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

October 22, 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 INTEGRATED INSPECTION REPORT 50-413/01-05 AND 50-414/01-05

Dear Mr. Peterson:

On September 22, 2001, the NRC completed an inspection at your Catawba Nuclear Station. The enclosed report documents the inspection findings which were discussed on September 27, 2001, with you and other members of your staff.

The inspection examined 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 inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, the inspectors identified three issues of very low safety significance (Green). The three green issues were determined to involve violations of NRC requirements. However, because of their very low safety significance and because they have been entered into your corrective action program, the NRC is treating these issues as non-cited violations, in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny these non-cited violations, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the United States Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Catawba facility.

Since September 11, 2001, your staff has assumed a heightened level of security based on a series of threat advisories issued by the NRC. Although the NRC is not aware of any specific threat against nuclear facilities, the heightened level of security was recommended for all nuclear power plants and is being maintained due to the uncertainty about the possibility of additional terrorist attacks. The steps recommended by the NRC include increased patrols, augmented security forces and capabilities, additional security posts, heightened coordination with local law enforcement and military authorities, and limited access of personnel and vehicles to the site.

The NRC continues to interact with the Intelligence Community and to communicate information to you and your staff. In addition, the NRC has monitored maintenance and other activities which could relate to the site's security posture.

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/***

Robert C. Haag, Chief
Reactor Projects Branch 1
Division of Reactor Projects

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

Enclosure: NRC Integrated Inspection Report 50-413/01-05, 50-414/01-05

cc w/enclosure: (See page 3)

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

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|---|---|
| Docket Nos: | 50-413, 50-414 |
| License Nos: | NPF-35, NPF-52 |
| Report No: | 50-413/01-05, 50-414/01-05 |
| Licensee: | Duke Energy Corporation |
| Facility: | Catawba Nuclear Station, Units 1 and 2 |
| Location: | 4800 Concord Road<br>York, SC 29745 |
| Dates: | June 24, 2001 - September 22, 2001 |
| Inspectors: | D. Roberts, Senior Resident Inspector<br>D. Billings, Acting Senior Resident Inspector<br>M. Giles, Resident Inspector<br>R. Gibbs, Senior Reactor Inspector (Section 1R12.1)<br>G. Salyers, Emergency Preparedness Inspector (Sections 1EP2, 1EP3, 1EP4, 1EP5, and 4OA1.3)<br>F. Wright, Senior Health Physics Inspector (Sections 2OS1, 2OS2, and 4OA1.2)<br>A. Nielsen, Health Physics Inspector (Sections 2OS1, 2OS2, and 4OA1.2) |
| Approved by: | R. Haag, Chief<br>Reactor Projects Branch 1<br>Division of Reactor Projects |

Enclosure

SUMMARY OF FINDINGS

IR 05000413-01-05, IR 05000414-01-05, on 06/24–9/22/2001, Duke Energy Corporation, Catawba Nuclear Station, Units 1 & 2, Maintenance Rule Implementation, Operability Evaluations, and Event Followup.

The inspection was conducted by resident inspectors and four inspectors from the regional office. The inspectors identified three green findings, which were non-cited violations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using the Significance Determination Process (SDP) found in Inspection Manual Chapter 0609. Findings to which the SDP does not apply are indicated by "No Color" or by the severity level of the applicable violation. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at http://www.nrc.gov/NRR/OVERSIGHT/index.html.

## A. Inspector Identified Findings

### Cornerstone: Mitigating Systems

- Green. The inspectors identified a failure to implement effective corrective actions for the Unit 2 Refueling Water Storage Tank (FWST) level channels 1 and 3 that was dispositioned as a non-cited violation. Specifically, portions of the instrument cables experience conduit temperatures of 275 degrees Fahrenheit which exceed the cable design rating of 194 degrees. This condition was identified in 1996 but was not promptly evaluated nor has the problem been fully resolved.

  The failure was determined to be of very low safety significance because all mitigation systems remained operable, the ability to manually swap the emergency core cooling system suction source from the FWST to containment sump was still available, and the channel failures did not render the system unavailable to perform its function. (Section 1R12.2)

- Green. The inspectors identified a failure to identify a condition adverse to quality and establish effective corrective actions following the failure of 1A Residual Heat Removal (ND) pump discharge piping support 1-R-ND-0226. The licensee failed to properly evaluate data from the 1A ND pump start on November 5, 2000, which had indications that a failure of the support had occurred. This was dispositioned as a non-cited violation.

  The failure was determined to be of very low safety significance because the licensee subsequently determined that the support failure did not render the ND system unavailable to perform its function. (Section 1R15)

- Green. The inspectors identified a failure to identify a condition adverse to quality which contributed to not recognizing that the "A" Train of the Control Room Area Chilled Water System (CRACWS) was inoperable. The successful start of the "A" chiller was the basis for calling "A" Train CRACWS operable. However, the fact that maintenance personnel assisted in the chiller start and unreliable operation of the chiller pressure switch was exhibited in earlier testing was not factored into the operability decision. This was dispositioned as a non-cited violation.

The failure was determined to be of very low safety significance because the “A” Train CRACWS functioned properly while “B” Train CRACWS was being restored to service. Also during subsequent tests, the “A” chiller operated satisfactorily. (Section 4OA3)

## Report Details

Summary of Plant Status:

Unit 1 operated at 100 percent power throughout the inspection period, except for a brief period on August 18 when power was reduced to 83 percent for main turbine control valve testing. Unit 2 operated at 100 percent power throughout the inspection period until August 26, when the unit started a power coastdown for the refueling outage. The unit was shutdown to start the refueling outage on September 15.

### 1. REACTOR SAFETY

**Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity**

1R01 Adverse Weather Protection

a. Inspection Scope

This inspection focused on the licensee's readiness and planned response in mitigating tornado and earthquake events. Two safety-related systems were selected for this inspection; the Emergency Diesel Generators (EDG) and the Component Cooling Water System (KC). The inspectors reviewed RP/0/A/5000/007, Rev. 21, Natural Disaster and Earthquake and RP/0/B/5000/030, Rev. 0, Severe Weather Preparations. The inspectors also conducted interviews with Emergency Preparedness personnel to review procedural guidance and controls which provided protective measures for the EDGs and the KC system.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

a. Inspection Scope

The inspectors performed partial walkdowns of the 1B EDG, the Unit 2 upper containment ice condenser, the 2A containment spray (NS) pump, and the 1A NS train. The walkdowns were performed while the system's opposite trains were either out of service for planned maintenance or surveillance testing. These partial walkdowns were conducted to verify the availability of redundant or diverse systems and components during periods when safety equipment was inoperable. The walkdowns were performed to determine if proper levels of defense-in-depth were maintained.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

The inspectors toured six areas important to reactor safety to verify that combustibles and fire ignition sources were properly controlled, and that fire detection and suppression capabilities were intact. For areas where fire detection equipment was out of service, the inspectors verified that compensatory measures (i.e., fire watch tours) were properly implemented. The inspectors selected the areas based on a review of the licensee's safe shutdown analysis, probabilistic risk assessment (PRA) based sensitivity studies, and summary statements related to the licensee's 1992 Initial Plant Examination for External Events submittal to the NRC. Areas toured included the nuclear service water (RN) intake structure, the Unit 1 turbine building/service building in the vicinity of the instrument air compressors, the Unit 2 A and B EDG rooms, the Unit 1 charging and safety injection pump room areas, the main control room, and the safe shutdown facility.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

a. Inspection Scope

The inspectors observed a control room simulator training scenario on August 22, 2001, to assess licensed operators and crew performance. The training scenario involved challenges to the operators including: a steam generator (S/G) tube leak in the A S/G which resulted in a tube rupture event, a failure of the A safety injection (NI) pump and both motor-driven auxiliary feedwater (CA) pumps to automatically start, the turbine driven CA pump tripped on overspeed, a failure of the A S/G Main Steam Isolation Valve (MSIV) to close, and a failure of the D S/G Power-Operated Relief Valve (PORV) to close in Manual. Following the simulator scenario, the inspectors observed the critique conducted by training instructors to assess their ability in identifying operator or simulator performance deficiencies.

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule (MR) Implementation

.1 Review of Periodic MR Assessment

a. Inspection Scope

The inspectors reviewed the licensee's periodic assessment, "Maintenance Rule Periodic Assessment for Maintenance Rule Implementation Catawba Nuclear Station April 1, 1999 - October 1, 2000," which was issued in accordance with paragraph a(3) of the Maintenance Rule (10 CFR 50.65). The inspectors verified that the assessment satisfied the time requirements of the Rule, and also that the assessment included all

required areas including balancing reliability and unavailability, review of a(1) activities, review of a(2) activities, and consideration of industry operating experience. The inspectors reviewed the goals and monitoring for a sample of a(1) structures, systems and components (SSC), verified appropriate changes were made in a(2) SSC performance criteria, and ensured that balancing of reliability and availability met the industry guidance. The inspectors reviewed Problem Investigation Process reports (PIPs) (97-03294, 98-02009, 98-02389, 99-04446, 99-04794, 00-02555, 00-03515, 00-03853, 00-04489, 01-00254, 01-01509, 01-02703, 98-00090, 99-00238, 99-00313, 00-00319) to determined that corrective actions for programmatic problems had been adequately addressed.

b. Findings

No findings of significance were identified.

.2 Routine MR Implementation

a. Inspection Scope

The inspectors reviewed the licensee's implementation of the maintenance rule (10 CFR 50.65) to determine whether responsible personnel were properly evaluating the effectiveness of maintenance on equipment important to safety. The inspectors verified that the licensee was properly classifying maintenance preventable functional failures (MPFFs). For those SSCs that were categorized as 10 CFR 50.65 (a)(1) due to previous performance problems, the inspectors reviewed corrective action documents to verify that the licensee had identified causal factors and recommended appropriate corrective actions. Some SSCs were also reviewed for proper maintenance rule scoping and risk categorization within the licensee's tracking system. The equipment problems identified below and associated documentation were reviewed:

| PIP or program document | Equipment Problem |
|---|---|
| C-98-02631 | Failure of the Unit 2 Refueling Water Storage Tank Level Channels 1 & 3 |
| C-01-03081 | Failure of EMFs 38, 39, & 40, Containment radiation monitors |
| C-01-03294 | Failure of the Unit 2 Operator Aid Computer server affecting cooling tower fans |
| C-01-04060 | 2SV-18, Main Steam Safety Valve, outside setpoint |

b. Findings

A Green finding was identified and dispositioned as a non-cited violation (NCV) for a failure to implement effective corrective actions. Since August 1996, numerous PIPs have been generated for the Unit 2 Refueling Water Storage Tank (FWST) level channels 1 and 3 which identified degraded performance and unreliable operating conditions. Proposed maintenance activities as of April 2001 indicate that these problems have still not been adequately resolved.

The inspectors reviewed PIPs associated with the Unit 2 FWST level channels.

| Date | PIP Number | Brief Description |
|---|---|---|
| 7/19/96 | C-96-01830 | Channel 3 failed. Replaced transmitter and NLP2 card. |
| 8/16/96 | C-96-01830 | Channel 3 failed again. Replaced transmitter and instrumentation cable. |
| 9/1/96 | C-96-02366 | Replaced channel 3 instrumentation cable due to extensive corrosion damage to armor jacketing. Identified cable conduit temperatures were 275 degrees F which exceeded cable design rating of 194 degrees F. |
| 5/26/97 | C-97-01744 | Channel 3 erratic indication. Replaced cable. |
| 6/2/97 | C-97-01827 | Channels 1 & 3 erratic indication. Generated WRs to inspect/repair plant ground cable at the Unit 1 & 2 FWST. |
| 7/14/97 | C-97-01827 | Disconnected grounded cable shields at transmitters for Unit 1 & 2 FWST channels 1,2,3,4. |
| 3/2/98 | C-98-00777 | OOT condition on channel 1 transmitter and associated bistable. Both recalibrated. |
| 7/23/98 | C-98-02631 | Channels 1 & 3 failed. Replaced both transmitters following lightning activity. |
| 7/27/98 | C-98-02654 | OOT condition on channel 1 transmitter. Replaced transmitter. |
| 9/13/99 | C-99-03715 | Spurious annunciators received in control room. |
| 7/11/00 | C-00-03501 | Channel 3 erratic indication and numerous annunciators during lightning activity. |
| 7/12/00 | C-00-03506 | Channel 3 failed. Replaced two transmitter circuit boards. Cause attributed to electrical storms. |

| | | |
|---|---|---|
| 7/21/00 | C-00-3655 | Documentation of a degrading trend for the susceptibility of channel 1 & 3 to lightning activity. |
| 8/18/00 | C-00-04086 | OOT condition on channel 3 transmitter. Recalibrated transmitter. |
| 6/7/01 | C-01-02511 | SRG assessment of untimely corrective actions based on a WR written on 4/30/01 to replace cables on channels 1 & 3 as an interim fix. Cables were not replaced until 6/4/01. |

After reviewing the maintenance history illustrated above, the inspectors determined that inadequate corrective actions contributed to the unreliable operation of Unit 2 FWST level channels 1 & 3 from July 1996 to August 2000.

The licensee determined that the instrumentation cable used for Unit 2 FWST channels 1 and 3 is rated for 194 degrees Fahrenheit. Portions of the cable are located in conduit next to the steam generator blowdown piping where temperatures of 275 degrees Fahrenheit have been recorded. The use of the cable, in its current application is outside the design criteria specified for the cable. This design inadequacy has required multiple cable replacement activities and has still not been corrected. In the interim, until corrective actions can be implemented to upgrade the cable, the licensee is conducting diagnostic testing on a periodic basis. This testing allows degraded conditions associated with the cable to be identified so that maintenance can be performed, if required, to prevent the loss of function of the cable.

Inadequate corrective actions associated with grounding of the Unit 1 & 2 FWST level channel transmitters also contributed to instrumentation unreliability. Inspections performed by the licensee to assess actual grounding conditions identified that field conditions were not in accordance with required Catawba grounding specifications. This was identified by the licensee in late 2000. This grounding condition has existed since July 1997 when maintenance was performed to disconnect the cable ground shields on both units' FWST level channels. The licensee documented in PIP C-00-3655 on August 2000, the need to revise Catawba grounding specifications, and on June 2001, the cable armor of all eight FWST level channel cables were connected to the station ground at their respective transmitter terminal boxes.

The licensee determined that the root cause of the FWST level channel 1 and 3 failures was due to an inadequate design of the instrumentation cable in that the environment of the cable exceeded its temperature rating. The licensee failed to perform a timely evaluation of this high temperature condition and how it affected the susceptibility of the instrumentation channel to different failure mechanisms, i.e., degraded cable being more vulnerable to lightning induced failure. As a result, effective corrective actions to prevent recurrence were not implemented. The failure to implement timely corrective actions for this degraded condition had a credible impact on safety in that reliable operation of FWST level channels 1and 3 was not assured from 1996 to 2001. This failure was determined to be of very low safety significance (Green) because all mitigation systems remained operable and the ability to manually swap the emergency core cooling system suction source from the FWST to the containment sump was still available.

10 CFR 50, Appendix B, Criterion XVI, requires that measures shall be established to assure that conditions adverse to quality are promptly corrected. This requirement is implemented through the licensee's Quality Assurance Program by NSD 208. Contrary to the requirements of Criterion XVI, the actions taken by the licensee in identifying and correcting this condition adverse to quality were inadequate. The inspectors considered this failure to promptly correct a condition adverse to quality as a violation of 10 CFR 50, Appendix B, Criterion XVI. This violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy and is identified as NCV 50-414/01-05-01: Failure to Implement Effective Corrective Actions Associated with the Unit 2 FWST level channels. This violation has been captured in the licensee's corrective action program as a revision to PIP C-00-3655.

1R13 Maintenance Risk Assessments and Emergent Work Evaluation

a. Inspection Scope

The inspectors reviewed the licensee's assessments of the risk impact of removing from service those components associated with the six emergent and planned work items listed below, focusing primarily on activities determined to be risk significant within the maintenance rule. The reviews were performed to determine if the licensee adequately identified and resolved problems associated with maintenance risk assessment and emergent work.

| Component or System | Reason for Removal from Service |
|---|---|
| Unit 2 ice condenser | Planned modification on intermediate deck doors while 2B NS pump was out of service |
| Unit 2 pressurizer spray valve | Planned work to remove control card for 2NC-29 while the controller for redundant spray valve 2NC-27 was selected to manual control |
| Unit 2 auxiliary feedwater system | Planned nuclear service water system to auxiliary feedwater system flushing activities |
| 2BD rod control power cabinet | Replacement of failed control card associated with Unit 2 rod control urgent failure |
| 1A EDG | Replacement of failed thermocouple associated with right-bank cylinder #1 , |
| 1B auxiliary building ventilation system | Removal of the train from service for maintenance on successive days, documented in PIP C-01-03667 |

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed operability determinations to verify that the operability of systems important to safety was properly established, that the affected component or system remained available to perform its intended safety function, and that no unrecognized increase in plant or public risk occurred. Operability evaluations were reviewed for the six issues listed below:

| PIP Number | Issue |
|---|---|
| C-99-02978 | Failure of ND snubber support 1-R-ND-0226 |
| C-01-01994 | VC Train "A" operability determination following the automatic trip of the Train "B" VC chiller |
| C-01-02745 | Breaker fuses associated with vital panel boards and auxiliary control panel boards rotated out of normal position |
| C-01-03326 | Potentially degraded EDG fuel oil filters which exceeded vendor recommended shelf life of two years |
| C-01-03595 | VC Train "A" flow test data did not meet TS acceptance criteria and the train was not declared inoperable |
| C-01-03655 | Unit 2 refueling water storage tank level instrument channel buried cables exposed to excessively high temperatures |

b. Finding

A Green finding was identified and dispositioned as an NCV for the failure to identify a condition adverse to quality and establish effective corrective actions following the failure of 1A Residual Heat Removal (ND) pump discharge piping support 1-R-ND-0226 on November 5, 2000.

This issue has been previously addressed in NRC Inspection Report 50-413/01-03 and 50-414/01-03 as an Apparent Violation (EEI) 50-413/01-03-02, Failure to Promptly Identify and Correct the Unit 1 Residual Heat Removal System Water Hammer Condition [Section 4OA2.b(2).2]. At the time this apparent violation was documented, the root cause of the repetitive water hammer events resulting in the repeated system support snubber failures had not been clearly identified by the licensee and therefore had not been dispositioned or characterized by the Significance Determination Process (SDP).

The licensee concluded that nine of the twelve documented failures associated with 1-R-ND-226 and 1-R-ND-596 were caused from water hammer events by the rapid pressurization of an idle ND train while changing ND system configuration. Procedure changes were implemented in 1993. No subsequent support failures were identified until July 1999, following the Unit 1 end-of-cycle (EOC) refueling outage 11 (May 1999),

when supports 1-R-ND-226 and 1-R-ND-596 were found in a locked-up, failed condition during scheduled freedom-of-movement testing. As a result of these failures, the licensee generated PIP C-99-02978 to document the need for further evaluation concerning the recurring support failures.

The licensee determined that these support failures were caused by a high-energy transient such as a water hammer event or a check valve slam event. These occurred during pump starts due to the accumulation of non-condensible gases in the ND heat exchanger. This flow transient created high accelerations which resulted in support failures.

During continued inspection and evaluation of this issue following Unit 1 EOC 12, the inspectors observed that supports 1-R-ND-226 and 1-R-ND-596 were not scheduled to have freedom-of-motion testing performed until May 2001. The inspectors questioned the adequacy of this schedule after they performed an independent review of the accelerometer data obtained during the outage-related pump starts. Site engineering personnel responded to the inspectors that the data was normal for pump starts, and was determined to be acceptable. Following these discussions, however, the freedom-of-motion testing was performed on March 13, 2001, which revealed a failure of support 1-R-ND-226.

In response to this failure, further review and evaluation of the accelerometer data obtained during 1EOC12 was performed by engineering personnel. This evaluation determined that accelerometer data was normal for all pump starts up to a pump start that occurred on November 5, 2000, to support safety injection/chemical and volume control check valve testing. All pump starts after November 5, 2000, revealed different baseline characteristics. The licensee concluded, therefore, that support 1-R-ND-226 failed on November 5, 2000. Following the identification of this failure, which resulted in support snubber replacement, and as a result of the corrective actions specified in PIP C-99-02978, engineering personnel have determined the ND system to be currently operable and past-operable. The licensee has inspected support 1-RD-ND-226 following each subsequent quarterly pump test and has not identified any additional failures.

The inspectors noted that the same data that was used in this failure determination was also available for evaluation by the licensee following the pump start on November 5, 2000. This support failure was not identified by the licensee, therefore, the licensee did not perform a system operability evaluation prior to returning Unit 1 to Mode 1. Because test data was not adequately evaluated and hence the degraded condition was not identified by the licensee for several months following the return of Unit 1 to operation, the inspectors considered this finding to have a credible impact on safety. However, because the failure was determined not to render the ND system unavailable to perform its function, this issue was determined to have very low safety significance (Green).

The inspectors reviewed completed corrective actions associated with previous snubber failures (prior to November 5, 2000) and determined those actions were reasonable. Therefore, the inspectors concluded that the apparent violation of 10 CFR, Appendix B, Criterion XVI, as captured by EEI 50-413/01-03-02, is only applicable for licensee actions involving the support failure on November 5, 2000.

As a result of this followup inspection, the inspectors confirmed that a violation of 10 CFR 50, Appendix B, Criterion XVI, occurred as previously discussed in NRC Inspection Report 50-413,414/01-03. The actions taken by the licensee in identifying the support failure of November 5, 2000, and establishing effective corrective actions were inadequate. This violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy and is identified as NCV 50-413/01-05-02: Failure to Identify Failed 1A ND Discharge Piping Support. This violation has been captured in the licensee's corrective action program as a revision to PIP C-99-02978. EEI 50-413/01-03-02 is closed based on the licensee's failure to comply with 10 CFR 50, Appendix B, Criteria XVI being dispositioned as an NCV in this report.

1R16 Operator Workarounds

a. Inspection Scope

The inspectors reviewed the cumulative effects of operator workarounds on the reliability, availability, and potential for misoperation of a system. The inspectors also reviewed the cumulative effects of operator workarounds that could increase an initiating event frequency or that could affect multiple mitigating systems and the cumulative effects of operator workarounds on the ability of operators to respond in a correct and timely manner to plant transients and accidents. The inspectors reviewed a cumulative list of current operator workarounds to assess individual workarounds and determine their cumulative impact on plant risk.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications

a. Inspection Scope

The inspectors reviewed the following modification to: (1) verify that the design bases, licensing bases, and performance capability of an SSC that could impact initiating event frequency was not degraded through the modification; and (2) verify that the modification performed during risk significant configurations did not place the plant in an unsafe condition. The inspectors also reviewed testing associated with this modification to ensure that the intended design goal was met and that testing did not adversely affect plant operations.

| Nuclear Station Modification Number | Description |
|---|---|
| CE-61740 | Installation of lifting lugs on ice condenser intermediate deck doors |

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing

a. Inspection Scope

The inspectors observed or reviewed post-maintenance tests, associated with the following six work activities, to determine if equipment was properly returned to service and that proper testing was specified and conducted to ensure that the equipment could perform its intended safety function following maintenance.

| Test Procedure/WO Number | Maintenance/Test Activity |
|---|---|
| PT/0/A/4400/022B, Rev. 55 | 2B RN pump test following breaker preventive maintenance |
| PT/1/A/4200/031, Rev. 31 | Valve seat repair of 1SV-1, 1D S/G PORV |
| PT/0/A/4200/017, Rev. 27 | Replacement of SSF diesel starting battery bank |
| PT/1/A/4200/007B, Rev. 52 | Alignment of 1B NV Pump |
| PT/1/A/4350/002A, Rev. 100 | Replacement of 1A EDG right bank #1 cylinder thermocouple |
| PT/0/A/4450/008, Rev. 32 | Control Room Area Ventilation System Performance Test |

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities

a. Inspection Scope

The inspectors observed or reviewed several activities during the 2EOC11 refueling outage, which started on September 15, 2001. Specific activities included verification that NC system cooldown rates were within Technical Specification (TS) limits; verification of containment closure and the availability of other defense-in-depth mechanisms during high-risk plant configurations; and activities related to the inadvertent control rod assembly removal with upper internal package. Procedures observed and/or reviewed to support the above activities included the following:

| Procedure Number | Title |
|---|---|
| Site Directive 3.1.30, Rev. 24 | Catawba Nuclear Station Unit Shutdown Configuration Control (Mode 5, 6, or No Mode) |
| MP/0/A/7150/043, Rev. 23 | Reactor Vessel Upper Internals Removal and Replacement |

| Procedure Number | Title |
|---|---|
| MP/0/A/7150/067, Rev. 28 | Rod Cluster Control Assembly Drive Rod Latching and Unlatching |

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors reviewed the five surveillance test procedures listed below to verify that TS surveillance requirements and/or Selected Licensee Commitment requirements were properly incorporated and that test acceptance criteria were properly specified. The inspectors observed actual performance of some of the tests and reviewed completed procedures to verify that acceptance criteria had been met. The inspectors also verified that proper test conditions were established in the procedures and that no equipment preconditioning activities were occurring.

| Procedure Number | Title |
|---|---|
| PT/1/A/4200/004C, Rev. 057 | Containment Spray Pump 1B Performance Test |
| PT/1/A4350/002A, Rev. 100 | Diesel Generator 1A Operability Test |
| PT/1/A/4250/006E, Rev. 8 | CA Valve Verification |
| PT/0/A/4450/008, Rev. 32 | Control Room Area Ventilation System Performance Test |
| PT/2/A/4350/002A, Rev. 72 | Diesel Generator 2A Operability Test |

b. Findings

No findings of significance were identified.

**Cornerstone: Emergency Preparedness**

1EP2 Alert and Notification System Testing

a. Inspection Scope

The inspector evaluated the alert and notification system (ANS) design and the testing program. The system consisted of 88 sirens within the 10-mile emergency planning zone. The siren testing program consisted of weekly low growl tests, weekly silent tests, and quarterly full cycle tests. Individual siren coverage was being improved with the

installation of new sirens (22 of the 88 sirens have been replaced). The full system replacement was scheduled to be completed in 2002.

b. Findings

No findings of significance were identified.

1EP3 Emergency Response Organization Augmentation

a. Inspection Scope

The inspector reviewed the design of the emergency response organization augmentation system and evaluated the licensee's capability to staff emergency response facilities within stated timeliness goals.

b. Findings

No findings of significance were identified.

1EP4 Emergency Action Level and Emergency Plan Changes

a. Inspection Scope

The inspector reviewed changes Revision 00-1 and 00-2 to the Emergency Plan to determine whether any of the changes decreased the effectiveness of the Emergency Plan. The review was performed against the requirements of 10 CFR 50.54(q).

b. Findings

No findings of significance were identified.

1EP5 Correction of Emergency Preparedness (EP) Weaknesses and Deficiencies

a. Inspection Scope

The inspector evaluated the efficacy of licensee programs that addressed weaknesses and deficiencies in emergency preparedness. Items reviewed included the 10 CFR 50.54(t) audit report, exercise/drill critique reports, and the corrective actions associated with the EP program. There had been no actual implementations of the Emergency Plan since the last inspection.

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation

a. Inspection Scope

The inspectors observed a control room simulator training scenario on August 22, 2001, to assess licensed operators' performance in the area of emergency preparedness. The inspectors verified that the operators made the correct drill event declaration (site area emergency) and that associated follow-up actions were performed in accordance with regulatory requirements and the licensee's procedures. The observed scenario (a steam generator tube rupture) was performed in conjunction with the licensed operator requalification program.

b. Findings

No findings of significance were identified.

## 2. RADIATION SAFETY

**Cornerstones: Occupational Radiation Safety**

2OS1 Access Control to Radiologically Significant Areas

a. Inspection Scope

The inspectors reviewed radiological surveys and access controls, and verified their implementation for outage work on Unit 2. The work was assessed for compliance with radiation work permits. The review included lock checks, administrative and engineering controls for locked-high radiation and very high radiation areas. Pre-job briefings, observations of work-in-progress and Health Physics (HP) technician job coverage were observed. Vendor HP technician qualifications were reviewed. The inspectors made independent air, radiation, and contamination surveys which were compared with licensee radiation survey results. Licensee activities were reviewed against the Updated Facility Safety Analysis Report (UFSAR), TS, and 10 CFR Part 20 requirements.

b. Findings

No findings of significance were identified.

2OS2 As Low As Reasonably Achievable (ALARA) Planning and Controls

a. Inspection Scope

The inspectors evaluated the plant collective exposure history, current exposure dose trends, and the year 2001 annual site dose goal to determine if the licensee was implementing ALARA practices as required by 10 CFR 20.1101(b) and licensee procedures. The inspectors also evaluated reactor shutdown chemistry controls and crudburst and the incorporation of ALARA dose control measures into licensee radiation work permits (RWP) through pre-job briefings. The evaluation included: ALARA planning, dose goals and estimates, daily dose results, job dose trends, and problem

identification and resolution. The Unit 1 cycle 12 ALARA outage report was evaluated for outage dose performance, dose rate trends, shutdown chemistry crud burst and clean-up, temporary shielding, and ALARA post-job review for lessons learned. The inspectors observed pre-job briefings to assess ALARA information provided to radiation workers during the on-going Unit 2 refueling outage.

The following initial ALARA planning reports for the Unit 2 cycle 11 refueling outage were reviewed for lessons learned and dose goal planning:

In service inspection during Unit 2 End of Core (EOC)11 Refueling Outage
Split Pin Replacement Project
U2 NCPU C & D Remove/Replace Reactor Coolant Pump Seals
U2EOC11 Steam Generator Maintenance
U2EOC11 Mechanical Valve Maintenance
U2EOC11 Air Actuated Valve Work
U2EOC11 Motor Operated Valve Testing and Actuator Preventative Maintenance
U2 NC Remove/Replace Reactor Vessel Head

b. Findings

No findings of significance were identified.

## 4. OTHER ACTIVITIES

### 4OA1 Performance Indicator (PI) Verification

.1 Reactor Safety PI Verification

a. Inspection Scope

The inspectors conducted annual reviews of the following three Reactor Safety PIs, as submitted to the NRC by the licensee, for accuracy:

| Cornerstone | PI |
|---|---|
| Initiating Events | Unplanned Scrams per 7,000 Critical Hours |
| Initiating Events | Scrams with Loss of Normal Heat Removal |
| Barrier Integrity | Reactor Coolant System Specific Activity |

This review was conducted for second quarter 2001 PI data submitted to the NRC. To verify the PI data, the inspectors reviewed Licensee Event Reports, control room logs, Operator Aid Computer trends, the results of daily reactor coolant system chemistry samples, and related licensee calculations. The inspectors verified samples of data for the entire period covered by the PI under review (e.g., for PIs covering four quarters, the

inspectors reviewed samples of data for the three quarters immediately prior to second quarter 2001 in addition to that quarter's data).

b. Findings

No findings of significance were identified.

.2 Radiation Safety and Public Radiation Safety PI Verification

a. Inspection Scope

The inspectors reviewed the accuracy of performance indicators in the occupational radiation safety and public radiation safety cornerstones for the period October 2000 - September 2001. Monthly performance indicator reports were reviewed with particular attention paid to any instances of unintended exposure (to workers or the public) or high radiation area nonconformance. The inspectors examined corrective actions (PIPs) in the area of radiation protection and chose two PIPs for detailed investigation (PIP C-01-3380 and PIP C-00-5494). The inspectors reviewed the licensee's procedure for the collection of performance indicator data (SH/0/B/2006/001 Rev. 0, NRC PI Data Collection, Validation, Review and Approval).

b. Findings

No findings of significance were identified.

.3 Emergency Preparedness PI Verification

a. Inspection Scope

The inspectors reviewed licensee records to determine whether the submitted PI statistics were calculated in accordance with the guidance contained in Section 2.4 (Emergency Preparedness Cornerstone) of NEI 99-02, Revision 1, "Regulatory Assessment Performance Indicator Guideline." The specific PIs reviewed included:

- Emergency Response Organization (ERO) Drill/Exercise: The inspector assessed the accuracy of the PI for ERO drill and exercise performance (DEP) through review of documentation. In addition, the inspector reviewed and discussed the licensee's methodology for calculating the DEP PI, with emphasis on the opportunities provided for the control room communicators. The inspector reviewed data from the previous eight quarters ending June 2001 when verifying the accuracy of the reported PI value of 93.28 percent.

- ERO Drill Participation: The inspector assessed the accuracy of the PI for ERO drill participation through review of source records for selected individuals. The inspector reviewed data from the previous eight quarters ending June 2001 when verifying the accuracy of the reported PI value of 94.68 percent.

- Alert and Notification System Reliability: The inspector assessed the accuracy of the PI for the alert and notification system reliability through review of the

licensee's records of the siren tests for the previous 12 months. The inspector reviewed data from the previous 12 months ending June 2001 when verifying the accuracy of the reported PI value of 96.23 percent.

b. Findings

No findings of significance were identified.

4OA3 Event Followup

(Closed) Licensee Event Report (LER) 50-413/01-002: Both units were in a condition prohibited by Technical Specifications due to both trains of Control Room Area Chilled Water system being inoperable.

A Green finding was identified and dispositioned as a NCV for the failure to identify a condition adverse to quality which contributed to not recognizing that the "A" train of the Control Room Area Chilled Water System (CRACWS) was inoperable. Specifically, operations personnel declared the "A" chiller operable following a start of the chiller on May 3, 2001, without adequately evaluating test data that demonstrated unreliable differential pressure switch operation. In addition it was later discovered that this start, used in determining operability, had been assisted by maintenance technicians. The licensee and the inspectors determined that the "A" chiller had been incorrectly declared operable.

This event occurred on May 3, 2001, while Units 1 and 2 were operating in Mode 1 at 100 percent power. While the "A" train of CRACWS was inoperable for preplanned maintenance, the "B" chiller automatically tripped at 1:01 a.m. due to a high motor temperature indication. With both trains of the CRACWS inoperable, TS 3.0.3 required action to be initiated within one hour to place both units in Mode 3 within seven hours. The licensee did not initiate a shutdown of both units because TS 3.0.3 was exited when the "A" train of the CRACWS was declared operable at 1:55 a.m. following the start of the "A" train chiller at 1:28 a.m. The "B" train chiller was returned to an operable status following repair activities at 7:51 a.m.

The licensee determined the root cause of this event to be human performance related because the declaration of operability was based on the assumption that the "A" train chiller had started without assistance, which was not correct. At 8:30 a.m. on May 3, 2001, it was discovered that technicians had assisted in the start of the "A" chiller by manipulating a differential pressure switch in the chiller starting circuit. This information had not been communicated to control room operators and therefore had not been taken into account when the "A" chiller was inappropriately declared operable at 1:55 a.m.

Prior to this event, on May 2, 2001, preplanned testing of the differential pressure switch had been performed and had required some manual manipulation for successful operation. Two of four test runs failed due to improper operation of the switch. These manipulations also had not been communicated to operations personnel prior to the "A" chiller being declared operable.

In review of the test data, the inspectors questioned the reliability of the pressure switch, its impact on the operability of the "A" chiller, and why the test results were not adequately evaluated by the licensee when determining operability. The inspectors concluded that the licensee's failure to adequately evaluate evidence of unreliable operation of the differential pressure switch also illustrated poor human performance.

Because the licensee incorrectly declared the "A" chiller operable at 1:55 a.m., a subsequent evaluation on the consequences of having both trains of CRACWS inoperable was not performed. Operability of the "A" chiller had not been adequately demonstrated with respect to the unreliable operation of the pressure switch. The inspectors determined this condition had a credible impact on safety because certain design basis functions of the "A" chiller had not been assured prior to taking credit for the chiller being operable. Although these human performance weaknesses contributed to operations personnel incorrectly declaring the "A" train of the CRACWS operable on May 3, 2001, the chiller operated properly while the "B" chiller was being restored to service. In addition, on May 4, 2001, the "A" chiller was started and its design function was satisfactorily demonstrated. Consequently, this issue has been determined to be of very low safety significance (Green).

10 CFR 50, Appendix B, Criterion XVI, requires that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. These requirements are implemented through the licensee's Quality Assurance Program by Nuclear System Directive (NSD) 208, Problem Investigation Process. The failure of the operators to perform an adequate review to determine the operability of the "A" chiller was considered to be a failure to identify a condition adverse to quality and is determined to be a violation of 10 CFR 50, Appendix B, Criterion XVI. This violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy and is identified as NCV 50-413,414/01-05-03: Failure to Identify a Condition Adverse to Quality that Rendered the "A" Chiller Inoperable. This violation has been captured in the license's corrective action program as a revision to PIP C-01-1994 and has been classified by the licensee as a Safety System Functional Failure (SSFF). LER 50-413/01-002 is closed.

## 4OA6 Meetings

### Exit Meeting Summary

The inspectors presented the inspection results to Mr. Gary Peterson, Site Vice President, and other members of licensee management at the conclusion of the inspection on September 27, 2001. No proprietary information was identified.

### Public Meeting Summary

Two meetings were conducted at the Catawba Nuclear Station Administration Building on July 11, 2001. Both meetings were open to the public. The first meeting was the Annual Assessment meeting. The purpose of this meeting was to discuss the NRC's Reactor Oversight Process (ROP) annual assessment of safety performance for Catawba Nuclear Station for the period of April 2, 2000 - March 31, 2001. The major topics addressed were: the NRC's ROP assessment program, the results of the

Catawba Nuclear Station assessment, and the NRC's Agency Action Matrix. Attendees included members of Duke Energy Corporation site management and staff, local news media, members of the public, and members of the NRC staff. The second meeting was held with state and local officials, and members of the public to discuss the ROP and NRC activities involving Catawba Nuclear Station.

## PARTIAL LIST OF PERSONS CONTACTED

Licensee

E. Beadle, Emergency Preparedness Manager
R. Beagles, Safety Review Group Manager
G. Gilbert, Regulatory Compliance Manager
R. Glover, Operations Superintendent
W. Green, Work Control Superintendent
P. Grobusky, Human Resources Manager
P. Herran, Engineering Manager
R. Jones, Station Manager
R. Parker, Maintenance Superintendent
G. Peterson, Catawba Site Vice President
J. Foster, Radiation Protection Manager
F. Smith, Chemistry Manager
R. Sweigart, Safety Assurance Manager

NRC

C. Casto, Region II
R. Hannah, Region II
C. Patel, NRR
M. Widmann, Region II

## ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed During this Inspection

| | | |
|---|---|---|
| 50-414/01-05-01 | NCV | Failure to Implement Effective Corrective Actions Associated With the Unit 2 FWST Level Channels Failures (Section 1R12) |
| 50-413/01-05-02 | NCV | Failure to Identify Failed 1A ND Discharge Piping Support (Section 1R15) |
| 50-413,414/01-05-03 | NCV | Failure to Identify A Condition Adverse to Quality that Rendered the "A" Chiller Inoperable (Section 4OA3) |

Previous Items Closed

| | | |
|---|---|---|
| 50-413/01-03-02 | EEI | Failure to Promptly Identify and Correct the Unit 1 Residual Heat removal System Water Hammer Condition (Section 1R15) |
| 50-413/01-002-00 | LER | Both units were in a condition prohibited by Technical Specifications due to both trains of Control Room Area Chilled Water System being inoperable. (Section 4OA3) |

## LIST OF ACRONYMS USED

| | | |
|---|---|---|
| ALARA | - | As Low As Reasonably Achievable |
| ANS | - | Alert and Notification System |
| CA | - | Auxiliary Feedwater |
| CFR | - | Code of Federal Regulations |
| CRACWS | - | Control Room Area Chilled Water System |
| DEP | - | Drill and Exercise Performance |
| EDG | - | Emergency Diesel Generator |
| EEI | - | Escalated Enforcement Item |
| EOC | - | End of Core |
| EP | - | Emergency Preparedness |
| ERO | - | Emergency Response Organization |
| FW | - | Refueling Water |
| FWST | - | Refueling Water Storage Tank |
| HIS | - | Hydrogen Ignition System |
| HP | - | Health Physics |
| KC | - | Component Cooling Water |
| MPFF | - | Maintenance Preventable Functional Failure |
| MSIV | - | Main Steam Isolation Valve |
| NCV | - | Non-Cited Violation |
| ND | - | Residual Heat Removal |
| NI | - | Safety Injection |
| NRC | - | Nuclear Regulatory Commission |
| NRR | - | Nuclear Reactor Regulation |
| NS | - | Containment Spray |
| NSD | - | Nuclear System Directive |
| NV | - | Chemical and Volume Control System |
| OOS | - | Out-of-Service |
| PI | - | Performance Indicator |
| PIP | - | Problem Investigation Process (report) |
| PORV | - | Power-Operated Relief Valve |
| PRA | - | Probabilistic Risk Assessment |
| RN | - | Nuclear Service Water |
| ROP | - | Reactor Oversight Process |
| SDP | - | Significance Determination Process |
| S/G | - | Steam Generator |
| SSC | - | Systems, Structures, and Components |
| SSF | - | Standby Shutdown Facility |

| | | |
|---|---|---|
| TDAFW | - | Turbine Driven Auxiliary Feedwater Pump |
| TS | - | Technical Specification |
| UFSAR | - | Updated Facility Safety Analysis Report |
| YC | - | Control Room Ventilation System Chilled Water System |