakrate was estimated at 2 gpm and approximately 75 gallons of hydraulic oil had been lost. The licensee initiated the power decrease of Unit 2 to less than the automatic reactor trip permissive interlock power level for a main turbine trip. A main turbine trip would have occurred if the hydraulic oil leak had continued. The inspector observed that control room activities were well controlled during the power reduction.

The licensee was successful in reducing the leakage from a steady stream of about 2 gpm to a leakrate of several drops per minute. Inspections of similar solenoid valves were performed on both units and no other instances of leaking valves were identified. After the leak was

stabilized and the main turbine hydraulic oil reservoir was replenished, the licensee returned the unit to full power and initiated frequent monitoring of the leak. The licensee completed repairs on May 13 to seal the leak (Work Order 97040075-02).

c. Conclusions

Identification of a main turbine hydraulic oil leak by a non-licensed operator was a good example of diligence and awareness of plant equipment conditions which prevented a main turbine/reactor trip. The control room staff performed well during the subsequent rapid power reduction and licensee actions to repair the leak were appropriate.

O6 Operations Organization and Administration

O6.1 Control of Overtime (71707)

a. Inspection Scope

The inspector performed an overtime audit to determine if overtime hours were worked in accordance with regulatory requirements and the licensee's administrative controls during the most recent Unit 2 refueling outage. The inspector reviewed: Catawba Technical Specification 6.2.2, Unit Staff; NRC Generic Letter 82-12, Nuclear Plant Staff Working Hours, and associated clarifying correspondence; NRC Generic Letter 83-14, Definition of "Key Maintenance Personnel;" and Duke Power Nuclear Station Directive 200, Overtime Control.

b. Observations and Findings

Technical Specification 6.2.2.f provides guidelines for limiting the working hours of station staff who perform safety-related functions. In part, the guidelines state that: (1) an individual should not be permitted to work more than 16 hours straight, excluding shift turnover time; and (2) an individual should not be permitted to work more than 16 hours in any 24-hour period, nor more than 24 hours in any 48-hour period, nor more than 72 hours in any 7-day period, all excluding shift turnover time. The TS also states that any deviation from the guidelines shall be authorized by the Station Manager or his designee, or higher levels of management, in accordance with established procedures and with documentation of the basis for granting the deviation.

Nuclear Site Directive (NSD) 200, Overtime Control, effective date December 27, 1996, provides administrative guidance to limit the working hours of people who perform safety-related functions. The NSD recognizes that excessive working hours can impact an employee's fitness for duty and states that employees working excessive hours will be assessed for fitness for duty each day a limit is exceeded. The NSD specifies that all work hours must be considered when calculating overtime, delineates the guidelines in TS 6.2.2.f, and requires that authorization to exceed the guidelines be obtained from one member of line supervision and the Station Manager or designee in advance.

Authorization of overtime must be documented per NSD 200, Appendix A, "Request for Work Hours Extension."

The licensee routinely reviews work hour extension forms to determine if they are being filled out completely and in accordance with NSD-200. Station PIP 2-C97-1821 was initiated to document numerous violations of NSD-200 that had occurred during the recent Unit 2 refueling outage and were identified during the subsequent periodic review of the work hour extension forms.

To determine if the licensee was controlling the use of overtime in compliance with TS 6.2.2.f, the inspector obtained payroll timesheets for a sample of exempt (salaried) and non-exempt (wage-earning) plant workers. The inspector identified instances where the timesheets of non-exempt plant workers indicated that overtime had exceeded TS limits. The inspector requested copies of the completed "Request for Work Hours Extension" forms for individuals who worked overtime in excess of administrative and TS guidelines. The inspector received authorization forms for the majority of instances where overtime was excessive. For specific instances, where authorization forms were not available, the licensee explained that either the limits were exceeded by small amounts of time that were considered "shift turnover" time, or the timesheets inaccurately indicated that time was charged to work that was not performed. The latter explanation involves payment for work that was scheduled, but postponed without sufficient prior notice. Employees and vendors were compensated for their scheduled time even though they were not onsite.

The inspector identified one instance where an individual's authorization for overtime was not available. A work hour extension form was provided to verify that authorization had been given for the individual's crew to perform critical outage support activities; however, the supervisor failed to recognize that the individual's name had been inadvertently left off the list. The inspector considered this oversight an isolated violation of the NSD-200 requirement that excessive overtime be authorized. This isolated occurrence did not indicate any programmatic failure to control overtime or pervasive non-compliance with TS and administrative requirements. The inspector is not aware of any adverse impact on plant equipment as a result of the violation. Therefore, this violation, which is of minor safety significance, is characterized as Non-Cited Violation (NCV) 50-414/97-08-02: Failure to Authorize Overtime in Excess of Administrative Limits, consistent with Section IV of the NRC Enforcement Policy.

The inspector asked the licensee if reviews of timesheets were performed to determine if overtime hours are being worked without the required, documented authorization. The licensee responded that the scope of their audits is limited to administrative reviews to ensure that the work hour extension forms that are filled out are done so correctly and in accordance with NSD-200 requirements; they do not review timesheets to determine if unauthorized overtime is being worked. The inspector considered such audits to be potential performance measures for determining the effectiveness of NSD-200 and the program it governs.

The absence of these audits or some alternative process for measuring the effectiveness of the program in controlling the use of overtime was considered a limitation of the program.
During the course of the inspection, the inspector identified a discrepancy between one employee's timesheet and onsite/offsite data provided to the inspector by the security organization. The onsite/offsite data reflected the times that the employee arrived onsite and left the site. This data was available only from April 21 to April 30. The timesheets indicated that the employee had worked 10 hours a day every day during the month of April. However, the onsite/offsite data indicated that, between April 21 and April 27, the employee worked between 13 and 18 hours a day. The inspector determined that, although the employee in question did not typically perform safety-related functions during the outage, other employees who did perform safety-related functions potentially could engage in similar time-recording practices if no administrative procedure or process prevented it.

The inspector asked if an alternative (to payroll timesheets) record for documenting hours worked was required; the licensee responded that the NSD required the individual and supervisor to keep track of hours worked, and that no formal process for performing this function was required. The inspector questioned the licensee's ability to monitor the use of overtime when an accurate and correct record of hours worked was not maintained for all employees, particularly exempt, salaried employees who may not be compensated for overtime and, therefore, may not document it on a payroll timesheet. The licensee reiterated that supervisors and individuals were expected to monitor the use of overtime, and that this expectation was the mechanism by which overtime was controlled. The inspector considered that the absence of a formal and auditable record of hours worked was a shortcoming of the licensee's program for verifying that TS requirements are met.

The inspector examined the provisions in NSD-200 for assessing an employee's fitness for duty. The NSD states that employees working excessive hours will be assessed for fitness for duty each day a limit is exceeded, and that the assessment must be performed shortly before overtime is to occur; specifically within the same day or same shift. This provision allowed assessments to be performed as many as 12 hours before the overtime work was to begin. The inspector determined that the NSD may not provide adequate direction to ensure that a fitness for duty assessment would be performed in sufficiently close proximity to the overtime work to ensure that the assessment was valid at the beginning of the work.

c. Conclusions

The inspector concluded that the isolated instance where excessive overtime was not authorized constituted a minor violation of NSD-200, which was characterized as a Non-Cited Violation. The absence of timesheet audits to determine if unauthorized overtime in excess of TS guidelines was being worked was considered a limitation of the licensee's overtime control program. No formal record, independent of payroll timesheets, existed for monitoring hours worked. As a result,

no alternative means for verifying that overtime (specifically excessive overtime worked by exempt personnel who may perform safety-related functions) was being provided. The inspector did not identify any adverse impact on safety-related equipment or plant operation as a result of these programmatic issues. Followup of the licensee's programmatic controls will be tracked as Inspector Followup Item (IFI) 50-413,414/97-08-03: Overtime Control Program Limitations. Aside from the programmatic issues noted, the inspector concluded that the licensee's overtime control program was generally effective.

O8 Miscellaneous Operations Issues (92901)

O8.1 (Closed) Licensee Event Report (LER) 50-413/96-001: Unit Shutdown Required By Technical Specifications

This event was also discussed in NRC Inspection Report 50-413,414/96-01. The licensee complied with TS time limits for performing the unit shutdown. Acceptance criteria provided in procedures for verifying main feedwater pump runback circuitry status during reactor trip breaker testing were conservative. The purpose of the status check was to ensure a feedwater pump runback would not be initiated when the reactor trip breaker testing was completed and the trip breakers were placed back in service. The inspector reviewed the licensee's corrective actions and verified procedure revisions were completed. The licensee updated the LER (commitment change letter dated December 4, 1996) to require installation of minor modifications CNCE-61214 and 61215 to eliminate the need to perform this particular circuit status check. The inspector verified by reviewing work order documentation (Work Order 96055051) that the Unit 1 modification was implemented. This event did not constitute a violation of NRC requirements.

O8.2 (Closed) LER 50-414/96-004: Containment Floor and Equipment Sump Level Alarm Inoperability due to an Operator Aid Computer Error

A random computer equipment error in the Unit 2 plant computer caused the alarm function to be suppressed. The Unit 1 computer had previously been replaced in June 1996, with a computer that is not susceptible to this type of error. The inspector verified by reviewing a sample of completed datasheets that the licensee performed a periodic operability verification of TS related Unit 2 computer points until the computer was replaced in April 1997. This LER was a minor issue and was closed based on this review.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments (61726 and 62707)

a. Inspection Scope

The inspector observed all or portions of the following maintenance related Work Orders (WOs) and reviewed the associated documentation:

- WO 97040075-02 Repair Unit 2 Main Turbine Hydraulic Oil Leak
- WO 97037274-02 Auxiliary Feedwater Turbine Motor Testing
- IP/1/B/3030/09 SB System Turbine Bypass Valve Calibration

b. Observations and Findings

The inspector observed that these activities were performed by personnel who were experienced and knowledgeable of their assigned tasks. Work procedures were present at the work location and being adhered to. Procedures provided sufficient detail and guidance for the intended activities. Activities were properly authorized and coordinated with operations prior to performance. Test equipment in use was calibrated, procedure prerequisites were met, and system restoration was completed.

c. Conclusions

The inspector concluded that routine maintenance activities were performed satisfactorily.

M1.2 Autostart of Nuclear Service Water Pumps During Maintenance (62707)

a. Inspection Scope

On May 20, 1997, during maintenance on the Unit 1 125VDC/120VAC vital instrument and control power system, a low Nuclear Service Water (NSW) Pit level signal was generated. All four NSW pumps received an autostart signal and two idle pumps started. The unit operators entered Abnormal Procedure AP/0/A/5500/20, Loss of NSW, Case 2: Loss of NSW Pit Level, to verify that the NSW system was not needed and secured the unneeded NSW pumps. The inspector discussed the occurrence with operations and regulatory compliance personnel; reviewed associated operating and abnormal operating procedures; reviewed several station PIPs and the facility's TS and FSAR; and reviewed NUREG-1022, Event Reporting Guidelines for 10 CFR 50.72 and 10 CFR 50.73 reports.

b. Observations and Findings

In 1995, during a Unit 2 refueling outage, the licensee identified a power alignment where a vital AC bus could be powered from regulated power for an extended period of time during refueling outages. This alignment facilitated the conduct of outage-related maintenance. The licensee recognized that when safety-related inverter 1EIA was removed from service for maintenance, level transmitters 1RNLT7400 and 0RNLT7390, as well as the associated NSW Pit A and B level channels, would be powered from a regulated power supply. Similarly, when safety-related inverter 2EIA was removed from service for maintenance, level transmitter 2RNLT7400 and its associated NSW Pit level channel, would be powered from a regulated power supply. Because NSW Pit level instruments were required during Modes 1-4 on the operating unit (at that time, Unit 1), this alignment was allowed on the operating unit for no more than 24 hours before shutdown was required by TS 3.8.3.1. The

licensee initiated PIP 0-C95-1809 to address the impact of this alignment on safety-related equipment.

One of the corrective actions from PIP 0-C95-1809 was to revise OP/1(2)/A/6350/08, Enclosure 4.9, 1EIA Shutdown and Return to Service, and Enclosure 4.12, 1EID Shutdown and Return to Service, to direct control room operators to declare the associated NSW Pit level instruments inoperable when their power supply was placed on Regulated Power. This would allow maintenance to continue for longer than a 24-hour period. Additionally, control room operators would refer to TS 3.3.2, Engineered Safety Features Actuation System Instrumentation, and take appropriate action. With one channel of NSW Pit level instrumentation inoperable, TS 3.3.2 required that the inoperable channel be placed in the tripped condition within 4 hours. With more than one channel inoperable, TS 3.3.2 required that the NSW system be aligned for NSW Pond recirculation within 4 hours. The revised procedure was approved on February 28, 1996.

Subsequent to the February 28, 1996, procedure revision, another change to OP/1(2)/A/6350/08, Enclosures 4.9 and 4.12 was made to add the appropriate model work order number (91002943) that would be issued to support placing the NSW pit level channels in the tripped condition when the associated inverter was removed from service and regulated power was aligned to the distribution bus. The procedure change was made for both units and was approved February 20, 1997.

Two out of three logic for low NSW pit level initiates the following actions: (1) swap of the NSW pump suction to the Nuclear Service Water Pond (NSWP); and (2) an automatic start of the NSW pumps. Inverter 2EIA supplies vital power to one NSW Pit level instrument; placing that instrument channel in the tripped position would not satisfy the logic for these two actions. However, since inverter 1EIA supplies vital power to two NSW Pit level instruments, tripping those instrument channels would satisfy the logic for these two actions.

On May 20, 1997, during maintenance on the 125VDC/120VAC vital instrument and control power system, a low Nuclear Service Water (NSW) pit signal was generated when the two channels powered from 1EIA, which had been removed from service for maintenance, were placed in the tripped condition. In response to this low level signal, all four NSW pumps received an autostart signal and started. This system response was not anticipated, nor was it included in the scope of procedure OP/1(2)/A/6350/08, Enclosure 4.9. The licensee determined that an Engineered Safety Features (ESF) had not occurred because the NSW system was not defined in the FSAR as an ESF system. The inspector questioned this basis, since the NSW system does perform an ESF function (to provide cooling water to the component cooling system heat exchangers and, thereby, serve as the heat sink for containment cooling). The licensee generated PIP 0-C97-1715 to clarify what NSW system actuations constitute an ESF Actuation. This issue is characterized as IFI 50-413,414/97-08-04: Reportability of NSW System Actuations. For this specific issue, the licensee reasoned that, since a safety injection signal did not initiate the NSW pump starts to mitigate an event that

required containment cooling, the pump start did not constitute an ESF function and was not reportable. The inspector agreed with this conclusion.

The licensee determined that the root cause of the pump start was an inadequate procedure. The procedure change records indicate that the TS and FSAR chapter associated with Electric Power Systems were consulted. As a result, the appropriate actions for TS 3.2.2 were not delineated in the procedure, and the impact of tripping two channels of NSW Pit level were not recognized. The procedure change to direct plant workers to place NSW Pit level instrumentation in the tripped condition should have applied to and been made for Unit 2 procedures only, since only one channel of NSW Pit level instrumentation was rendered inoperable by the inverter maintenance.

The inspector concluded that the inadequate procedure was a violation of TS 6.8.1, Procedures and Programs. However, the impact on plant equipment was of minor safety significance. Therefore, this violation is characterized as NCV 50-413/97-08-05: Inadequate Procedure Results in Autostart of the NSW Pumps, consistent with Section IV of the NRC Enforcement Policy.

The inspector verified that, on May 21, 1997, OP/1/A/6350/08 was revised to remove the reference to model work order 91002943 for tripping the NSW Pit level instruments associated with inverters 1EIA and 1EID.

c. Conclusions

A NCV was identified for inadequate procedure. The inspector concluded that a more thorough review of the FSAR and of the TS associated with the ESF function of the NSW system may have revealed the inappropriateness of tripping two channels of NSW Pit level instrumentation. The inadequate procedure did not pose a threat to safety-related equipment or render a safety-related component inoperable. Corrective actions for the NCV were timely and appropriate. An IFI was identified to further review NSW ESF reportability.

M1.3 Maintenance of Electric Motors (62700)

a. Inspection Scope

This inspection was performed to determine by document review, work observation and interviews, the apparent cause for increased electric motor failures over the past two year period.

b. Observations & Findings

The inspector reviewed the following documentation to ascertain the extent of the problem, the underlying reason(s) for these failures and the corrective actions taken to prevent their recurrence:

- Electric Motor Failures — Root Cause Analysis (11-21-96)

• CTS-09-96	Electric Motor PM Program (12-2-96)
• SA-97-61(CN)(SRG)	Assessment of Warehouse Material Control (5-21-97)
• CNS Site Focus Issue Initiative: NO. 17 Motors	System Reliability (6-2-97)
• SM/0/A/5130/001	Preventive Maintenance for Medium Voltage Motors in Storage
• SM/0/A5130/002	Inspection and Testing of Motors

Background

By review of the above documents and through discussions with the licensee's component engineer in charge of electric motor maintenance, the inspector ascertained that electric motor failures at Catawba indicated an increasing trend since the fourth quarter of 1994. Most of these failures were evaluated as electrical in nature. The licensee's Self-Assessment evaluated the failure rate and determined that it was approximately double that of the industry. The underlying reasons for theses problems as determined by the licensee's Assessments and Root Cause Analysis included human factors, organizational and management deficiencies, personnel changes, programmatic deficiencies and a failure to implement existing Technical Support Program (TSP) instructions.

Findings

Prior to establishing the present organization with assignment of specific responsibilities towards maintenance of electric motors, the responsibility for testing electric motors had been assigned to a group out of the licensee's General Offices. As such, the program lacked good coordination and communications between key individuals. For example, the site organization did not have easy access to test data feedback or have control over the type of tests performed. This made tracking and trending motor performance difficult to implement.

Vendor Maintenance Monitoring - In reference to motor repair work performed by vendors, the documents reviewed revealed that the organizational structure and the program in place at the time did not provide for good communications between Catawba Maintenance and the vendor(s). As such, the licensee accepted repaired motors from the vendor when these motors were not in a condition suitable for service. This was evidenced by problems with the Unit 1 Heater Drain Tank C1 motor and Unit 2 Condensate Booster Pump C motor.

Technical Support Program - The TSP for small and medium size electric motors was established to provide guidance and information for maintenance on electric motors and to establish certain goals for the

Preventive Maintenance (PM) program. These goals were designed to reduce failures of motors critical to plant operation by trending performance and repairs as required. However, the documents reviewed revealed that TSP recommendations for PM of small and medium motors were essentially ignored by supervision. In general, this was attributed to changes in staffing due to the reorganization and management's apparent lack of skills and knowledge to recognize the seriousness of the problem. Failure of the Unit 2 Cooling Tower Fan A7 and Instrument Air Compressor D motors were examples of failures due to PM program inadequacies and management's failure to take a proactive role in this area.

PM of Electric Motors in Storage - On or about September 10, 1996, the licensee determined that the spare Containment Spray (NS) motor was inadequately stored in the contaminated warehouse, in that the warehouse heater was not energized. This problem was documented in PIP No. O-C96-2488. In addition to this problem, the licensee's investigation identified other large motors stored without heaters energized. The latter were stored in an "old" warehouse located outside of the protected area. The problem evaluation section of the PIP found motor PM procedure IP/O/A/3851/03 to be inadequate, in that it did not provide instructions to ensure that motor heaters were energized as required and that no appropriate action was taken to repair broken heaters. To correct this problem the licensee generated modification CNCE8015. Completion of the corrective action on this modification was scheduled for June 30, 1997.

Assessment of Warehouse Material Control - Between April 23-28, 1997, the licensee performed an assessment of activities associated with onsite receiving, storing, shipping and controlling of motors and other equipment both onsite and offsite. The assessment, which was documented under Report Nos. SA-97-61(CN)(SRG), was conducted in response to damages identified on a spare Nuclear Service Water (RN) Pump motor while undergoing pre-installation testing following its release from storage. Details of the damages and repairs performed were documented in PIP 2-C97-1166. Findings, evaluation and corrective actions associated with this assessment were documented in PIP O-C97-1621. A review and evaluation of the findings were as follows: (1) there were no procedures which adequately detailed the correct methods of performing preventive maintenance, moving or shipping of motors, and responsibilities applicable to each of these activities were not assigned to any one individual or group; and (2) there were no procedures to define the necessary controls for equipment loaned out to other Divisions or companies to assure proper maintenance and suitability for use upon their return.

In response to the problems described above, the licensee took specific action to correct the immediate problems and generated a Nuclear Site Directive (NSD), Storage and Handling of Motors, to address the issue on a broader basis. Areas covered included: receiving, storage, off- and on-line testing, in-storage testing, issuing and transportation of motors.

This licensee identified problem of a failure to provide adequate procedures for handling and conducting preventive maintenance of motors in storage was determined to be a violation of 10 CFR 50, Appendix B, Criterion V, "Procedures." This licensee identified and corrected violation was treated as a NCV consistent with Section VII.B.1 of the NRC Enforcement Policy. This issue was identified as NCV 50-413,414/97-08-06: Inadequate Motor Preventive Maintenance and Control Procedures.

Work Observation

As a followup to the aforementioned document review, the inspectors observed preventive maintenance testing performed on the Auxiliary Feedwater (CA) Pump Turbine, 2 Sump Pump Motor "B". The testing was performed per procedure SM/O/A/5130/002. Tests performed on this motor included meggering, digital low ohmmeter resistance, polarization index, visual and functional. The testing was performed under Work Order No. 97037274-02, using a Baker Motor Analyzer, S/N016. Test results attained were well within acceptance criteria. All equipment used for this test were properly identified and within designated calibration timeframe. Personnel involved in the test appeared knowledgeable, and followed the above-mentioned procedure in executing their tasks.

Inspection of Motors in Storage

The inspector, accompanied by the responsible component engineer, inspected small, medium and large motors stored in Warehouses No. 2 and 4. Storage conditions appeared to be consistent with ANSI N45.2.2, Level "B" requirements, including environmental control, protection against physical damage and airborne contamination. In Warehouse No. 4, the inspector noted that three pump motors associated with fuel pool cooling, volume control and "C" heater drain systems did not have their heaters energized. However, the component engineer indicated that a decision had been made to modify rather than fix the existing heaters which did not work properly and could damage the motors if energized.

c. Conclusions

This inspection revealed that electric motor failures had increased significantly over the last couple of years. This increase of failures was attributed in part to organizational changes, programmatic deficiencies, human factors, inadequate resources, high work loads, and management's failure to take a proactive role in this area. Following completion of the Root Cause Analysis Report and Assessments on the Electric Motor PM Program and Warehouse Material Control, the licensee took appropriate measures to improve conditions in this area. An NCV was identified regarding inadequate motor PM and control procedures.

M1.4 Review of Maintenance Activities Associated With Air Operated Valves (62700)

a. Inspection Scope

During this report period, the inspector reviewed the licensee's

activities for maintenance of Air Operated Valves (AOVs). Areas reviewed included, but was not limited to, AOV maintenance program attributes including PM and Corrective Maintenance (CM), valve outage assessments, maintenance rework program assessments, valve related PIPs, and valve testing.

b. Observations and Findings

The inspection was a general look at various aspects of the licensee's AOV activities to determine that Management had been actively focused on maintaining AOVs important to safe and reliable operation of the plant.

AOV Program Elements

A formal, structured program had not been implemented for AOVs at this time. However, the elements of a program had been developed and controlled by the engineering and maintenance groups. Control of these elements were assigned to an engineering valve specialist who was responsible for the program and was involved with problem resolutions. The engineer had been tasked with development of an AOV program document (i.e., an engineering directive for AOVs). This document was scheduled on the management calendar to be completed by the end of 1997. The document will be coordinated with all three Duke Power sites.

The licensee had performed a review of the AOV and solenoid valve population and application. A population of 2,348 AOVs had been identified. There were 169 active AOVs identified in safety significant systems. From a review of the licensee's documentation, the inspectors noted the following program elements:

- active valves were stroke time tested per ASME Code requirements
- 482 safety-related solenoid valves were maintained through the Environmental Qualification Program
- 50 of the most critical actuators/valves were scheduled for rebuild/replacement under a recently initiated program (Model PM work orders would be established to automatically perform this function at 8-10 year frequencies)
- 68 high energy, normally closed valves were monitored for leakage using infrared techniques
- diagnostic testing was used in calibration and setup of control valves using state of the art equipment
- AOVs/solenoid valves were trended in the Failure Analysis Trending system
- approximately 150 PMs had been developed based on an operating experience database

- procedures had been developed for the various aspects of AOV/solenoid valve maintenance

Positioner Calibration

The inspector witnessed the positioner calibration on AOV 1SB24 (air operated steam dump control valve). The inspector observed the pre-job briefing and reviewed the work order, procedure IP/1/B/3030/09 (SB System Turbine Bypass Valve Calibration) and the procedure's data sheet results. The inspector also observed the work in progress. An approved procedure was present and followed on the job; personnel were knowledgeable and skilled in the task; and an Instrumentation and Electrical technician was present for on-the-job-training to expand skills. The job was performed in a controlled and professional manner.

Instrument Air System

The licensee had previously noted high dew point temperatures and excessive moisture in the instrument air system, resulting in valve problems and a number of system failures. Modification CN 50431 replaced the three reciprocating air compressors with two centrifugal compressors, and the refrigerant dryers with two heatless, air-purge desiccant dryers. The dew point was reduced from the 50-70 degree range to minus 30 degrees. System failures have trended down from a high of 16 in 1995 to none so far in 1997. The inspector considered that this was a positive step to improve system/plant performance and reliability.

MSIV Issue

The inspector reviewed the failure of Main Steam isolation Valve (MSIV) 1SM1 to close in the required stroke time on March 7, 1995, against the recommendations of NRC Information Notice (IEN) 87-28, Air System Problems At U.S. Light Water Reactors, and IEN 88-24, Failures of Air Operated Valves Affecting Safety-Related Systems, to determine if the failure of MSIV 1SM1 had been due to the causes discussed in IEN 88-24. Licensee documentation confirmed they had reviewed the safety-related solenoid valve application with the vendors as a result of IEN 88-24 and concluded that these valves would operate against as high as 150 psi air system pressures. Maximum instrument air system pressure for Catawba was 115 psi. MSIV solenoid valves were missed in this survey, in that they were supplied as a part of a whole manifold assembly. Subsequent testing and re-evaluation of the 1SM1 past operability (PIP C96-0751) indicated that the root cause of the failure was an intermittently sticking solenoid valve, possibly in conjunction with marginal spring force. No other MSIV at Catawba or McGuire has had this problem. To reduce the possibility of future failures, the licensee installed stronger springs in Units 1 and 2 MSIV solenoids. The inspector concluded that failure of MSIV 1SM1 to meet its stroke time was an isolated event.

Self-Assessments

The inspector reviewed outage critiques for U1EOC8, U1EOC9, and U2EOC7. These critiques dealt largely with improving efficiency through better organization, planning and communication. One deficient area was valve maintenance rework. Review of an assessment report on the Maintenance Rework Program (MNT 15-97) showed that the cause for maintenance rework items fell into three general areas; Work Practices, Design/Equipment, and Planning/Procedure/Training. Approximately 60% of rework items were in the Work Practice area. In the area of valves, a review of over three years of data indicated a significant reduction in rework items. It appeared that management focus on reduction of rework items has shown positive results.

c. Conclusions

Management focus on Air Operated Valve maintenance has resulted in improved performance. Air operated valve program elements were in place and an Engineering Directive was in development. Observed maintenance was performed well with good management involvement.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) Unresolved Item (URI) 50-413,414/96-16-02: Nonconservative RCS Controlled Leakage Test

Surveillance procedure PT/1(2)/A/4150/01, Reactor Coolant System Controlled Leakage Verification, was not being performed to simulate the system flowpath as it is described in the current TS basis. The TS basis states that the controlled leakage limitation restricts operation when the total flow supplied to the reactor coolant pump seals exceeds 40 gpm with the modulating valve in the supply line (NV-294) fully open at a nominal Reactor Coolant System pressure of 2235 psig. However, the surveillance test had been performed with NV-294 in the normal modulating position to control charging flow. This was not conservative because the accident analysis assumes a station blackout concurrent with a loss of coolant accident, and the valve fails to the open position on a loss of power to ensure that adequate seal injection is provided.

The licensee initiated an appropriate procedure change to PT/1(2)/A/4150/01 and determined that with the modulating valve fully open, Reactor Coolant System Controlled Leakage was within allowable limits. The inspector reviewed PIP 2-C97-1010, which documented the results of subsequent surveillance tests that were performed from October 10, 1996, through February 28, 1997. The inspector determined that total seal injection flows continued to fall within the acceptance criterion of 40 gpm. The inspector also reviewed the supporting documentation associated with the Emergency Core Cooling Systems' past operability evaluation and discussed the evaluation with engineering personnel. The analysis indicated that with modulating valve NV-294 fully open during a large break loss of coolant accident, flow to the seals would not have exceeded the limit assumed in the accident analysis, and sufficient flow would have been provided to the core. The

inspector concluded that the Emergency Core Cooling Systems were past operable. This Unresolved Item is closed, as is associated LER 50-413/96-09, Inadequate Reactor Coolant Controlled Leakage Test.

M8.2 (Closed) LER 50-413/96-09: Inadequate Reactor Coolant Controlled Leakage Test

(Details pertaining to this item are discussed in Section M8.1)

III. Engineering

E1 Conduct of Engineering

E1.1 Nonconservative Thermal Power Calculation Error (71707, 37551)

a. Inspection Scope

On May 9, the licensee identified a small nonconservative error in the operator aid computer thermal power calculation. The inspector reviewed the licensee's evaluation of the significance of the error (PIP 0-C97-1589), verified modifications were installed to correct the error, and reviewed UFSAR commitments related to the accuracy of thermal power measurements.

b. Observations and Findings

The operator aid computer thermal power calculation is used by control room operators as the primary indication to control the reactor thermal power within the licensed power limit of 3411 megawatts-thermal. During the final stages of the Unit 2 power ascension testing following its recent refueling outage, the licensee identified a small discrepancy between the operator aid computer thermal power indication and the measured main generator electrical output. This discrepancy prompted a detailed review of the thermal power calculation. The licensee's review identified that an incorrect constant (coefficient of thermal expansion) was used in the plant computer's thermal power calculation which resulted in an error with a magnitude of 0.3 percent in the nonconservative direction. This caused indicated power to read 0.3 percent below actual power. The licensee's review determined that the error existed since the new operator aid computers were placed inservice (September 1996 for Unit 1 and April 1997 for Unit 2). The old and new computer systems used different calculation techniques for generating this constant which were not realized until the detailed review of the thermal power calculation was performed. A power discrepancy was not detected following the Unit 1 startup in September 1996 because normal process instrumentation uncertainty errors masked the 0.3 percent calculation error.

The inspector reviewed UFSAR and safety analysis commitments for uncertainties for the thermal power indication. The UFSAR and safety analysis assume an error of 2 percent for this parameter and use an assumption of 102 percent rated thermal power as the initial condition

for accident analyses. The licensee's General Office personnel performed a review of the actual uncertainty of the thermal power measurement and found, based an previous calculations, that the actual uncertainty of the indication was 1.52 percent. An addition of 0.3 percent error caused by the incorrect constant resulted in a total uncertainty of 1.82 percent, which is within the analyzed uncertainty. Based on this, the inspector considered that the error resulting from using the incorrect constant was of minor safety significance. The licensee revised the constant by performing a software change to both unit's computers. The inspector verified by reviewing Variation Notices VN-CN-11329AS and VN-CN-21329Y that the constant was corrected. The inspector also verified by reviewing operator aid computer group display data printouts that this constant had been input properly into the plant computers.

The inspector reviewed the power history printouts for both units and found that they were conservatively operated below 100 percent power. Normally, thermal power was controlled at 99.8 percent to 99.9 percent power based on a review of data for the 12 hour averaged thermal power calculation. There were no excursions above 100 percent power identified during this review.

c. Conclusions

The licensee's pursuit and resolution of a small nonconservative thermal power calculation error identified in the new plant computers was an example of good questioning attitude. The error had minor safety significance because of its small magnitude and did not result in exceeding the 2 percent uncertainty required by the Updated Final Safety Analysis Report and assumed in safety analyses.

E2 Engineering Support of Facilities and Equipment

E2.1 Potential Air Binding of Auxiliary Feedwater Pumps

a. Inspection Scope (37551)

During an auxiliary feedwater (CA) suction source reliability review at the McGuire Nuclear Station, engineering personnel identified a potential vulnerability of the CA system to air entrainment in the suction piping to the CA pumps and subsequent air binding of the pumps. The licensee determined that the potential vulnerability applied to the Catawba Nuclear Station (CNS) as well. The inspector discussed the issue with Engineering personnel; reviewed the facility's TS and UFSAR; reviewed station PIP 0-C97-1579 and a 10 CFR 50.72 notification of potential inoperability of the CA system; reviewed information provided from the pump vendor; assessed the appropriateness of compensatory actions; and verified that compensatory actions had been effectively implemented.

b. Observations and Findings

Because they provide condensate quality water, the normal suction sources for CA are the shared CA condensate storage tank (CACST), the respective unit's upper surge tank (UST) and the respective unit's condenser hotwell. However, these sources do not meet seismic requirements. Therefore, the assured suction source for the CA system is NSW, which is not of condensate quality. Unit 2 TS 3.7.1.5 requires that the Condensate Storage System, which consists of the CACST, UST and Condenser Hotwell, be operable during Modes 1 through 3 with a contained water volume of at least 225,000 gallons. This TS requirement is not applicable to Unit 1.

If the CA system automatically starts, a low CA pump suction pressure will cause pump suction to swap to the Nuclear Service Water system. Similarly, a low CACST level signal will cause pressure switch OCSPS5030 to close CACST outlet valves 1/2CA-6 (if the control switch is in auto). This automatic function prevents the introduction of air into the system piping after the CACST has been depleted. Control board switches also enable a reactor operator to manually close the valves from the control room. The valves are powered from the Blackout Power System to ensure that the CA pumps are protected from air binding during a station blackout event.

On May 8, Catawba engineering personnel identified three mechanisms whereby air entrainment in the suction piping to the CA pumps could cause air-binding of all three CA pumps (2 motor-driven and 1 turbine-driven). The three issues were: vortexing of the CACST, vortexing of the UST, and depletion of the CACST. The licensee determined that specific conditions were necessary to cause vortexing of the CA and the UST. Specifically, high CA system flow rates (e.g., during a main steamline break accident) and a small range of tank levels were required for vortexing to occur.

Similarly, a dual unit loss of offsite power coincident with a main steamline break on one unit is a condition necessary for CACST depletion to cause air entrainment in the CA system piping. A second condition necessary for CACST depletion to result in air entrainment is a negative pressure (less that atmospheric pressure) at the junction of the CACST and the UST discharge piping. This condition would essentially educt air into the suction piping downstream of the junction.

The CA pump vendor was contacted to evaluate pump operability under the postulated air entrainment scenarios. The vendor responded that the length of piping from the CACST to the CA pumps was sufficient to preclude the any generated vortex from reaching the suction of the pumps. Any small amount of air that might be entrained in the suction line if the postulated vortex did not break up would be forced through the pump by the inertia of the fluid in the piping without any noticeable affect on the pump.

The vendor was unable, however, to provide assurance that CACST depletion, concurrent with UST supplying the CA pumps, would not cause

pump damage as a result of air entrainment from the emptied CACST into the suction piping to the pumps. This scenario posed a real possibility that sufficient air could be drawn into the pump suction piping and to the pump, to cause pump failure. The failure mechanism is referred to as a break in suction, whereby air trapped in the pump casing would preclude water from entering the pump. The pump would run dry and be severely damaged.

The vendor indicated that a small amount of air would be passed through the pump without any noticeable affect, whereas a large amount of air would cause a suction pressure drop to the NSW auto swap to setpoint. The vendor was unable to quantify the mid-range amount of air entrained in the water that would cause this failure without extensive analysis and modeling. Engineering personnel have contracted a separate vendor to quantify the air factor required to cause pump failure. The results of their analysis and the associated past operability evaluation are not formally completed. This issue is characterized as URI 50-413,414/97-08-07: Potential Air Binding of Auxiliary Feedwater Pumps, pending the completion of the hydraulic analysis and past operability evaluation.

The licensee submitted a 10 CFR 50.72 notification to the NRC regarding the potential air binding problem. The licensee also implemented compensatory actions to protect the CA pumps from the postulated air binding failure until the analysis is completed. Compensatory actions consisted of: (1) closing 1CA-6 and 2CA-6 to eliminate the potential for air binding the CA pumps as a result of CACST depletion; (2) maintaining each units UST full to minimize the risk of an autoswap to the NSW system on low AFW pump suction pressure; and (3) implementing Abnormal Procedure (AP)-06, Loss of Steam Generator Feedwater, upon any CA autostart. The inspector verified that these compensatory actions either had been taken or were communicated to the control room operators via Operations Technical Memorandum #97-01. The inspector also verified that the requirements of Unit 2 TS 3.7.1.5 to maintain a volume of 225,000 gallons of water in the Condensate Storage System were being met.

c. Conclusions

The inspector concluded that the licensee's efforts to determine if the concern identified at the McGuire Nuclear Station was applicable to Catawba were prompt. Consultation with off-site resources to determine the amount of air that would cause pump failure was appropriate, and compensatory actions to prevent air-binding of the CA pumps in the interim were conservative. An Unresolved Item was identified regarding the potential for air binding the Auxiliary Feedwater pumps.

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) Apparent Violation 50-413,414/97-04-01: Auxiliary Feedwater System Single Failure Design Deficiency

During an inspection conducted January 6 through 23, 1997, the NRC examined the facts and circumstances associated with a licensee-

identified design deficiency that rendered the auxiliary feedwater system outside its design basis. On January 9, 1997, Licensee Event Report (LER) 50-413/96-012 was submitted to communicate this determination, and on January 17 Revision 1 to the LER was submitted to provide additional information and corrective actions.

The NRC's inspection findings associated with this issue were documented in NRC Inspection Report 413,414/97-04. The issue was characterized as Apparent Violation (EEI) 50-413,414/97-04-01: Auxiliary Feedwater System Single Failure Design Deficiency. By letter dated February 18, 1997, the NRC notified the licensee of an exercise of discretion in accordance with Section VII.B.3 of the Enforcement Policy. The letter documented the closure of the apparent violation and completed the NRC's action on the issue. Accordingly, the apparent violation is administratively closed.

IV. Plant Support

P1 Conduct of Emergency Preparedness Activities

P1.1 Emergency Exercise (71750)

On May 7, the resident inspectors observed the licensee's annual emergency exercise. The exercise was conducted from the training simulator and included Technical Support Center, Operations Support Center, and Emergency Operations Facility activation with limited participation by offsite organizations. Inspector observations included simulator, Technical Support Center, and Operations Support Center functions. The inspectors noted particularly good performance by personnel in the Operations Support Center to recognize that a field team was to be dispatched with multiple tasks to be performed. The tasks were divided and more than one team was dispatched to perform the tasks. The inspector observed the licensee's critique and noted that discrepancies and strengths identified were appropriately characterized. In general, the inspectors concluded that licensee performance during the drill was appropriate.

R1 Radiological Protection and Chemistry Controls

R1.1 Tours of the Radiological Control Area (RCA) (71750)

The inspectors periodically toured the RCA during the inspection period. Radiological control practices were observed and discussed with radiological control personnel, including RCA entry and exit, survey postings, locked high radiation areas, and radiological area material conditions. The inspector concluded that radiation control practices were proper.

R2 Status of Radiological Protection and Chemistry Facilities and Equipment

R2.1 Background Radiation Levels in the Vicinity of Whole Body Friskers (71750)

During a plant tour on April 28, the inspector noted that two whole body friskers located in the men's change facility (located in the Auxiliary Building) were in an alarm condition that indicated high background radiation levels. One of the friskers had been removed from service, the other appeared to be available for use. The inspector contacted Radiation Protection Surveillance and Control and was informed that the friskers had been checked and were acceptable for use. The inspector also noted that hand held friskers in the area were reading a higher radiation background than normal, but still within limits to perform an acceptable survey.

The inspector questioned the cause for the higher than normal radiation background with licensee radiation protection supervision. Apparently, a waste system line in the vicinity of the change room has caused elevated background levels in the past. After questioning by the inspector, the licensee initiated PIP C-97-1463 to address the issue. The line was subsequently flushed and the background radiation levels returned to normal.

The inspector noted that radiation protection personnel did not demonstrate a questioning attitude and initiate appropriate actions, including initiation of a PIP, until the inspector questioned the whole body frisker alarms and the cause of the higher than normal background radiation.

S1 Conduct of Security and Safeguards Activities

S1.1 General Comments (71750)

During the period, the inspectors toured the protected area and noted that the perimeter fence was intact and not compromised by erosion or disrepair. Isolation zones were maintained on both sides of the barrier and were free of objects which could shield or conceal an individual. The inspectors periodically observed personnel, packages, and vehicles entering the protected area and verified that necessary searches, visitor escorting, and special purpose detectors were used as applicable prior to entry. Lighting of the perimeter and of the protected area was acceptable and met illumination requirements.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on June 12, 1997. The licensee acknowledged the findings presented. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

Bhatnager, A., Operations Superintendent
Birch, M., Safety Assurance Manager
Coy, S., Radiation Protection Manager
Forbes, J., Engineering Manager
Harrall, T., Instrument and Electrical Maintenance Superintendent
Kelly, C., Maintenance Manager
Kimball, D., Safety Review Group Manager
Kitlan, M., Regulatory Compliance Manager
McCollum, W., Catawba Site Vice-President
Nicholson, K., Compliance Specialist
Peterson, G., Station Manager

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
IP 61726: Surveillance Observation
IP 62700: Maintenance Program Implementation
IP 62707: Maintenance Observation
IP 71707: Plant Operations
IP 71750: Plant Support Activities
IP 92901: Followup - Operations
IP 92902: Followup - Maintenance
IP 92903: Followup - Engineering

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-413/97-08-01	VIO	Inadequate Alarm Response Results in Inadequate and Untimely Corrective Actions for Valve Operability Determination (Section O1.2)
50-414/97-08-02	NCV	Failure to Authorize Overtime in Excess of Administrative Limits (Section O6.1)
50-413,414/97-08-03	IFI	Overtime Control Program Limitations (Section O6.1)
50-413,414/97-08-04	IFI	Reportability of NSW System Actuations (Section M1.2)
50-413/97-08-05	NCV	Inadequate Procedure Results in Autostart of the NSW Pumps (Section M1.2)
50-413,414/97-08-06	NCV	Inadequate Motor Preventive Maintenance and Control Procedures (Section M1.3)
50-413,414/97-08-07	URI	Potential Air Binding of Auxiliary Feedwater Pumps (Section E2.1)

Closed

50-413/96-001	LER	Unit Shutdown Required By Technical Specifications (Section O8.1)
50-414/96-004	LER	Containment Floor and Equipment Sump Level Alarm Inoperability due to an Operator Aid Computer Error (Section O8.2)

50-413,414/96-16-02	URI	Nonconservative RCS Controlled Leakage Test (Section M8.1)
50-413/96-09	LER	Inadequate Reactor Coolant Controlled Leakage Test (Sections M8.1, M8.2)
50-413,414/97-04-01	EEI	Auxiliary Feedwater System Single Failure Design Deficiency (Section E8.1).

List of Acronyms

AFWCST - Auxiliary Feedwater System Condensate Storage Tank
ANSI - American Nuclear Standards Institute
AOV - Air Operated Valve
ASME - American Society of Mechanical Engineers
CA - Auxiliary Feedwater System
CFIV - Main Feedwater Containment Isolation Valve
CFR - Code of Federal Regulations
ECCS - Emergency Core Cooling System
EEI - Apparent Violation
EOC - End of Cycle
ESF - Engineered Safeguards Feature
FSAR - Final Safety Analysis Report
GL - Generic Letter
IFI - Inspector Followup Item
IN - Information Notice
IR - Inspection Report
MSIV - Main Steam Isolation Valve
NCV - Non Cited Violation
NRC - Nuclear Regulatory Commission
NS - Containment Spray
NSD - Nuclear Site Directive
NSW - Nuclear Service Water
NSWP - Nuclear Service Water Pond
PDR - Public Document Room
PIP - Problem Investigation Process
PM - Preventive Maintenance
psig - Pounds Per Square Inch Gauge
QA - Quality Assurance
RCA - Radiologically Controlled Area
RCP - Reactor Coolant Pump
RCS - Reactor Coolant System
RG - Regulatory Guide
RP - Radiation Protection
SB - Main Steam System Bypass to Condenser
SI - Safety Injection
SLC - Select Licensee Commitments
SM - Main Steam System
SPOC - Single Point of Contact
SRG - Safety Review Group
TS - Technical Specifications

UFSAR - Updated Final Safety Analysis Report
URI - Unresolved Item
UST - Upper Surge Tank
VAC - Volts, alternating current
VDC - Volts, direct current
VIO - Violation
VN - Variation Notice
WO - Work Order