UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-413/94-30 and 50-414/94-30

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

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

Facility Name: Catawba Nuclear Station Units 1 and 2

Inspection Conducted: December 12-16, 1994 and January 9-27, 1995

Inspectors: L R Moore for
M. Thomas
2/14/95
Date Signed

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SUMMARY

Scope:

This routine announced inspection was conducted in the area of engineering and technical support activities. This inspection included both corporate and station engineering organizations.

Results:

- One violation was identified, 50-413,414/94-30-01, Inadequate Corrective Action for Temporary Modification Program Deficiency (paragraph 2.2.2).

- In general, the corporate and station engineering organizations were providing effective engineering and technical support at Catawba (paragraphs 2.1.5 and 2.2.5).

Enclosure

- Some activities were identified which warranted increased management attention. These activities included establishing time constraints for processing of industry and technical information (paragraph 2.1.3.1), documentation of generic determination basis (paragraph 3.1.3.2), better documented problem description and resolutions for Problem Investigation Process (PIP) reports (paragraphs 2.2.3.2 and 2.2.4.2).

- Permanent and temporary plant modifications reviewed had adequate 50.59 safety evaluations and post modification testing specified (paragraphs 2.2.3.1 and 2.2.4.1).

- Engineering was involved in preparing, reviewing, and approving surveillance test results and procedure changes for assigned systems (paragraph 2.2.3.4).

- The system teams were a positive attribute in efforts to address system and equipment issues (paragraph 2.2.5).

- The engineers were knowledgeable of their assigned systems/components and any related issues (paragraph 2.2.5).

- Licensee engineering self assessment activities were effective in identifying areas for improvement and increased management attention (paragraph 2.3).

- The performance of Probabilistic Risk Assessment analysis by corporate engineering to support station shutdown risk assessment was identified as a strength (paragraph 2.1.4).

REPORT DETAILS

1. Persons contacted

Licensee Employees

+P. Abraham, Manager, Severe Accident Analysis Section
+H. Atkins, Nuclear Support Division Supervisor
A. Bhatnagar, Manager, Electrical/Systems Equipment Engineering
C. Boyd, Manager, Modifications
+R. Casler, Manager Operational Assessment
+K. Canady, Manager, Nuclear Engineering
+K. Caraway, Manager Electrical Systems and Equipment
*J. Cox, Supervisor, Power Systems Equipment Engineering
*T. Crawford, Manager, Mechanical Engineering Systems
+D. Demart, Manager, Civil Engineering
*J. Forbes, Manager, Site Engineering
+R. Gribble, Manager, Core Mechanical Thermal-Hydraulics Engineering
*+G. Grier, Manager, Engineering Support Division
+E. Hite, Manager, Mechanical Systems Engineering
+D. Keck, Mechanical Equipment Engineering Manager
*W. Miller, Operations Superintendent
*K. Nicholson, Compliance Specialist, Regulatory Compliance
*M. Patrick, Safety Assurance Manager
*D. Rehn, Vice President, Catawba Nuclear Station
+T. Ryan, Manager, Operating Experience Assessment
+B. Simril, Member, Nuclear Safety Review Board
J. Stackley, Supervisor, Electrical Equipment Engineering
+G. Swindlehurst, Manager, Safety Analysis
*Z. Taylor, Manager, Regulatory Compliance
+T. Welch, Manager Mechanical Rotating Equipment

Other licensee employees contacted during this inspection included operators, engineers, technicians, and administrative personnel.

NRC Resident Inspectors

P. Balmain, Resident Inspector
*R. Freudenberger, Senior Resident Inspector
J. Zeiler, Resident Inspector

+Nuclear Generation Office - Corporate
*Attended exit meeting

Abbreviations and acronyms are listed in paragraph 4.0.

2.0 Engineering and Technical Support (37550)

The Duke Power Company Engineering Quality Improvement Project (EQIP) was completed in the first quarter of 1994 and resulted in reorganization of corporate engineering and station engineering at all licensee sites. Essentially this established a self-contained engineering organization at each site with identical organizational

structures. A similar organizational structure was established at the corporate engineering organization to facilitate their role in coordinating station engineering activities and addressing generic issues. An important element of the reorganization was the dissolution of the corporate design engineering organization and the corporate engineering responsibility as the design base authority. The design base authority and a large portion of the design engineering staff were absorbed into the station engineering organizations. This inspection included engineering support provided by both the corporate and station engineering organization.

2.1 Corporate Engineering

The Duke Power corporate engineering resource is contained in the Nuclear Generation Office (NGO) of the Nuclear Generation Department and was physically located in Charlotte, North Carolina. The NGO organization and responsibilities are stated generally in the Duke Power Topical Report (Duke 1-A), amendments 16 and 17. These are stated more specifically in the Nuclear Policy Manual, Volume 1, dated August 22, 1994. Detailed descriptions of the NGO responsibilities are contained in the business plans of the four individual divisions. The NGO provides support to the self-contained engineering organizations at the three Duke power nuclear stations. The NGO's primary role is to facilitate coordination and communication of engineering issues and processes between the three stations. Additionally, the NGO acts as the primary interface with the industry and assumes the lead on generic issues.

2.1.1 Organization

The NGO is divided into four divisions. The Engineering Support Division provides technical support to the stations in engineering, procurement, supplier verification and maintenance. This division is the principle interface for the station engineering division. The Nuclear Engineering Division is responsible for fuel/core management and nuclear design at all nuclear stations and interfaces with a small reactor engineering staff at each station. This division also provides support for severe accident analysis and probabilistic risk assessment (PRA). The Station Support Division provides support to station divisions other than engineering, i.e. chemistry, radiation protection, work controls and quality assurance technical services. This division also included the steam generator replacement group. The fourth NGO division is the Nuclear Assessment and Issues Division which performs the licensee's regulatory and other independent assessment activities. This division also contains the Nuclear Safety Review Board and Operating Experience Assessment (OEA) Program. The corporate divisions reviewed during this inspection included Engineering Support and Nuclear Assessment and Issues.

2.1.2 Station Interface

A primary mechanism for communication and coordination between stations and the NGO is via station/corporate teams. These teams are defined as Business Excellence Steering Teams (BEST) and are established at all management levels. The realignment accomplished by the 1994 reorganization resulted in parallel engineering organization structures at the three nuclear stations and a similar structure in the corporate Engineering Support Division. An engineering manager BEST would consist of 4 members, i.e. the three station engineering managers and the corporate engineering manager. Similar BESTs are established down to first line supervisors through the plant managers. The BEST process provided a method for designating priority on engineering work and the type of support to be provided by corporate engineering to the station. This was demonstrated by review of 1994 monthly meeting minutes for the Valve Engineering BEST which included a Top Improvement Issue List. These minutes contained updates on the status of the Generic Letter (GL) 89-10 motor operated valve (MOV) program, and development of the relief valve and check valve programs. Additionally, the individuals responsible for various aspects of the programs were designated. The detail of the business plans for the corporate engineering division were developed based on BEST determinations of station support requirements.

A corporate engineering self-assessment discussed in paragraph 2.3.1 of this report identified that this interface mechanism could be improved by the establishment of formal structure and expectations for the BEST process. The process enhancements were completed in November, 1994.

The PIP process and informal telephone contact were also mechanisms for interface between corporate and station engineering. PIPs reviewed during the inspection demonstrated the corporate/station interface in addressing station problems. Discussions with station and corporate engineers during the inspection indicated a fluid interface on many station issues. In particular, the OEP process required direct interface between station and corporate engineers in determining applicability and resolution for industry and vender information issues.

The inspectors concluded that an appropriate interface existed between corporate and station engineering.

2.1.3 OEA and Vendor Technical Interface

In addition to the direct station support provided by the Engineering Support group the corporate engineering support included the Operating Experience Assessment Program (OEP). This program, which included the vendor technical information interface, was upgraded in 1994 to address weaknesses identified by licensee and NRC audits. These weaknesses included timeliness, backlogs, accountability and tracking. The OEP staff was increased from seven to seventeen individuals to improve timeliness and backlogs. The process was changed to incorporate the Problem Investigation Process (PIP) for item tracking. Accountability was improved by designating a corporate individual to champion each item

from receipt to resolution. Additionally, the OEP staff assumed a greater responsibility for applicability reviews and resolution development. The OEP procedures were revised to reflect these changes. The inspector reviewed Nuclear System Directive (NSD)-204, Operation Experience Program Description, revision 2, and OEP Section Guidelines for Use of Operating Experience Information, revision 0. The inspectors concluded that adequate guidance was provided for processing operating experience issues and the program changes appropriately addressed the identified weaknesses.

A project charter was completed on December 1, 1994 to improve the vendor equipment technical information interface activities. The scheduled actions in the charter included a reverification that the program included the required program elements of NRC Generic Letter GL 90-03, Relaxation of Staff Position In Generic Letter 83-28, Part 2, "Vendor Interface for Safety-Related Components." The GL 90-03 elements required the identification of safety related equipment vendors and the establishment of a formal licensee/vender interface. The charter proposed the development of a new NSD to specifically address the vender technical information interface activities and verification that the identified GL 90-03 related technical manuals were complete and up-to-date. The charter actions were scheduled to be completed on January 1, 1996. The initial phases to reverify the GL 90-03 program elements were near complete and on schedule. The proposed NSD was in the final draft stage. A test sample of manuals at each site had been verified. The inspectors concluded that appropriate actions had been initiated to upgrade the vender equipment technical information interface activities.

2.1.3.1 Timeliness

The following items were reviewed to determine if the OEP program was adequately processing vendor technical and industry event information:

VIL 0-93-03	VIL 0-93-04	VIL 0-93-05	VIL 0-93-11
VIL 0-93-16	VIL 0-93-19	VIL 0-93-20	VIL 0-93-24
VIL 0-93-33	VIL 0-93-46	VIL 0-94-05	VIL 0-94-11
VIL 0-94-16	VIL 0-94-28	VIL 0-94-32	VIL 0-94-33
VIL 0-94-40	VIL 0-94-53	VIL 0-94-54	VIL W-94-06
IN 94-24	IN 94-52	IN 94-50	IN 94-54
SOER 94-01	PIP 0-094-0875	PIP 0-G94-0192	
PIP 2-M94-0615	PIP 0-M94-0615		

The timeliness of OEA item processing was based on controls within the PIP process which required 30 day and 90 day responses for applicability review and resolution development. The OEP guideline established a 30 day goal for processing of OEA PIPs in the general office. This goal included applicability review and disposition determination. Applicability reviews not completed in 30 days were monitored weekly by management. The average OEP process time calculated on January 5, 1995, was 39 days. The inspectors noted that there were valid reasons for applicability reviews which exceeded 30 days and that the current OEP provided no mechanisms for extensions therefore the average was

influenced by the subset of items requiring extensive applicability evaluations. Licensee audit NG-93-09 in February 1993, identified 103 OEP items greater than 90 days old. On January 5, 1995, there were 37 items greater than 90 days old. Additional factors that relate to process timeliness include current corporate processing of OEPs which is more extensive and the number of items was increased due to the addition of generic review of station PIPs. Overall, the timeliness of OEP disposition has improved.

Implementation of the OEP disposition was accomplished by generation of a station PIP. This allowed an additional 90 days for changes to procedures or manuals. The station PIP was generally resolved by a minor modification to perform the actual document change. Minor modifications were allowed an additional 60 days for processing. This chain of transfers between processes resulted in an allowable process time period of eight months for a simple manual change. The inspectors noted the OEP process did not specify a time constraint for the processing of OEP items from receipt to resolution implementation.

The PIP procedure was changed in June, 1994, to state that an OEP PIP could not be closed based on initiation of a minor modification, however, this limitation was not completely understood by the station staff. Inspector discussions with the station staff indicated that this stipulation was not clearly understood. The inspectors noted examples where an OEP PIP at Catawba was closed based on initiation of a minor modification. Although there were many examples in which OEP issues were implemented into document changes in less than six months, it was not uncommon for vendor manual changes to be implemented eight months or more after receipt of initial notification by the vendor.

The inspectors concluded that there were no safety concerns identified with respect to the implementation span discussed above. The interface with the station during the NGO disposition provided appropriate opportunity for the identification and escalation of safety significant issues. However, the inspectors concluded that further management attention was warranted in defining time constraints for implementation of OEP and vender technical information issues.

2.1.3.2 Generic Applicability Reviews

Increased management attention was also warranted on OEP documentation of generic reviews. The inspectors noted that the basis for determination of generic applicability was not adequately documented in the OEP NGO PIPs. In many cases, an issue was determined to be not applicable to Catawba based on discussion with a station engineer. Although the demonstrated interface with the station on the issue was commendable, the basis for the determination was documented as discussion with the station contact. It was not clear if the determination was made based on the station engineer's memory or a verifiable source such as drawings, equipment lists, design specifications, etc.

For example, McGuire PIP O-M94-0615, dated May 18, 1994, addressed an identified problem at McGuire related to air quality of the instrument air system. The PIP stated that air particulate limits were maintained by "end use" filter units at the equipment and that the pressurizer Power Operated Relief Valves (PORVs) and Main Steam Isolation Valves (MSIVs) did not have the filters installed in their instrument supply lines. The corrective action was to install the filters in the air supply lines to these components. The Catawba generic review for this PIP stated that per discussion with the station system engineer the filters were installed in the Catawba air system, therefore no recommendations were made for Catawba. The inspectors reviewed the following drawings to verify the generic determination statement:

CN-1499-NC10, Instrument Detail PORV Valve Control, Revision 5
Atwood & Morrill 13000-01-H, MSIV Cylinder Operated, Revision 13

The inspectors' review of the instrument drawings for the Catawba PORVs and MSIVs and discussion of this issue with the station engineering staff demonstrated that the statement was incorrect. There are no "end use" filters installed for this equipment at Catawba.

Additional discussions with the station engineering demonstrated that air system quality was routinely monitored at Catawba and no air quality problem currently existed, based on this routine monitoring. The inspectors' concern was related to the use of incorrect information as the basis for a generic applicability determination. The inspectors concluded that the inadequate documentation of the basis for the generic determination contributed to the incorrect information and this aspect of the OEP process was a weakness which warranted increased management attention.

2.1.3.3 OEP Conclusion

The inspectors concluded that the licensee's actions to increase staffing, establish accountability, and improve tracking were effective improvements in the OEP process. Management focus on performance in this area was demonstrated by the inclusion as an element in NGO audits (as discussed in paragraph 2.3) and approval of the project charter to improve the vender technical information interface process. Further management attention was warranted on program aspects related to basis documentation for generic reviews, closure of OEP PIPs prior to completion of the implementing minor modification, and establishing a time constraint for processing vender information into manuals. The inspectors' overall conclusion, based on the sample of OEP issues, was that industry and technical information was adequately evaluated and incorporated into station training and documentation at Catawba.

2.1.4 Station Support Examples

The inspectors reviewed several examples of station engineering support provided by the NGO. The Preventive Maintenance Optimization Program was a modified reliability centered maintenance process to maximize the

effectiveness of station preventive and predictive maintenance activities. The process was applied to pilot systems at each of the Duke nuclear stations and a schedule was developed to address all safety related systems. The NGO staff provided representatives at industry work groups and meetings to allow site engineering to focus on site specific issues. This industry expertise was incorporated into site activities via the BEST process and system teams. Other generic issues in which the NGO was the lead/coordinator included the Generic Letter 89-10 response related to valve testing, the Erosion/Corrosion control Program, and environmental qualification of equipment.

The inspectors reviewed two examples of corporate involvement in shutdown risk assessment at Catawba. The Severe Accident Analysis Group performed probabilistic risk assessments (PRA) to assess plant configurations in support of outage planning. Evaluation of Core Damage Frequency During Shutdown CNS 1EOC8, dated November 17, 1994 evaluated four cases for the February 1995, Unit 1 refueling outage. The cases involved removal of Emergency Core Cooling System (ECCS) trains, 4160 VAC Buses, and Emergency Diesel Generators in conjunction with refueling and integrated leak rate testing. Evaluation of Core Damage Frequency During Shutdown, dated April 13, 1994, evaluated potential Unit 2 outage configurations for the recent outage. This evaluation addressed activities including refueling, auxiliary feedwater system piping replacement, and maintenance on incore flux thimbles. These evaluations were used by the station in determining work schedules with the minimum shutdown risk.

Another NGO engineering station support activity reviewed by the inspectors was commercial grade procurement. This activity was assigned to the Nuclear Services Division, Engineering Maintenance Support Group, Procurement Engineering. Nuclear Procurement Procedure NPP-220, Commercial Grade Procurement Items, revision 1, provided guidance for this activity. The inspectors reviewed the following sample of commercial grade dedication documents to determine if component critical characteristics were appropriately identified to assure form, fit, and nuclear safety related function:

CGD 3006.01-01-0005, Bussman, Division of Cooper Industries, All Fuses Manufactured at Goldsboro, N.C. Facility, revision 2, dated May 27, 1994

CGD 3014.03-03-0004, Josyln clark, type TM Starters/Contactors & Associated components, revision 6, dated November 18, 1994

CGD 3014.03-07-0001 Josyln clark controls, NEMA Size 3,4,&5 TM Starter, dated July 18, 1988

CGD 2006.06-01-0001, V-Belts for HVAC equipment, revision 7, dated January 5, 1994

CGD 3008.04-03-0001, ABB Flexitest Relay Test Switches, Type FT-1 & Accessories, revision 0, dated July 11, 1994

The inspectors concluded that the documentation designated the appropriate component critical characteristics to assure fit, form, and nuclear safety function for the evaluated components. Receipt inspection criteria based on these evaluations were provided to the station and incorporated into Commercial Grade Procurement Acceptance Documents (CGPA). The inspectors reviewed the following sample of receipt inspection reports (RIRs) for these components to determine if the acceptance criteria were appropriately verified during the site receipt of the components:

RIR CC 199933, V-Belt, June 16, 1994
RIR CN 35500 Belt V 62" X 200" X 0.53", September 29, 1994
RIR CN 35706 Belt, v, November 11, 1994
RIR CC 19829 Bussman Fuses, May 23, 1994
RIR MC 40252, Switch Test Type FT-1, August 4, 1994
RIR CC 19161, Fuse, March 21, 1994

The above documentation demonstrated that the specified acceptance criteria were verified during site receipt of the commercially dedicated equipment. The inspectors concluded that corporate engineering provided effective station support for commercial grade procurement activity.

2.1.5 Corporate Engineering Conclusion

The inspectors concluded that the NGO provided adequate station engineering support. Duties and responsibilities were adequately documented and understood. Station interfaces were effective in the areas reviewed by the inspectors. Although some aspects of the OEP warranted increased management attention, improvement was demonstrated in the performance of the operating experience assessment and vender technical information interface activities. The performance of PRA analysis to support shutdown risk assessment was a strength.

2.2 Station Engineering

The station engineering resource includes four divisions; Electrical Systems and Equipment (ESE), Mechanical Engineering Systems (MES), Mechanical and Civil Equipment (MCE), and Modifications. This organizational structure was the result of the 1994 reorganization and is consistent with the other Duke Power nuclear stations and similar to the corporate Engineering Support Division. The Nuclear Policy Manual, section 3.2, provides a general description of station engineering responsibilities. A more detailed description of the duties and responsibilities was provided by the EQIP II document. The Modification Manual provides a description of the modification design organization and process guidance. SES Management Procedure 1.12, System Engineer Program, dated December 21, 1994, provides specific guidance for system engineering activities. The inspectors concluded that engineering organization responsibilities were appropriately designated in station documents.

The inspectors assessed station engineering performance based on review of engineering support for selected target mechanical and electrical systems and status of backlogs. The targeted safety related systems were Component Cooling, Control Room Ventilation, Chemical and Volume Control System, Safety Injection, 4160 Volt AC, 600 Volt AC, and 125 Volt DC. Within these systems the inspectors reviewed problem identification and resolution, design changes, operability evaluations associated with the PIPs, system and equipment monitoring, and involvement in maintenance and testing. The backlogs reviewed included PIPs, maintenance work orders (MWOs) on engineering hold, drawings, and temporary modifications.

2.2.1 Backlogs

The inspectors reviewed station backlogs to assess engineering support performance related to PIPs, MWOs on engineering hold, drawings and temporary modifications. On January 23, 1995, there were 45 PIP items which did not meet the PIP program time constraints. These backlog items were tracked by management and periodic lists of current and late PIPs provided to each engineering section. In January 1994 there were 3,419 drawings of various types in a backlog status, i.e. greater than six months old. In January 1995, there were 170 drawings in the backlog. The reduction was attributable to increased management focus and the use of contractors to supplement the modifications staff.

Management focus on engineering hold MWOs has resulted in a decrease in this backlog from 415 in 1993 to 51 in January 1995. Weekly status reports on MWOs were distributed and performance trends were monitored. The were 48 temporary modifications installed with 13 greater than one year old. This number of temporary modifications was not considered a problem because a refueling outage was scheduled for February 1995, and most were less than one year old. A sample of five temporary modifications greater than one year old indicated that work to resolve these conditions was in progress. The inspectors concluded that the backlog status in these areas demonstrated effective station engineering support performance.

2.2.2 Temporary Station Modifications (TSM)

The inspectors reviewed the licensee's corrective actions which addressed a deficiency related to routine verification (audit) of installed TSMs. This issue was identified by NRC non-cited violation 50-413,414/94-17-08, Failure to Perform Routine Audits of Temporary Modifications, and addressed by PIP 0-C94-1026. The cause was attributed to inadequate transfer of responsibility for this function during the reorganization. Inconsistent updating of the TSM data base was also addressed by the PIP. The licensee completed their corrective actions on October 6, 1994, and the PIP was closed on November 15, 1994.

During this inspection the inspectors reviewed a TSM audit initiated after completion of the licensee's corrective action. The audit was initiated on November 9, 1994, and completed on December 21, 1994.

The licensees TSM Update Report, dated January 26, 1995, identified 30 active TSMs which were not included in the November/December 1994, TSM verification audit. The inspectors concluded that the licensee's corrective actions to resolve this identified problem were inadequate. This item is identified as violation 50-413,414/94-30-01, Inadequate Corrective Action for Temporary Modification Program Deficiency.

2.2.3 Mechanical Systems

The inspectors reviewed the technical support provided by engineering for selected mechanical systems. The support included activities associated with design control (modifications), problem identification and resolution, operability evaluations associated with PIPs, maintenance activities, surveillance testing, system/equipment monitoring and trending, etc. The systems reviewed included component cooling (KC), chemical and volume control/high head safety injection (NV), intermediate head safety injection (NI), and control room ventilation (VC/YC).

2.2.3.1 Design Control

The inspectors reviewed the nuclear station modifications (NSM), minor modifications (MM), and temporary station modifications (TSMs) discussed in this section and section 2.2.4.1 to: (1) determine the adequacy of the safety evaluation screening and 50.59 safety evaluations; (2) verify that the modifications were reviewed and approved in accordance with Technical Specifications (TS) and applicable administrative controls; (3) verify that the modifications were installed in accordance with the applicable modification package; (4) verify that applicable design bases were included and design documents (drawings, plant procedures, Final Safety Analysis Report (FSAR), TS, etc.) were revised; and (6) verify that post modification testing (PMT) requirements were specified and adequate testing was performed. The following MMs and TSMs were reviewed for the mechanical systems listed above:

MM CE-3292, Replace Air Flow Monitor Transducer

MM CE-3897, Replace KC Pump 1A1 Inboard and Outboard Bearing Thermocouples

MM CE-4208, Addition of Accelerometers to VC Switchgear Air Handling Units

MM CE-60100, Install 3-Way Valves in Valve Stem Leak-off Lines

TSM-92055983, Provide Cooling for Radiation Monitoring Cabinets

TSM-93001419, Remove Power From and Tie Open Dampers in VC Ductwork

TSM-93005376, Disable VC Annunciator Associated With the Battery Room Exhaust Fans

TSM-93018822, Remove Power From and Tie Open Damper 1CR-D-9

TSM-93018825, Remove Power From and Tie Open Damper 2CR-D-9

TSM-93080082, Install Stainless Steel Bonnet for Valve 1KCD06

The inspectors concluded that these MMs and TSMs were supported by appropriate engineering calculations where applicable, contained adequate 50.59 safety evaluations, and contained adequate PMT requirements.

2.2.3.2 Problem Identification and Resolution

The inspectors selected 55 PIPs for review that were issued during 1993 and 1994 which related to the targeted mechanical systems. The PIPs were reviewed to determine if they were processed in accordance with controls specified in NSD 208, Problem Investigation Process. The inspectors paid particular attention to the technical adequacy and quality of the operability evaluations performed in the PIPs. The inspectors made the following observations during review of the PIPs:

- PIP No. 1-C94-1484 was written on October 20, 1994, when valve 1NI122B failed to fully close when it was being aligned for the performance of surveillance test PT/1/A/4200/09A, Auxiliary Safeguards Test Cabinet Periodic Test. The problem description section of the PIP stated that the valve was declared inoperable and a WR request was written to investigate the problem. However, the screening remarks section of the PIP stated that there was no indication of a problem with the valve. The PIP was closed. The inspectors questioned licensee engineering personnel as to why the screening remarks contradicted the PIP problem description. Engineering personnel indicated that a key word had been inadvertently omitted from the screening remarks which caused it to contradict the problem description. The screening remarks should have stated that there was no indication of a "past" problem with the valve. The PIP was revised to correct the screening remarks. The inspectors also reviewed MWO 94069083-01 which had been written to investigate the problem with the valve during the upcoming Unit 1 refueling outage that was scheduled to begin on February 11, 1995.

- PIP No. 2-C93-0414 was written on May 20, 1993, when an unidentified jumper was found installed between links E30L and E52L in cabinet 2EATC09. At the time the jumper was installed, the licensee was not able to determine the purpose for the jumper nor who installed it. A work request was written to investigate the jumper. The licensee determined the system (VC) to be operable on May 25, 1993. The inspectors noted that the PIP did not provide a basis for the operability determination nor did it indicate whether the jumper was removed. The inspectors discussed this PIP with the engineering personnel who indicated that, although it was not clearly documented in the PIP, the operability

determination was based on the location of the jumper, and the jumper was removed under MWO 92086834-01. The inspectors reviewed drawings which showed the location of the jumper and applicable MWO documentation for removal of the jumper. The inspectors concurred with the licensee's operability determination.

- PIP No. O-C94-1194 was written on August 30, 1994, to address an issue where the licensee was not in compliance with Section III of the American Society of Mechanical Engineers (ASME) Code. Westinghouse, which provided the original design for relief systems throughout the nuclear steam supply system (NSSS), issued Nuclear Safety Advisory Letter NSAL-94-009 which identified two instances where the relief systems contained a manual isolation valve between the relief devices and the final relief point for those relief paths. Interpretations of the ASME Code, published in Code Cases dated March 1, 1989, and March 3, 1989, ruled that a manual valve locked in the open position with appropriate procedural guidance did not meet the requirements of ND-7153 in the 1974 Edition or NC-7142 in the 1980 Edition of ASME Section III. The first instance involved the relief systems that discharge to the recycle holdup tank in the boron regeneration system. The second instance involved the relief system protecting the cold or charging side of the regenerative heat exchanger in the NV system. The inspectors noted that this was a generic issue which applied to most of the Westinghouse plants in the United States. The Westinghouse evaluation determined that the issue had a low safety significance because it was unlikely that the condition could lead to an over-pressurization of the applicable components. Also, if an over-pressurization event did occur, the event was already analyzed in the FSAR. During review of this PIP, the inspectors noted that the licensee was in the process of preparing a FSAR change to address the ASME Code noncompliance issue. During discussion of this issue with licensee personnel, the inspectors indicated that, since this issue represented a condition that was possibly outside the existing licensing basis for Catawba, a request for relief from the ASME requirements was the more appropriate mechanism for addressing this issue. The inspectors noted that several other licensees had addressed this issue by submitting relief requests to the NRC Office of Nuclear Reactor Regulation.

The inspectors concluded that engineering generally provided timely and technically adequate responses (operability evaluations, cause determinations, proposed resolutions, etc.) for assigned PIPs. There were some instances noted which are discussed in the above paragraphs and in section 2.2.4.2 where the PIP documentation either did not accurately describe the problem or the proposed resolution did not adequately address the problem described in the associated PIP.

2.2.3.3 Maintenance Work Orders

The inspectors reviewed 11 corrective maintenance MWOs performed during 1993 and 1994 that were associated with the targeted mechanical systems. The inspectors concluded that engineering provided adequate technical support when requested by maintenance personnel. There was documented evidence in several of the MWOs where either the system or equipment engineer provided support to maintenance.

2.2.3.4 Testing

During the review of the selected modifications and MWOs, the inspectors noted that system and equipment engineers were involved in the development and review of post modification and post maintenance testing requirements for the targeted mechanical systems. The inspectors also noted during the review of selected periodic tests that the system and equipment engineers were involved in preparing, reviewing, and/or approving surveillance test results and procedure changes for the targeted systems. The inspectors concluded that adequate testing was being specified and performed. Engineering was providing adequate support to the test program.

2.2.3.5 System/Equipment Monitoring and Trending

The inspectors reviewed various performance indicators and reports and held discussions with engineering personnel to determine licensee efforts to monitor performance for the targeted mechanical systems. The inspectors noted that the system and equipment engineers monitor and trend selected system and component parameters. Items monitored included: pump bearing temperatures, motor temperatures, pump vibration levels, pump hydraulic performance, system leakage, thermal efficiency, system flows, etc. The inspectors concluded that system and equipment monitoring were effective and had contributed to improved performance.

2.2.3.6 System Teams

The inspectors noted that the licensee has formed system engineering teams to provide technical support, perform trend analysis, and advise operations for certain systems. The teams consisted of personnel from various station organizations including operations, all groups within engineering, and other groups as applicable. The teams were charged with developing action plans to correct any system related concerns and to maintain system performance at expected levels.

The inspectors noted that there were system teams for the KC system and the VC/YC system. There was also an ECCS system team which included the NI system and the NV system. The inspectors reviewed KC, VC/YC, and ECCS system team reports for September/October 1994 and November/December 1994. The system team reports addressed areas such as system status, unavailability, achievements, and problems. The November/December system team report indicated that unavailability of the KC system was reduced by a factor of two in 1994.

The inspectors concluded that engineers in the mechanical area were knowledgeable of their assigned systems and components. The system teams were a positive attribute which demonstrated good cooperation and interface among various plant groups during efforts to resolve system and equipment issues and improve system performance.

2.2.3.7 Conclusion

The inspectors concluded that engineering was providing adequate and timely support to the plant in the mechanical area. This conclusion was based on documentation reviewed, discussions with engineering and other plant personnel, and observations made during plant walkdowns. The system teams were considered a positive approach to addressing issues and improving system performance.

2.2.4 Electrical Systems

The selected target systems in the electrical area were the 4160 Volt AC Power (EPC), 600 Volt AC Power (EPE) and the 125 Volt DC Vital Instrumentation and Control Power (EPL) nuclear safety related systems. The inspectors reviewed various documentation, issued within the last two years (1993 to the time of the inspection), relating to these systems and interviewed the licensee's engineers responsible for the systems and related equipment to assess their involvement in problem resolution, design control, maintenance, testing and operations. A walkdown of the systems was performed to assess the physical condition of the equipment. The results of these reviews are discussed in the following paragraphs.

2.2.4.1 Design Control

The inspectors reviewed two completed major modification packages (NSM), CN-11320 for Unit 1 and CN-21320 for Unit 2, which dealt with the replacement of the degraded grid voltage protection relays.

Since no other major modifications were made to the targeted electrical systems within the last two years, the inspectors reviewed the available documentation included in the yet to be completed NSM CN-11339 for Unit 1 and NSM CN-21339, for Unit 2 which dealt with the licensee's planned replacement of the four safety related batteries for the 125 Volt DC Vital Instrumentation and Control Power System of each unit. The inspectors concluded that, to the extent of engineering completed and documentation available at the time of the review, the packages were technically sound.

The inspectors reviewed twelve minor modifications packages which were implemented for the targeted electrical systems within the last two years.

The inspectors concluded that these packages were technically sound, were supported by appropriate engineering calculations, contained post modification testing requirements and contained adequate safety evaluations per 10 CFR 50.59.

2.2.4.2 Problem Identification and Resolution

The inspectors reviewed 27 PIPs relating to the targeted electrical systems issued during the last two years. The PIPs were reviewed for the technical adequacy of the operability evaluations and for conformance to NSD 208. The inspectors made the following observations during review of the PIPs.

- PIP No. 1-C93-0898 identified an event, on October 30, 1993, involving the station's emergency diesel generator Unit 1A while it was being subjected to its periodic load test. The PIP reported that, while attempting to parallel this diesel generator unit to its bus, which was being served by the off-site power source, the generator breaker tripped due to the pickup of its instantaneous overcurrent protective relay scheme. The PIP also identified that a subsequent check of the protective relaying indicated that the overcurrent relay was appropriately set and functioning correctly, however, the synchronizing (sync) check relay was found to be out of tolerance. The "as found" sync check relay setting would allow the generator breaker to close onto the energized bus with a phase difference of $\pm$ 35 degrees. The intended setting was reported to be $\pm$ 10 degrees. The inspectors concluded that the technical evaluation presented in the PIP was correct by implying that the overcurrent condition seen by the protective relaying was a result of generator breaker closing with a phase angle difference as much as 35 degrees. However, the technical evaluation failed to address the potential over stressing and the affect of this over stressing on the diesel generator unit (shaft, coupling, generator windings, etc.) that may have resulted from the out-of-phase paralleling attempt. A similar overcurrent trip situation was reported to have occurred with diesel generator Unit 1A on March 8, 1993 and was addressed by PIP 1-C93-0190. In response to the inspectors' concern, the licensee initiated an evaluation of the potential overstresses and contacted the diesel generator vendor for input. This evaluation had not completed at the conclusion of this inspection. This issue will be followed up after completion of the licensee's evaluation, including the input from the vendor. The inspectors informed the licensee that follow up of this issue will be performed in conjunction with Part B of Inspector Follow-up Item IFI 50-413/93-31-01, Resolution of Emergency Diesel Generator Issues.

- The detailed problem description in PIP No. 2-C93-0163 stated that an electrical short in a motor starter control circuit was caused by a wiring error and that subsequent troubleshooting methods caused motor and motor control center damage. The problem

evaluation and corrective actions in the PIP addressed the troubleshooting methods but did not address the original wiring error. In response to the inspectors' query regarding the wiring error, the licensee indicated that the condition was not a "point-to-point" wiring error but rather a case of poor workmanship. That is, a terminated wire had strands protruding from the barrel of its connector which touched an adjacent terminal point. As a result of this response the inspectors concluded that this was a case wherein the PIP did not accurately describe the problem and did not address the complete problem. The licensee indicated that the PIP would be revised to clarify the problem description and address the poor workmanship situation.

- The detailed problem description in PIP No. 2-C93-1175 stated that a humming noise was heard coming from motor control center cell 2EMXH-F05C determined that the starter contacts were burned. The description went on to state that the starter contactor was replaced but the humming noise still existed. Work Order No. 93090892, which was related to this PIP reported that the control circuit for the starter indicated a overcurrent condition, i.e., "Overload Flashing" and that only the starter contactor's contacts were replaced. The problem evaluation and corrective actions in the PIP addressed the humming noise but did not address the apparent overload condition reported by the work order and implied by the burned contacts mentioned in the PIP. During discussions with the licensee regarding the PIP, the licensee indicated that the work order was correct in that only the starter contactor contacts were replaced at that time. Further, the licensee indicated that the apparent overload was caused by the malfunction of a control circuit component. The inspectors concluded that this was another example wherein the PIP did not accurately describe the problem and did not address the complete problem. The licensee indicated that the PIP would be revised to correct the starter contactor replacement statement and to address the implied overload condition.

- PIP No. 0-C94-0452 related to minor modification CN-60138 which was issued to change two 600 volt load center feeder breaker trip settings to provide more conservative protection for the feeder cables in keeping with Duke Power Company's practices. The two breakers, 1ELXB-5B and 2ELXB-5B, served double-ended motor control center 2EMXH. The minor modification was indicated as being outage work since the specified PMT included performance of the engineered safety features surveillance test. The modification called for changing the settings to 600 amp with a 1.1 long time multiplier from the existing specified 1000 amps with 0.7 long time multiplier. The PIP problem description stated that one of the breaker's trip settings was changed during a non-outage period in which the testing could not be performed. Also, the "as-found" setting for the breaker was 800 amps with a 0.7 long time multiplier rather than the 1000 amps specified. The screening remarks section of the PIP identified three concerns:

(1) the modification work done during a non-outage period rather than during an outage as specified

(2) continued operability of the breakers without the specified post-modification testing

(3) past operability considering the as-found condition of the breaker

The technical evaluations addressed the latter concern but did not clearly address the other two. Further, the PIP evaluation did not address the incorrect breaker trip setting.

During a walkdown, the inspectors noted that the only possible tap settings for the two breakers of concern were 600 amps, 1000 amps and 1600 amps. Thus, the inspectors questioned the 800 amp tap setting reported by the PIP and potential impact on the technical evaluation of the past operability. Engineering personnel reviewed the issue with the maintenance group who indicated that the actual "as-found" setting was 1000 amps with a 0.8 long time multiplier. Further, there had been a miscommunication between the parties and the PIP description was in error. The licensee performed a technical re-evaluation of the past operability and determined that the previous conclusion (i.e., "... the breaker was still operable, providing adequate protection without risk of spurious tripping") was still valid. The inspectors concurred with the re-evaluation. The inspectors noted that the minor modification was later cancelled and the breaker trip settings were returned to their previous specified settings of 1000 amps with a 0.8 long time multiplier as reported in PIP No. 0-C93-0866.

The licensee indicated that PIP No. 0-C94-0452 would be revised to clearly address the work having been done during a non-outage period, the breakers continued to be operable without the post modification testing, to correct the "as-found" breaker trip setting and revise the technical evaluation based on the "as-found" trip setting.

The inspectors concluded that in general, the engineering actions and evaluations of the PIPs were timely and technically responsive with four noted exceptions discussed in the above paragraphs. The inspectors further concluded that operability evaluations of problem conditions, identified by the various targeted electrical system PIPs reviewed, were adequate. However, as noted in the above paragraphs, there were examples noted where the PIPs failed to accurately describe the complete problem. The most significant of these was the potential for overstressing of DG 1A which resulted from the out-of-phase paralleling attempts discussed in PIP No. 1-C93-0898.

2.2.4.3 Maintenance Work Orders

The inspectors reviewed eighteen maintenance work orders relating to the targeted electrical systems performed during the last two years. Evidence of engineering involvement was found to be adequate. A good example of this was Work Order No. 93078309 titled "I/R 1A D/G Breaker Overcurrent, dated 10/30/93. This was the incident addressed by PIP No. 1-C93-0898 (see section 2.2.4.2), wherein the diesel generator 1A breaker tripped when the licensee attempted to parallel the machine with the off-site power source. Technical evaluation in this PIP identified the out-of-phase paralleling attempt as the cause of the trip.

2.2.4.4 Testing

Evidence of post modification and post maintenance testing were observed during the inspector's review of the modification packages and maintenance work orders for the targeted electrical systems. The inspectors noted appropriate and adequate engineering involvement in the establishing of post modification testing. The inspectors also observed engineering involvement in the preparation and review of surveillance testing programs for the targeted systems in the electrical area, in compliance with the stations Technical Specifications.

2.2.4.5 System Teams

The inspectors observed that the licensee had recently formed two separate teams of technical specialists; one team was associated with the high voltage systems (i.e., 600 Volts AC systems and above up to and including the switchyard's 230KV system) and the other team associated with low voltage systems (i.e., below 600 Volts AC and 250/125 Volts DC systems). The team members represented various groups and activities including ESE, Instrumentation & Electrical Maintenance (IAE) and Operations. Others would be assigned as required and would include technical specialists from Modification Engineering, General Office, Work Control Center, etc. The team leaders for both groups were selected from the Electrical Systems/Equipment group. Notes for the first meetings of both teams had not yet been issued by the licensee, so a review by the inspectors was not possible. However, engineering personnel indicated that team expectations were to include:

- identification of issues which affect system performance and development of a top ten list

- performance of periodic system walkdowns

- review of PIP trends, corrective actions, root cause evaluations

- address emerging problems and generic system concerns

- monitor minor modifications and proposed major modifications (NSM) and prioritize for activation meetings

- optimize maintenance performed during and outage versus non-outage periods

- look ahead at planned work and maintenance to insure full team understanding of scope and requirements

- review industry issues

- review training needs

The inspectors concluded that the electrical system/equipment teams were a positive initiative for engineering support.

2.2.4.6 Conclusion

The inspectors concluded that the licensee's engineering and technical support in the electrical area for the nuclear station was adequate and timely. This conclusion was based on documentation reviewed, interviews with the licensee's engineering personnel and walkdowns performed during the inspection. The electrical engineering personnel were knowledgeable and up to date on the requirements and current issues relating to their assigned systems and equipment.

2.2.5 Overall Conclusion Regarding Site Engineering

Based on the review of engineering support being provided for the target mechanical and electrical systems, the inspectors concluded that site engineering was providing adequate and timely support to the plant. Engineering personnel were knowledgeable of the requirements and current issues relating to their assigned systems and equipment. The inspectors considered the system teams were a positive attribute which demonstrated good cooperation and interface between engineering and other plant organizations in addressing system and equipment concerns. Increased management attention is warranted to ensure better documentation of the problem description and problem resolution for some PIPs.

2.3 Self Assessment

The inspectors reviewed examples of the licensee's 1993 and 1994 self assessments of engineering activities. These included regulatory audits and self assessments by the corporate Nuclear Assessment group and a station self assessment by a station engineering team.

2.3.1 Corporate Assessments

The corporate Nuclear Assessment Regulatory Audit group conducted annual regulatory audits which reviewed a broad cross section of corporate engineering support activities. Audit report NG-93-08-(GO), Nuclear Services Activities, dated September 27, 1993, included the Operating Experience Assessment (OEA) program, steam generator replacement project, electrical engineering manuals, nuclear engineering, and procurement engineering activities. Commercial grade procurement and

the OEA program were reviewed in depth in the 1993 audit. Audit report NG-94-09(GO), Nuclear General Office, dated August 22, 1994, included OEA, Problem Identification Program (PIP), Modifications, Probabilistic Risk Assessment (PRA), nuclear engineering, and station interfaces in these areas. The 1994 audit was particularly strong in the nuclear engineering services area. The audits were well documented and reports provided an adequate basis for conclusions and findings. The inspectors noted that the OEA process and vender technical information interface was included as elements of the corporate audits. Audit reports and auditor notes demonstrated that the auditors were experienced and knowledgeable of corporate organizational responsibilities, work practices, and procedures.

A corporate self assessment which was not a regulatory audit was documented in a report dated September 16, 1994. This assessment reviewed the effectiveness of corporate station support and the corporate's and station's understanding of corporate engineering support responsibility. The assessment methodology was primarily interviews with the corporate (NGO) and station engineering staffs. The assessment identified that the coordination and communication between corporate and the stations could be improved in some areas. The corrective action was the development of Nuclear System Directive (NSD)-108, Business Excellence Steering Team (BEST) Process, dated November 11, 1994. This NSD was developed to improve the interface function between stations and with the corporate engineering organization by establishing a formal structure for BEST groups.

2.3.2 Station Assessments

A Nuclear Assessment group audit of station operations was documented in report NG-94-11(CN) and included a review of Catawba modification activities. Although this was not specifically an engineering audit, it addressed Nuclear Station Modifications (NSMs), minor modifications, and temporary modifications.

A Catawba self assessment was conducted in September, 1994, by a team of station Engineering Division and Safety Review Group personnel. This was an assessment of station engineering support activity using Institute of Nuclear Power Operations (INPO) guidelines for engineering support. The assessment scope included the majority of station engineering functions and included such aspects as organization, documentation, procedures, plant performance monitoring, reactor engineering, and modifications. Conclusions and findings were appropriately supported in the assessment report. An action plan was developed to address areas which were identified to need improvement. The assessment scope was adequate to assess the effectiveness of station engineering performance following the reorganization.

A corporate assessment of the vendor technical information interface at McGuire was conducted in 1994 which provided input for the development of the project charter discussed in paragraph 2.1.3.

2.3.3 Conclusion

The inspectors concluded that the licensee was conducting an adequate level of self assessment activity to monitor performance of the corporate and station engineering resources. The audit and assessment reports demonstrated that the activities were well planned and documented. Results and findings were appropriately distributed to the engineering organizations and management.

3.0 Exit Interview

The inspection scope and results were summarized on January 27, 1995 with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection findings listed below. Additional discussions were held by telephone with licensee personnel on January 31, 1995, to discuss the generic applicability review of a PIP relating to filters in the instrument air system. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

- (Open) Violation 50-413,414/94-30-01, Inadequate Corrective Action for Temporary Modification Program Deficiency (paragraph 2.2.2)

- Review of the licensee's evaluation of the potential overstresses on the 1A diesel generator resulting from the out-of-phase paralleling attempts will be followed up in conjunction with Part B of IFI 50-413/93-31-01, Resolution of Emergency Diesel Generator Issues (paragraph 2.2.4.2)

4.0 Abbreviations and Acronyms

AC	Alternating Current
ASME	American Society of Mechanical Engineers
BEST	Business Excellence Steering Team
CGD	Commercial Grade Dedication
CGPA	Commercial Grade Procurement Acceptance Document
CNS	Catawba Nuclear Station
DC	Direct Current
DG	Diesel Generator
ECCS	Emergency Core Cooling Systems
EPC	4160 Volt AC Power System
EPE	600 Volt AC Power System
EPL	125 Volt DC Vital Instrumentation and Control Power System
EQIP	Engineering Quality Improvement Project
ESE	Electrical Systems and Equipment
FSAR	Final Safety Analysis Report
GL	Generic Letter
HVAC	Heating Ventilation and Air Conditioning
IAE	Instrumentation and Electrical
IFI	Inspector Followup Item
INPO	Institute of Nuclear Power Operation
KC	Component Cooling System

MCE	Mechanical and Civil Equipment
MES	Mechanical Engineering Systems
MM	Minor Modification
MOV	Motor Operated Valve
MWO	Maintenance Work Order
MSIV	Main Steam Isolation Valve
NGO	Nuclear Generation Office (corporate engineering resource)
NI	Safety Injection System
NPP	Nuclear Procurement Procedure
NSAL	Nuclear Safety Advisory Letter
NSD	Nuclear System Directive
NSM	Nuclear Station Modification
NSSS	Nuclear Steam Supply System
NV	Chemical and Volume Control System
OEA	Operating Experience Assessment
OEP	Operating Experience Program
PIP	Problem Investigation Process
PMT	Post Modification Testing
PORV	Power Operated Relief Valve
PRA	Probabilistic Risk Assessment
RIR	Receipt Inspection Report
SOER	Significant Operating Event Report
TS	Technical Specifications
TSM	Temporary Station Modification
VAC	Volts Alternating Current
VC/YC	Control Room Ventilation System
VIL	Vendor Information Letter