UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET SW SUITE 23T85
ATLANTA, GEORGIA 30303-8931

FEBRUARY 23, 2001

Duke Energy Corporation
ATTN: Mr. G. R. Peterson
Site Vice President
Catawba Nuclear Station
4800 Concord Road
York, SC 29745

SUBJECT: CATAWBA NUCLEAR STATION - NRC INSPECTION REPORT 50-413/01-02, 50-414/01-02

Dear Mr. Peterson:

On January 26, 2001, the NRC completed a safety system design and performance capability inspection at your Catawba Units 1 and 2. In conjunction with this inspection effort, a 10 CFR 50.59 safety evaluation inspection was also conducted. The enclosed report documents the inspection findings which were discussed on January 11 and 26, 2001, with Mr. Pete Herran and other members of your staff.

This inspection was an examination of activities conducted under your licenses as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your licenses. The team reviewed selected procedures and records, observed activities, and interviewed personnel.

No findings of significance are identified in the enclosed report.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Charles R. Ogle, Chief
Engineering Branch
Division of Reactor Safety

Docket Nos. 50-413, 50-414
License Nos. NPF-35, NPF-52

Enclosure: NRC Inspection Report 50-413,414/01-02
(with Appendix of documents reviewed)

cc w/encl:
Regulatory Compliance Manager Duke Energy Corporation

Electronic Mail Distribution

Lisa Vaughn
Legal Department (PB05E)
Duke Energy Corporation
422 South Church Street
Charlotte, NC 28242

Anne Cottingham
Winston and Strawn
Electronic Mail Distribution

North Carolina MPA-1
Electronic Mail Distribution

Henry J. Porter, Assistant Director
Div. of Radioactive Waste Mgmt.
S. C. Department of Health
and Environmental Control
Electronic Mail Distribution

R. Mike Gandy
Division of Radioactive Waste Mgmt.
S. C. Department of Health and
Environmental Control
Electronic Mail Distribution

Richard P. Wilson, Esq.
Assistant Attorney General
S. C. Attorney General's Office
Electronic Mail Distribution

Vanessa Quinn
Federal Emergency Management Agency
Electronic Mail Distribution

North Carolina Electric
Membership Corporation
Electronic Mail Distribution

Peggy Force
Assistant Attorney General
N. C. Department of Justice
Electronic Mail Distribution

County Manager of York County, SC
Electronic Mail Distribution

Piedmont Municipal Power Agency
Electronic Mail Distribution

Manager
Nuclear Regulatory Licensing
Duke Energy Corporation
526 S. Church Street
Charlotte, NC 28201-0006

Distribution w/encl:
C. Patel, NRR
NRR (RidsNrrDipmlipb)
PUBLIC

OFFICE	RII:DRS	RII:DRP	RII:DRS	RII:DRS	RII:DRP	RII:DRP	DRS
SIGNATURE	**CSMITH**	**SFREEMAN**	**RMOORE**	**NMERRIWEATHER**	**RCARROLL**		**MSCOTT**
NAME	CSMITH	SFREEMAN	RMOORE	NMERRIWEATHER	RCARROLL	RHAAG	MSCOTT
DATE	02/21/2001	02/21 /2001	02/ 21/2001	02/21/2001	02/21/2001	02/23 /2001	2/21/2001
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: C:\CAT0102R1.wpd

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos:	50-413, 50-414
License Nos:	NPF-35, NPF-52
Report Nos:	50-413/01-02, 50-414/01-02
Licensee:	Duke Energy Corporation (DEC)
Facility:	Catawba Nuclear Station, Units 1 & 2
Location:	4800 Concord Road York, SC 29745
Dates:	January 8 - 26, 2001
Lead Inspector:	R. Carroll, Senior Project Engineer
Team:	S. Freeman, Resident Inspector N. Merriweather, Senior Reactor Inspector R. Moore, Reactor Inspector M. Scott, Senior Reactor Inspector (Section 1R02) C. Smith, P.E., Senior Reactor Inspector
Other Personnel:	K. Maxey, Reactor Inspector Trainee S. Walker, Reactor Inspector Trainee
Approved by:	C. R. Ogle, Chief, Engineering Branch Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000413-01-02, 05000414-01-02, on 01/08-26/01, Duke Energy Corporation, Catawba Nuclear Station, Units 1 & 2, safety system design.

This safety system design and performance capability inspection, which included a 10 CFR 50.59 safety evaluation inspection, was conducted by regional inspectors and a resident inspector.

No findings of significance were identified.

Report Details

Inspection Background: This was an inspection of risk significant systems and components that are required to ensure successful mitigation of a loss of offsite power (LOOP) and/or station blackout (SBO). The risk significant systems and components were identified based on LOOP/SBO related core damage frequency contribution from turbine building flood (FTB), tornados (TORN), and LOOP (T3) initiating event sequences. The effort encompassed: essential and SBO alternating current (AC) systems/components; emergency and standby shutdown facility (SSF) diesels; direct current (DC) battery systems; standby makeup pumps (SMP); auxiliary feedwater turbine-driven pumps (CATP); and related supporting systems. As a risk informed inspection, not only were system/component capabilities evaluated, but recovery activities (i.e., emergency and abnormal operating procedures) and effects on related initiating event frequencies were assessed as well.

1. REACTOR SAFETY
Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R02 Evaluations of Changes, Tests, or Experiments

a. Inspection Scope

The inspectors reviewed nine "full safety evaluations" to confirm that the licensee had appropriately reviewed and documented changes in accordance with 10 CFR50.59 and licensee procedure Nuclear Site Directive (NSD) 209, 10 CFR 50.59 Evaluations, Revision 8. The inspectors also reviewed ten design changes and two procedure changes for which the licensee determined safety evaluations were not required. This was done in order to confirm that the licensee's conclusions to "screen out" these changes were correct and consistent with 10 CFR 50.59 and NSD 209. Highlighted accordingly as "Full 50.59 Safety Evaluations" or "50.59 Screenings" in the attached Appendix, are the seventeen minor modifications (MM), two nuclear system modifications (NSM), and the two abnormal procedures (AP) that were reviewed to ensure that changes could be made to the facility without obtaining a license amendment. The inspectors also reviewed applicable sections of the Updated Final Analysis Report (UFSAR), site drawings, supporting analyses, calculations, Technical Specifications (TS), and procedures to ensure they were correctly revised.

In addition, the inspectors reviewed nine corrective action program documents (listed in the attached Appendix) to confirm that the licensee was identifying 10 CFR 50.59 related issues, entering issues into the corrective action program, and resolving the concerns. Reviewed were two corporate audits and Problem Investigation Process reports (PIP) associated with six site modification assessments and one modification readiness review.

b. Findings

No findings of significance were identified.

1R21 Safety System Design and Performance Capability

.1 System Needs

a. Inspection Scope

Energy Source

The team performed a design review for probable common cause failure of risk significant equipment to operate due to inadequate equipment utilization voltage. The team reviewed design basis documents, installed equipment, calculations of record, vendor information, and approved design output drawings for Unit1 4160 volt AC (VAC) and 600 VAC power distribution systems. The team evaluated the adequacy of the licensee's analysis of the electrical distribution system and its compliance with the guidance of Branch Technical Position PSB-1, Adequacy of Station Electric Distribution System Voltages. Capability of risk significant motors to perform was evaluated for compliance with vendor recommendations and the requirements of American National Standards Institute (ANSI) C50.41-1982, American National Standard for Polyphase Induction Motors for Power Generating Stations. The capability of risk significant motors and Generic Letter 89-10 motor operated valves to perform was also evaluated against industry standards.

The team reviewed plant modification NSM CN-11339, 125 VDC Vital Instrumentation and Control (I&C) Power (EPL) System Battery Replacement Modification, design basis documents, installed equipment, calculations of record, and industry standards used for sizing the 125 VDC batteries and battery chargers for the vital I&C power system. Calculation CNC-1381.05-00-011, 125 VDC Vital I&C Power System Batteries and Battery Charger Sizing, was reviewed to confirm capability of the lead calcium model NCN-21 batteries to power their loads for two hours upon a loss of coolant accident/LOOP. Additionally, calculation CNC-1381.05-00-0122, Station Blackout Battery Sizing Calculation for the 125 VDC Vital I&C Batteries, was reviewed to confirm capability of the batteries to power their loads for a four-hour coping duration during a SBO without load stripping.

The team reviewed design documentation, drawings, calculations, technical manuals, test documentation, and installed equipment to verify that the sizing of storage tanks and design of the automatic fuel oil transfer valves were adequate to provide the fuel requirements to operate the emergency diesel generators (EDGs) for the period of time assumed in the accident analysis. This included diesel testing to determine the fuel consumption rate and calculations determining the fuel oil volume required for seven days of operation. Additionally, station acceptance criteria for fuel oil quality was reviewed to verify these were consistent with the EDG vendor recommendations and applicable industry standards.

The team reviewed design documentation and equipment specifications to verify that the EDG air start system capability and storage capacity were consistent with design bases assumptions. This included calculations for air receiver sizing and test documentation to verify multiple start capability.

The team reviewed design documentation and sizing calculations to verify that the SSF diesel fuel oil day tank contained enough fuel to start the diesel and support an orderly shutdown if the main fuel oil tank failed. The SSF diesel generator battery sizing calculation was also reviewed to verify that the starting system had the design capacity for 10 starts. In addition, the team reviewed the other SSF diesel support systems (e.g., fuel transfer pump, inlet dampers, room heaters, etc..) to verify they were supplied from sources powered by the SSF diesel.

Controls

The team reviewed elementary wiring diagrams which depicted the permissives and starting circuits for EDGs and EDG load sequencers for degraded and loss of voltage conditions on the essential 4160 VAC safety-related buses. The objective of the review was to verify that risk significant systems and components required to ensure successful mitigation of a LOOP or SBO would be capable of performing their design functions consistent with the licensing and design basis for the plant. The team specifically reviewed the 2-out-of-3 relay logic for the degraded and undervoltage relays. These reviews were performed to verify that upon a LOOP the EDGs and the load sequencer would start and initiate load shedding and sequencing of required blackout loads.

The team reviewed elementary wiring diagrams which depicted the electrical interlocks between 4160 VAC switchgear breakers ETA(B)-2, FTA-1, and GTA-1. This review was performed to verify that the associated EDG could not be inadvertently aligned to the grid through the blackout bus if blackout bus supply breaker GTA-1 was closed or failed to open.

The team reviewed elementary wiring diagrams depicting permissives for starting the CATP on a LOOP. This review was performed to verify that the pump would start and provide feedwater to the steam generators in a LOOP or SBO condition. The team also reviewed the control logic and permissives for automatically opening the CATP suction isolation valves (CA-174 and -175) on low suction pressure. This review was performed to verify that this transfer was operable during a LOOP/SBO. The team also reviewed the level controls for the CATP A sump pump to verify that it would adequately control sump pump water level during a LOOP/SBO event.

Operator Actions

The team reviewed pertinent operating procedures to determine consistency with assumed LOOP/SBO operator recovery actions. Specific actions assessed were: manually load shedding the essential busses; locally starting the EDGs; manually closing the output breaker; starting the SSF diesel generator and SMP from the SSF; transferring the power supply of motor control center (MCC) EMXS from Unit 1 to the SSF; controlling letdown using the reactor head vents from the SSF; manually controlling pressurizer heaters; fully isolating the primary and secondary systems; controlling the CATP from the SSF; and verifying primary side natural circulation. Also reviewed were the qualifications and training records of security personnel designated as qualified to operate the SSF diesel generator.

Heat Removal

The team reviewed calculations and equipment specifications to verify that the internal cooling systems for the engine cooling and lubricating oil were adequate to maintain EDG operation within vendor specifications. This included heat transfer testing data sheets which verified the capacity of the EDG heat exchangers.

The team reviewed the sizing calculation for the SSF intake dampers to verify adequate cooling and combustion air was provided for the SSF diesel generator.

The team reviewed the availability and capacity of auxiliary feedwater (CA) water sources (necessary for primary-to-secondary side heat removal) during a SBO event. These sources included condensate storage tanks, main condensers, and the condenser circulating water (RC) system imbedded piping. The review included calculations which determined the volume of water to remove decay heat during a SBO event, tank and piping drawings, and calculations determining the volume of the available water sources.

b. Issues and Findings

No findings of significance were identified.

.2 System Condition and Capability

a. Inspection Scope

Installed Configuration

The team performed field walkdown inspections of the associated SBO and Unit 1 essential 4160 VAC, 600 VAC, and 120 VDC power systems, including: 4160 VAC degraded and undervoltage relays; transformers SATA, SATB, 1ATC, and 1ATD; EDGs and their support systems (e.g., fuel oil, starting air, batteries, etc..); EDG load sequencer and control panels; and the SSF diesel and its support systems (e.g., fuel oil, starting batteries, etc..). Also field inspected in Unit 1 was the accessible equipment related to the CATP, SMP, and isolated phase bus (IPB) system. The walkdowns were performed to look for degraded or nonconforming conditions and to verify consistency with design documents and drawings.

Design

The team reviewed design bases documents and approved design output drawings of the 4160 VAC essential auxiliary power system in order to verify that the degraded voltage relay set point values of voltage magnitude and time delays were consistent with values incorporated in the TS. The analytical limits upon which the degraded voltage dropout set points were based were also reviewed to ensure that steady state voltage criteria for risk significant equipment were not violated when fed from the preferred power supply during degraded voltage conditions. The loss of voltage relay set point values of voltage magnitude and time delay was also evaluated to demonstrate agreement with values delineated in the TS and to ensure compliance with General Design Criteria 17 for minimizing loss of offsite power to the 4160 VAC essential

auxiliary power system. Instrument loop inaccuracies associated with the degraded voltage relays and the loss of voltage relays were reviewed for agreement with values listed in the instrument calibration procedures.

The team reviewed the as-built sizing data for the CATP pit sump pump motor to verify that the overload heater had been selected consistent with site engineering guidance and vendor recommendations.

The team reviewed the voltage drop and electrical loading calculation for the SSF to verify that required loads were within the continuous rating of the SSF diesel.

Testing

The team reviewed a sample of completed calibration records to verify that instruments were being calibrated in accordance with setpoint documents. The records addressed calibration of the load sequencer timer relays, CATP sump level transmitters, and CATP suction pressure switches. The test methods were also reviewed to verify that all appropriate relay contacts were being verified as operable. The records reflected the most recent calibrations and are described as follows:

- Calibration Data Sheets from IP/1/A/3670/001A for EDG1A Load Sequencer Timers (EQB) (Performed by Work Order No. 98275137-01)

- Calibration Data Sheets from IP/1/A/3181/001 for CATP Sump Pump Level Transmitter Calibration (Performed by Work Order No. 98297423-01)

- Calibration Data Sheets from IP/1/B/3140/005 for Calibration of Auxiliary Feedwater System (CA) Non-Safety Related Instrumentation (Performed by Work Order 98185746-01)

- Calibration Data Sheets from IP/2/B/3140/005 for Calibration of Auxiliary Feedwater System (CA) Non-Safety Related Instrumentation (Performed by Work Order 98292682-01)

The team reviewed the maintenance procedures for 4160 VAC circuit breakers to determine whether breaker operating times were being checked, and whether the allowable operating times specified were adequate to support proper operation of the electrical interlocks between breakers ETA-2, FTA-1, and GTA-1 during blackout loading of the EDG if breaker GTA-1 failed to open.

The team reviewed data from the most recent performance of the monthly SSF diesel generator run and from the functional test performed at SSF installation. In addition, the level in the SSF fuel oil day tank before and after the monthly run was compared to verify operation of the fuel oil transfer pump.

b. Issues and Findings

No findings of significance were identified.

.3 Selected Components

a. Inspection Scope

Component Maintenance

The team reviewed design changes of equipment accomplished through the licensee's design change process, as well as component level design changes accomplished using the licensee's procurement process, to verify that system and equipment function was appropriately evaluated and maintained.

The team reviewed maintenance and testing documentation to assess the licensee's actions to verify and maintain the function, reliability and availability of: 4160 VAC switchgear breakers 1ETA3, 1ETA4, and 1ETA18; EDG related equipment (i.e., the diesels, fuel oil storage tanks, air start system tanks, and critical valves FD-22 and RN-232); SSF power delivery system related equipment (i.e., the diesel, fuel oil day tank, fuel oil transfer pump, and the inlet dampers); the SMP(s) and associated valves NV-865 and NV-872; and the CATP(s), associated suction isolation valves CA174 and CA175, and CATP sump pump(s).

Component Inputs/Outputs

The team reviewed pump performance curves and motor/pump speed torque curves for the nuclear service water pump motors in order to verify that the motors were adequately sized based on mechanical load demand. Additionally, the team reviewed design basis calculations for degraded voltage conditions in order to verify the capability of the 4160 VAC electrical distribution system to support operation of risk significant motors. The team also reviewed diesel generator room supply fan motor performance curves in order to verify that the motors were adequately sized for performing their design function. The capability of the fan motors, as well as risk significant Generic Letter 89-10 motor operated valves, to perform their design function under degraded voltage conditions at 600 VAC Motor Control Centers was inspected by review of calculation CNC-1381.05-00-0070, Auxiliary Power System Voltage Study - Source Voltage, Revision 6.

Operating Experience

The team reviewed the licensee's evaluation of Information Notice (IN) 2000-06, Offsite Power Voltage Inadequacies. The licensee's evaluation of the IN was incorporated in their response to INPO SOER 99-01, Loss of Grid, issued in December 1999. The team reviewed the licensee's response to Recommendation 4 of this SOER in order to verify that grid stability and reliability assumptions are valid to ensure that the switch yard voltage is maintained within the limits necessary for supporting operation of the nuclear units.

The team also reviewed the licensee's evaluation for IN 88-75, Disabling of Diesel Generator Output Circuit Breakers by Anti-Pump Circuitry, and IN 97-21, Availability of Alternate AC Power Source Designed For Station Blackout Event.

b. Issues and Findings

No findings of significance were identified.

.4 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed PIPs and corrective maintenance documentation related to the EDGs and their support systems, the SSF diesel and its support systems, CATP(s), and the SMP(s) for the past three years to assess the adequacy of corrective actions for identified problems.

The team reviewed Licensee Event Report (LER) 50-414/96-001 and associated PIPs C-96-00455, C-96-00273, and C-96-00864 to verify appropriate corrective actions had been implemented for the 1996 LOOP event on Catawba Unit 2. As indicated in Section 1R21.2, a walk-down was performed of the Unit 1 IPB system to verify that those corrective actions implemented to prevent recurrence of moisture accumulation were still in place and operable. The team also reviewed the preventive and corrective maintenance records for the IPB system since 1996 to verify that similar problems have not occurred.

The team reviewed PIPs C-98-01748, C-98-01057, and C-00-02947, which described I&C problems on equipment relied on for a LOOP and/or SBO, in order to verify that appropriate corrective actions were planned or taken to resolve the concerns.

The team reviewed PIP C-00-02488, which addressed the unexpected intermittent reset actuation of the EDG 2A load sequencer due to a failed timer relay. The review focused on the investigation to determine the root cause for the timer failure and the planned corrective actions to prevent recurrence of the problem.

The team reviewed the June 2000 Catawba Nuclear Station Stationary Battery Assessment Report, which documented continuous problems with nickel cadmium batteries used for the 125 VDC EDG auxiliary power. Recommendations for replacing the batteries were delineated in Section 3.4 of the report. The team reviewed MM CNCE-70521, dated October 17, 2000, and Commercial Grade Item Evaluation CGD-3014.06-03-0001, Revision 12, in order to verify compliance with the report recommendations, as well as industry guide and standards for sizing nickel cadmium batteries. The commercial grade dedication package for the replacement batteries was reviewed to ensure that required technical and quality requirements had been incorporated.

The team reviewed PIPs C-96-00241 and C-99-04064, which concerned stress cracking and age-related deterioration of the RC system rubber expansion joints. Since the Catawba Probabilistic Risk Assessment (PRA) recognizes the failure of the RC expansion joints as a turbine building flood LOOP initiator (due to the 6900 VAC:4160 VAC transformers for both units being located in turbine building basement), the review focused on the licensee's replacement plans and interim compensatory actions.

b. Issues and Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA6 Management Meeting

The lead inspector presented the inspection results to Mr. P. Herran, Engineering Manager, and other members of the licensee's staff at an exit meeting on January 25, 2001. The licensee acknowledged the findings presented. Proprietary information is not included in the inspection report.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

T. Baumgarner, Operations Support
S. Brown, Civil Electrical & Nuclear Engineering Manager
D. Caldwell, Civil, Engineering Manager
K. Caldwell, Power Systems & Equipment Engineering Manager
M. Carwile, Mechanical Systems & Equipment, Secondary Engineering Manager
G. Gilbert, Regulatory Compliance Manager
P. Herran, Site Engineering Manager
J. Herrington, Electrical Modifications Engineer
G. Strickland, Regulatory Compliance Specialist
R. Sweigart, Safety Assurance Manager
J. Thrasher, Modifications Engineering Manager

NRC:

C. Ogle, Chief, Engineering Branch, Division of Reactor Safety, Region II

APPENDIX

LIST OF DOCUMENTS REVIEWED

PIPs Initiated as a Result of this Inspection

PIP C-01-00184, CNC-1381.05-00-0070 References Outdated FSAR Page Number
PIP C-01-00193, Outdated FSAR Table Reference in DBD CNS-115.01-EPC-0001
PIP C-01-00383, FSAR Section 8.2.2.1 is Confusing Concerning Grid Stability and Requires Clarification
PIP C-01-00386, CNC-1381.05-00-0012 Does Not Document Basis for Degraded Voltage Allowable Value in Technical Specifications
PIP C-01-00397, NSM CN-11339 Incorrectly States Design Basis Duty Cycle for Replacement Vital Batteries is One Hour Instead of Two Hours
PIP C-01-00189, CNC-1223.42-00-004 Does Not Model Flow From CAPT to All Four Steam Generators.
PIP C-01-00413, No Pre-Op or Regular Testing to Verify Inability of Breakers FTA(B)-1 and ETA(B)-2 to Close While GTA(B) is Closed
PIP C-01-00179, Incorrect Airflow Input in CNC-1211.00-00-0032 for SSF Diesel Room Dampers
PIP C-01-00182, No PM Performed on Inlet Dampers VK DA 4A & 4B and Heaters VK EH 5 & 6
PIP C-01-00350, No PM for SSF D/G Fuel Oil Day Tank and Transfer Pump
PIP C-01-00350, Vendor Recommended Engine Coolant Flush Not Being Performed
PIP C-01-00437, Use of Flexible Hose versus Metal Tubing on Engine Cooling Water Subsystem
PIP C-01-00440, Conduct Analysis of Grid Faults and Affect on 4160 V Essential Bus Blackout Relays and Degraded Voltage Relays
PIP C-01-00381, Enhancements to EP/1(2)/5000 ECA-0.0, Loss of All AC Power
PIP C-01-00425, Apparent Discrepancy Between Vendor Information and CNS Practice Regarding RC Expansion Joints
PIP C-01-00435, Cracks Were Found on the 1C2 and 2C2 Condenser Inlet Rubber Expansion Joints

Technical Specifications

TS Section 3.3.5, Loss of Power Diesel Generator Start Instrumentation

UFSAR

Section 8.2, Offsite Power System (4/8/00)
Section 8.3, Onsite Power System (4/8/00)
Selected Licensee Commitment 16.7-9, Standby Shutdown System (9/20/99)

Vendor Documents

CGD-3009.03-11-0001, Commercial Grade Dedication Package for Cutler Hammer D87 Timers, Attachment 2
CNM 1301.02-0058 002, Cummings Engine Co. Generator Set Service Manual II

CNM 1301.02-0040 001, 75A SFT Assembly
CNM 1301.02-0040 002, SSF Diesel Generator Standard Day Tank Parts List
CNM 1301.02-54, Fuel Oil Day Tank Terminal Strip Box Wiring Detail
CNM 1301.02-46, Day Tank
CNM 1211.00-0552.001, VK System Controls
CNM 1211.00-0735 001, Dampers by Ruskin
Squirrel Cage Induction Motor Data Sheet for Motors Rated 100 HP and Above; Motor Application- Nuclear Service Water Pump Motors
Induction Motors Starting Characteristics and Time Current and Thermal Limit Curves, Figures 33-37
Joy Manufacturing Company Fan Model 60-26-1170 Diesel Generator System Ventilation Fan Performance Curves
Joy Manufacturing Company Air Fan Test Data for Fan Model No. 60-26-1170, Tag Nos. DSF-1A1, 1A2, 1B1, and 1B2

LERs

LER 50-414/96-001, Loss of Offsite Power on Unit 2 due to Electrical Fault Near Unit 2 Main Transformer

INs

IN 00-06, Offsite Power Voltage Inadequacies
IN 88-75, Disabling of Diesel Generator Output Circuit Breakers by Anti-Pump Circuitry
IN 97-21, Availability of Alternate AC Power Source Designed for Station Blackout Event

Miscellaneous Documents

Duke Power 10 CFR 50.59 USQ Evaluation , UFSAR Change Summary Form Package No. 00-036, Approved on January 20, 2000.

50.59 Screenings for Selected Modifications and Procedures

MM CE-61654, Rewiring of Damaged Cable (8/31/00)
MM CE-61390, Speed Indication Addition for Auxiliary Feedwater Pump (8/25/98)
MM CE-10357, Diesel Control Power Circuit Breaker Replacement (4/28/99)
MM CE-9523, Replacement of Diesel Generator Speed MOP with DRU (7/20/98)
MM CE-61640, Rewiring of Devices Affected by Damaged Cable (9/7/00)
MM CE-61381, Instantaneous Trip Setpoint for Breaker in Remote Starters (DG DC Fuel Oil Pump, 4/22/98)
MM CE-10518, RN Pump Discharge Valve MOV Motor Replacement (12/20/99)
MM CE-10275, Condenser High Refrigerant Pressure Switch Replacement (12/20/99)
MM CE-61301, Blackout Auxiliary Power Supply Feeder Breaker Replacement (7/7/97)
MM CE- 61505, CN-1702-05.01 Revision (7/8/97)
AP/1/A/5500/06, Revision19, Loss of Steam Generator Feedwater
AP/1/A/5500/07, Revision 32, Loss of Normal Power

Full 50.59 Safety Evaluations for Selected Modifications

MM CE-61291, Auxiliary Feedwater Check Valve Internals Removal (2/18/98)
MM CE-61396 &7, Unit 1 and 2 CA-6 Valve Alignment (with Unit 1 CE-61530, Restoration of CA-6 to Operable Status (11/12/98)
NSM CN-11383, CA Flow Rate reduction Nuclear System Modification (7/9/97)
MM CE-61625, NV Pump 1-A 3rd Generation Mechanical Seal (9/20/00)
MM CE-70610, Piping Replacement Between RN Pump Structure and Pit Wall (11/6/00)
MM CE-10107, Chilled Water Recycle Temperature Switch Jumpered (1/16/99)
MM CE-61487, Reference Leg Pressure Tap Between Annulus Ventilation and Auxiliary Building Changed (7/6/99)
NSM CN-21379, Replacement of 6.9 kV Switchgear Tie Breakers with Faster Vacuum Breakers (5/12/98)
MM CE-10411, Installation of Enclosures Around CS Expansion Joints (5/20/99)

Corrective Action Documents

PIP C-99-01125, Assessment Modification CNCE-7901
PIP C-00-02058, SRG Assessment Modification CNCE-61395
PIP C-00-02059, SRG Assessment Modification CNCE-21393
PIP C-00-02060, SRG Assessment Modification CN-21405
PIP C-00-02061, SRG Assessment Modification CNCE-61395
PIP C-00-02516, Readiness Review performed on NSM CN-50477
PIP C-00-00165, Assessment of 10 CFR 50.59 Screenings and USQ Evaluations
PIP C-96-01725, RC to CA Manway Vent Valves Not Checked for Proper Operation
PIP C-00–03194, High Repair Rate for Limit Switch of 1CA-67
PIP C-93-00183, CAPT #2 Sump Pump 2A Failed to Start in Auto
PIP C-00-04898, 2A EDG Trip During Operability PT
PIP C-99–01223, EDG 1B Failed to Start on PT
PIP C-99-01643, EDG 1B Would Not Start When Taken Out of Maintenance Mode
PIP C-99-01648, EDG 1B Output Breaker Trip on 50 DGT Relay
PIP C-99-01755, KD Hx 2B Exceed Trend Data for Number of Tubes Plugged
PIP C-99-02666, OEDB No. 99-021588 Regarding Cleaning Agent Used On Fuel Oil Tanks
PIP C-99-03288, EDG 1A Load Swings
PIP C-96-01561, SSF Diesel Generator Maintenance
PIP C-96-01627, No Design Basis for SSF 24V Battery
PIP C-97-03218, No Battery Capacity Test for SSF 24V Batteries
PIP C-98-02004, Discrepancies in Calculation CNC-1211.00-00-0032
PIP C-98-02456, Incorrect Sizing Calculation CNC-1211.00-00-0032
PIP C-98-02461, Discrepancies in Calculation CNC-1211.00-00-0032
PIP C-98-03155, SSF Instrumentation
PIP C-01-00179, Incorrect Sizing Calculation CNC-1211.00-00-0032
PIP C-01-00182, No Preventive Maintenance on SSF Intake Dampers
PIP C-01-00350, SSF Diesel Generator Fuel Oil Day Tank
PIP C-01-00381, Changes to Loss of All AC Power EOP
PIP C-01-00437, Flexible Cooling Hose on SSF Diesel Generator
PIP M-96-01501, SSF Diesel Generator Vendor Recommendations not in PM Program
PIP C-96-00241, Cracks Found in RC System Expansion Joints to Point That Cord is Visible

PIP C-99-04064, Rubber Expansion Joint 1RC6 has Developed Separations in Previously Repaired Cracks
ENG-06-00, Catawba Nuclear Station Stationary Battery Assessment Report, June 2000
Corporate Audit File No. SA-00-26, Engineering Functional Area Assessment
Corporate Audit File No. SA-99-22, Engineering Functional Area Assessment

Procurement Dedication Packages

CGD 2018.04-00-0022, Power element for AMOT Thermostatic Valve Model 8DAS, Revision 2
CGD 2018.04-00-0025, Elliott Turbocharger Rotor Assembly Repair, Revision1
SID 2010.04-00-0008, Replacement Parts for DSRV-16-4 Diesel, Revision 2
CGD 3014.06-03-0001, NICAD Battery Cells and Associated Components, Revision 12

Calculations

CNC-1223.42-00-0033, Design Parameters for CA Pump Suction form Upper Surge Tank Isolation Valves 1&2 CA-004, Revision 3
CNC-1223-04-00-0071, SMUP Split Flow Calculation to the Reactor Coolant Pumps, Revision 1
CNC-1223.04-00-0009, SMUP sizing, Revision 5
CNC-1223.04-00-0070, SMUP NPSH and Suction Damper Evaluaiton, Revision 3
CNC-1223.54-01-0004, Calculation of RC Supply to CA to Support SSF Operability, Revision1
CNC-1211.00-00-0036, SSF Temperature Calculation, CA Pump Room Area, Revision 1
CNC-1240.02-00-0001, NUMARC 87-00 SBO Mechanical Compliance, Revision1
CNC-1223.42-00-0012, CA System, Unit 2, Nuclear Safety Related Functional Design Requirement Verification, Revision6
CNC-1223.42-00-0004, CA System, Unit 1, Nuclear Safety Related Functional Design Requirement Verification, Revision8
CNC-1223.59-03-0011, Design Basis Calculation for Fuel Oil Storage Tank Level, Revision 3
CNC-1223.42-00-0057, CA System Hydraulic Model (Framatone), Revision 0
CNC-1223.42-00-0011, CA System Steady State Suction Pressure Determination, Revision 0
CNC-1223.43-02-0007, CAPT Available Horsepower, Revision 0
CNC-1223.42-00-0054, Analysis of CA System Suction Sources, Revision 1
CNC-1552.08-00-0255, SSF Auxiliary Feedwater Inventory Requirements, Revision1
CNC-1381.05-00-0118, Station Blackout Coping Study, Revision 4
CNC-1240.00-00-0006, SSF Temperature Calculation/Auxiliary Feedwater Pump Area, Revision 1
CNC-1301.06-00-0056, Standby Shutdown Facility Diesel Generator Battery Sizing Calculation, Revision 2
CNC-1381.06-00-0052, Loading and Voltage Calculation for SSF Diesel Generator and SSF Auxiliary Power System, Revision 1
CNC-1223.10-00-0004, Design Basis Calculation for SSF Diesel Generator Storage Tank Level,
Revision 3
CNC-1211.00-00-0032, Standby Shutdown Facility HVAC Requirements, Revision 2
CNC-1381.05-00-0070, Auxiliary Power System Voltage Study- Source Voltage Limits, Revision 6
CNC-1381.05-00-0017, Class 1E Diesel Protective Relaying and Sequencer Under Voltage Relay settings, Revision 14

CNC-1381.05-00-0012, 4160 Volt Essential Auxiliary Power Switchgear Relay Settings, Revision 10
CNC-1381.05-00-0011, 125 VDC Vital Instrumentation and Control Power System Battery and Battery Charger Sizing Calculation, Revision V6
CNC-1381.05-00-0122, Station Blackout Battery Sizing Calculation for the 125 VDC Vital I&C Batteries, Revision V4
CNC-1381.05-00-0080, 125 VDC Diesel Generator Battery and Charger Sizing Calculation, Revision V7
CNC-1381.05-00-0150, Station Blackout battery Sizing Calculation for the 125 VDC Diesel Auxiliary Power (EPQ) Batteries, Revision 2
CNC-1205.19-00-0153, Generic letter 89-10 MOV calculation NV System 1(2) NV202B, 203A, 872A, Revision 1
NRC Generic Letter 89-10/96-05 Quarter-Turn MOV Calculations:
- CNC 1205.19-00-0079, Tag Location: 1RN038B, Revision 1
- CNC 1205.19-00-0084, Tag Location: 1RN846A, Revision 2
- CNC 1205.19-00-0096, Tag Location: 1RN063A, Revision 1
- CNC 1205.19-00-0077, Tag Location: 2RN028A, Revision 2
- CNC 1205.19-00-0077, Tag Location: 2RN038B, Revision 1

Procedures

PT/2/A/4200/07F, SMUP Flow Verification, 11/26/95
PT1/A/4200/07F, SMUP Unit 1, Flow Verification Test, 3/14/98
PT/1/A/4400/006E, KD Hx 1A Heat Capacity Test, 3/8/00
PT/1/A/4350/002B, EDG 1B Operability Test, 1/08/01
PT/1/A/4200/019, FD Valve Inservice Test (QU), 8/22/00
MP/0/A/7400/033, EDG Temperature Regulation valve Corrective Maintenance. 7/10/00
PT/2/A/4200/013C, RN Valve Inservice Test, 1/8/01
OP/1/A/6350/005, Alternate AC Power Sources
IP/0/B/4974/026, Inspection and Maintenance of GE Magne-Blast 4.16 KV Circuit Breaker, Revision 6
IP/0/A/4974/003, Inspection and Maintenance of 5 HK Air Circuit Breakers, Revision 19
EP/1/A/5000/ECA-0.0, Loss of All AC Power, Revision 20
AP/1/A/5500/06, Loss of S/G Feedwater, Revision 26
PT/0/A/4200/017, Standby Shutdown Facility Diesel Test, Revision 26
PT/0/A/4200/019, Standby Shutdown Facility Diesel Generator Operating Parameters, Revision 6
PT/0/A/4550/014, Periodic Surveillance for AD Sample, Revision 1
OP/0/B/6350/011, Standby Shutdown Facility Diesel Operations, Revision 33
OP/0/B/6100/013, Standby Shutdown Facility Operations, Revision 45
OP/1/B/6100/009S, Annunciator Response for Standby Shutdown Facility (0AD-11), Revision 20
OP/1/A/6700/001, Unit 1 Data Book, Curve 7.3, SSF Fuel Oil Tank Volume Curve
SM/0/B/8430/001, Safe Shutdown Facility (SSF) Cummins Diesel Generator Preventative Maintenance, Revision 5
TP/1/A/1350/007, Standby Shutdown Diesel Functional Test, Revision 13

Modifications

NSM CN-20652, Replace EDG Start Timers, 7/25/96
NSM CE-4178, Replace Pressure Switches on EDG Fuel Oil Strainer, 8/9/93
NSM CE-60090, Modify Control to EDG Fan Damper Motors, 5/8/96
MM CNCE-70521, 125 VDC Emergency Diesel Generator Nickel Cadmium Batteries, 10/17/00
NSM CN-11339, 125 VDC Vital I&C Power (EPL) System battery Replacement Modification, Revision 2

Drawings

CNM 1301.00-0042-001, Thermxchange Inc., Lube Oil Cooler, Revision D3
CNM 1301.00-0041-001, EDG Jacket Water Cooler, Revision D4
CNM 1148.00-0088-001, EDG Fuel Oil Storage Tank, Revision D15
CNM 1592-1.0, Flow Diagram of Auxiliary Feedwater System, Revision 26
CN 1330-3, condenser Dooling Water Intake and Discharge pipes Profile and Hydraulic Gradient, Revision 0
CNM 1203.03-0080, SMUP - Flow Control Operation, Revision D2
CNM 1201.05-196, TDCA Pump Curve, 1/28/77
CNM 1201.05-197, TDCAP Hydraulic Test Data, 1/28/77
CN 1554-1.8, Flow Diagram of Chemical Volume and Control System, Revision4
CN 1554-1.5, Flow Diagram of Chemical Volume and Control System, Revision 8
CN 1592-1.0, Flow Diagram of Auxiliary Feedwater System, Revision 26
CN 1592-1.1, Flow Diagram of Auxiliary Feedwater System, Revision 22
CN 1592-1.2, Flow Diagram of Auxiliary Feedwater System, Revision 0
CNM 1203-03-0080, Pumping Unit Assembly for 5P-323 with electric motor (SMP), Revision D2
CNEE-0120-01.01, Elementary Diagram Diesel Engine Control Panel 1A & 1B (Typical - Part 1) Engine Panel Electrical Scheme., Revision 11
CNEE-0120-01.01-01, Elementary Diagram Diesel Engine Control Panel 1A & 1B (Typical - Part 1) Engine Panel Electrical Scheme., Revision 20
CNEE-0120-01.01-09, Elementary Diagram Diesel Engine Control Panel 1A & 1B (Typical Part 2) Engine Panel Electrical Scheme., Revision 6
CNEE-0147-02.04, Elementary Diagram Auxiliary Feedwater System (CA) Motor-Driven PMP A Safety Injection and 4KV Blackout TD PMP 1 & MD PMP A, Revision 3
CNEE-0147-04.19, Elementary Diagram Auxiliary Feedwater System (CA) RC to CA SUCT Isolation Valve 1CA174, Revision 6
CNEE-0147-04.20, Elementary Diagram Auxiliary Feedwater System (CA) RC to CA Suction Isolation Valve 1CA175, Revision 4
CNEE-0147-01.07, Elementary Diagram Auxiliary Feedwater System (CA) Transfer of CA Suction to CCW, Revision 1
CNEE-0160-02.21, Elementary Diagram Liquid Waste Recycle System (WL) Steam Turbine Driven Auxiliary Feedwater Pump # 1 Sump Pump “1A”, Revision 13
CNEE-0160-02.21-01, Elementary Diagram Liquid Waste Recycle System (WL) Steam Turbine Driven Auxiliary Feedwater Pump #1 Sump Pump “1A”, Revision 5
CNEE-0115-01.02, Elementary Diagram 4160V Switchgear 1ETA Unit 2 4160V Switchgear 1FTA1 Feeder Breaker, Revision 9
CNEE-0115-02.01, Elementary Diagram 4160V Blackout Switchgear 1GTA Unit 1 Normal Incoming Breaker to 4160V Blackout Switchgear 1FTA1A (Part1), Revision 9

CNEE-0115-02.01-01, Elementary Diagram 4160V Blackout Switchgear 1GTA Unit 1 Normal Incoming Breaker to 4160V Blackout Switchgear 1FTA1A (Part 2), Revision 6
CN-1702-04.01, One Line Diagram 4160V Blackout Auxiliary Power System (ETB) 4160V Switchgear No. 1GTA, 1FTA, 1GTB, 1FTB, Revision 10
CNEE-0115-02.05, Elementary Diagram 4160V Blackout Switchgear 1FTA & 1GTA Potential, Breaker Failure, Heater Circuits, Revision 8
CNEE-0115-02.02-01, Elementary Diagram 4160V Blackout Switchgear 1FTA Unit 1 Alternate Incoming Breaker From 4160V Switchgear 1ETA2 (Part 2), Revision 6
CNEE-0115-02.02, Elementary Diagram 4160V Blackout Switchgear 1FTA Unit #1 Alternate Incoming Breaker From 4160V Switchgear 1ETA2 (Part 1), Revision 7
CNEE-0114-00.01, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 1) Voltage Sensing Circuit, Revision 7
CNEE-0114-00.02, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 2) Actuation Circuit, Revision 4
CNEE-0114-00.03, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 3) Actuation Circuit, Revision 12
CNEE-0114-00.04, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 4) Load Logic, Voltage Sensing, Reset & Load Shed Circuits, Revision 4
CNEE-0114-00.05, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 5) Load Logic Voltage Sensing Reset, & Load Shed Circuits, Revision 6
CNEE-0114-00.06, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 6) Reset Circuits, Revision 11
CNEE-0114-00.07, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 7) Reset Circuits, Revision 7
CNEE-0114-00.08, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part B) Committed & Accelerated Sequence Circuits, Revision 10
CNEE-0114-00.09, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 9) Test & Air Conditioning Control Circuits, Revision 6
CNEE-0114-00.10, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 10) Loading Relays, Revision 2
CNEE-0114-00.11, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 11) Loading Relays, Revision 5
CNEE-0114-00.12, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 12) Isolation Devices, Revision 8
CNEE-0114-00.12-01, Elementary Diagram Diesel Generator No.1A Load Sequencer (Part 12A) Isolation Devices, Revision 5
CNEE-0114-00.13, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 13) Isolation Devices, Revision 21
CNEE-0115-01.19, Elementary Diagram 4160V Switchgear 1ETA Potential Circuits, Revision 15
CNEE-0115-01.20, Elementary Diagram 4160V Switchgear 1ETA Breaker Failure, Mode Selector and Degraded Bus Voltage Circuits, Revision 16
CNEE-0114-00.01, Elementary Diagram Diesel Generator No. 1A Load Sequencer (Part 1) Voltage Sensing Circuit, Revision 7
CNEE-0115-01.04-01, Elementary Diagram 4160V Switchgear 1ETA Unit #4 Standby Incoming Breaker Transfer SATA, Revision 7
CNEE-0115-01.03-01, Elementary Diagram 4160V Switchgear 1ETA Unit #3 Normal Incoming Breaker Transformer 1ATC, Revision 7

CNEE-0115-01.20-01, Elementary Diagram 4160V Switchgear 1ETA Breaker Failure and Switchgear Mode Selector Circuits Auxiliary Relays, Revision 12
CN-1702-05.02, One Line Diagram Essential & Blackout Auxiliary Power Systems 4.16KV/600V Systems EPC, EPE, ETC, Revision 8
CNEE-0115-01.18 Elementary Diagram 4160V Switchgear 1ETA Unit #18 Diesel Generator 1A, Revision 18
CN-1702-02.01, One Line Diagram 4160 Volt Essential Auxiliary Power System (EPC) 4160V Switchgear No. 1ETA, Revision 17
CNEE-0115-01.18-01, Elementary Diagram 4160V Switchgear 1ETA Unit # 18 Diesel Generator 1A, Revision 11
CNEE-0115-01.20, Elementary Diagram 4160V Switchgear 1ETA Breaker Failure, Mode Selector and Degraded Bus Voltage Circuits, Revision 16
CN-1560-1.0, Flow Diagram of Standby Shutdown Diesel System (AD), Revision 3
CN-1560-2.0, Flow Diagram of Standby Shutdown Diesel System, (AD) Revision 2
CN-1579-4.3, Flow Diagram of Misc. Structures Ventilation System, Standby Shutdown Facility, Revision 2
CN-1324-06, Standby Shutdown Diesel Fuel Oil Storage Tank, System AD, Revision 2
CN-1522-11.85-07, Heating-Ventilating-Air Conditioning, Standby Shutdown Facility Equipment Schedule, Revision 8
CN-1522-11.85-06, Heating-Ventilating-Air Conditioning, Standby Shutdown Facility El 594-0 & 611-4 Plans and Sections, Revision 7
CN-1703-03.24, One Line Diagram, 600V Nonessential Load Center 1SLXG, Standby Shutdown Facility, Revision 3
CN-1744-01.01, Connection Diagram, SSF Diesel Control and Instrumentation System (EQD) and Associated Diesel Control System (AD) SSF Diesel Generator Control Panel (1ELCC0045) and Miscellaneous Terminal Boxes, Revision 6
CNEE-0111-02.43, Elementary Diagram, 600V Nonessential Load Center 1SLXG, Cpt. 5B, Diesel Generator S Feeder Breaker, Revision 7
CNEE-0111-01.32-02, Elementary Diagram, MCC SMXG Compt F05C, Standby Shutdown Facility Pressurizer Heater Group, Revision 6
CNEE-0144-01.01, Elementary Diagram, SSF Diesel Controls and Instrumentation Sys (EQD), Revision 10
CNEE-0144-03.04, Elementary Diagram, Standby Shutdown Facility (EOC) SSF Annunciator System Lamp Box 0AD11, Revision 5
CNEE-0120-01.01, Elementary Diagram, Diesel Engine Control Panel 1A & 1B, Revision 11
CNEE-0120-01.01-01, Elementary Diagram, Diesel Engine Control Panel 1A & 1B, Revision 20

Design Bases Documents

CNS-114.00-EQB-0001, Diesel Generator Load Sequencer (EQB) System Design Basis Specification, Revision 6
CNS-1592.CA-00-0001, Auxiliary Feedwater System (CA) Design Basis Specification, Revision 22
CNS-1465.00-00-0018, Plant Design Basis Specification for Station Blackout Rule, Revision 2
CNS-115.01-EPC-0001, 4.16 KV Essential Auxiliary Power System (EPC) and Class 1E D/G Protective Relaying and Metering System (ERN) at Catawba Nuclear Station Units 1 and 2, Revision 4

CNS-106.01-EPL-0001, 125 VDC Vital I&C Power System (EPL) Design Basis Specification, Revision 3
CNS-106.03-EPQ-0001, Design Basis Specification for the EPQ System, Revision 6
CNS-1465.00-00-0018, Plant Design Basis for Station Blackout Rule, Revision 2
CNS-120.01-EQC-0001, Design Basis Specification for the EQC System, Revision 5
CNS-112.01-EPE-0001, Design Basis Specification for EPE System, Revision 4

Work Orders (WO)

WO 94058032-01, Refurbish Breaker 1ETA3 (02/16/95)
WO 94094295-01, PM Potential XFMR in Top Hat 1ETA3 (02/23/95)
WO 98273976-01, PM Potential XFMR In Top Hat 1ETA3 (10/23/00)
WO 98275107-01, PM Breaker 1ETA-3 (10/04/00)
WO 93001900-01, Inspect/Replace Clip/Fastener On Bottom Cubicle 1ETA4 (09/29/93)
WO 93060295-01, Install New Breaker In 1ETA4 09/27/93
WO 94094296-01, 1EPC - PM Potential XFMR In Top Hat 1ETA4 (02/23/95)
WO 97077582-01, Refurbish Breaker 1ETA-4 (02/16/98)
WO 98273977-01, 1EPC - Doble XFMR In Top Hat 1ETA4 (10/23/00)
WO 97042940-01, Refurbish Breaker 1ETA-18 (06/17/97)
WO 95027858-01, FF4799 WUO1. Perform MOV Test On 2CA174 (04/11/96)
WO 98197172-01, CE10646 WU1, 2CA174, Remove/Replace & Perform 98-0 Test (12/07/00)
WO 98093577-01, 2CA174 Perform Limited Limitorque PM (11/17/99)
WO 96094022-01, 2CA175 Perform Comprehensive Limitorque PM (12/17/97)
WO 96014503-01, 2AD - Replace DOI NK1 In 2ELCC0034 (04/11/97)
WO 98213465-01, 2CA174 Perform Comprehensive Limitorque PM (12/07/00)
WO 98306194-01, 2CA174 Perform Limited Limitorque PM (10/05/00)
WO 98262695-01, 2CA174 Inspect/Replace Actuator Setup (05/09/00)
WO 98113250-01, 2CA - Replace DOI NK1 In 2ELCC0034 (09/08/00)
WO 98094345-01, 2CA174 Inspect/Replace Control From SSF (10/15/99)
WO 97089193-01, 2CA174 Perform Limited Limitorque PM (11/17/98)
WO 96079741-01, 2CA175 Perform Limited Limitorque PM (09/15/97)
WO 97020114-01, 2AD-SSF CA174, 175 - Replace Isolator NK1 (11/28/00)
WO 98343128-01, 2CA175 Perform Comprehensive Limitorque PM (12/19/00)
WO 98330502-01, CE70489 WU1, 2CA175, R/R & PFM 89-10 Test (11/12/00)
WO 96004014-01, 2CA175 Refurbish Gearbox Removed From 2CA175 (03/14/97)
WO 98093578-04, 2CA175 Perform Limited Limitorque PM (11/17/99)
WO 96094023-01, 2CA174 Perform Limited Limitorque PM (12/16/97)
WO 98292702-01, 2CA175 Perform Limited Limitorque PM (08/28/00)
WO 97089194-01, 2CA175 Perform Limited Limitorque PM (11/17/98)
WO 95092314-01, E07492 WUO1 - 2CA175 Perform MOV Test (01/30/97)